

Effects of Classroom-based Team Experiences on Undergraduate Student Leadership Development: When Practice Does Not Make Perfect

David Rosch

Assistant Professor

Agricultural Education Program

University of Illinois at Urbana-Champaign

Urbana, IL 61801

dmrosch@illinois.edu

Abstract

Engineering students ($N = 285$) enrolled in either a first-year or senior-year design course that consisted entirely of team-based collaborative learning projects reported few gains in their overall leadership development. First-year students made moderate gains in transformational leadership skills and social-normative motivation to lead. Peer evaluations of skill were lower than were self-reported scores, and, for first-year students, self-reported scores and peer scores were not correlated. A high degree of co-curricular involvement in student organizations, as compared to little or no involvement, was associated with student gains in seniors. These results indicate the relatively small degree of leadership learning that takes place in classroom-based team experiences when those experiences are not paired with opportunities for deliberate practice or reflection in the development of leadership capacity.

Introduction

Classroom-based team learning has become a well-used strategy in higher education (Colbeck, Campbell, & Bjorklund, 2000; Gamson, 1994). The Higher Education Research Institute (2014) found that 86% of freshman in the United States participated in a course-based group project in their first semester of college. Placing students in groups to complete assignments is done not only to mirror future professional workplace activities but also to provide students with the opportunity to engage in the group development process as part of overall leadership development (Smith, Sheppard, Johnson, & Johnson, 2005). Accreditation agencies have supported this trend by requiring universities to provide students with opportunities to learn how to communicate and function effectively within teams (Colbeck et al., 2000).

Research has shown how collaborative learning that occurs through classroom-based group projects can help students to learn course material. A meta-analysis (Smith, Sheppard, Johnson, & Johnson, 2005) showed that 305 studies on the student learning outcomes associated with collaborative learning and group projects have been conducted. Johnson, Johnson, and Smith (1998) found that collaborative learning is often more effective than is competitive or

individualistic learning processes for the mastery and application of course material. Although a great deal of research has shown that collaborative learning helps students to develop skills such as communication, teamwork, and leadership, there is no research that isolates and evaluates the specific effects of team experiences on the development of such skills. Thus, the current study was designed to examine the degree to which students who engaged in semester-long classroom-based team experiences increased their leadership capacity over the course of a semester.

Team Experiences and Student Development. In the classroom, students are often placed in teams to complete assignments as well as to learn “soft skills” (Coleman, 1996), such as leadership, decision making, and communication, a set of skills increasingly required for professional success (National Association of Colleges and Employers, 2013). In this regard, the Wharton School, a highly ranked MBA program, describes its teams-oriented classroom structure as follows: “The [team] model is based on the business world in which employees work together in teams that depend on persuasive rather than positional leadership. Your [team] serves as a living laboratory for cultivating these skills” (The Wharton School, n.d., para. 1). This description can apply to the cooperative learning experiences seen in many departments across disciplines that range from engineering to business and to the liberal arts (Colbeck et al., 2000).

Although the practice of placing students in collaborative learning environments has become ubiquitous in higher education in the United States, empirical research that evaluates its effects on student leadership development has lagged behind. Within co-curricular settings, research suggests that involvement in student clubs boosts students’ psychosocial development (Foubert & Grainger, 2006), engagement on campus (Berger & Milem, 1999), and expectations to persist and graduate (Kuh, 1995). Within the classroom, collaborative team experiences have been associated with increases in students’ learning, as compared to individualistic or competitive learning pedagogies (Smith et al., 2005), a higher degree of satisfaction with the classroom and overall learning experiences (Umbach & Wawrzynski, 2005), increases in teamwork skills (Halstead & Martin, 2002), and, when paired with concurrent co-curricular involvement, accelerated social and cognitive development (Huang & Chang, 2004).

Research on the effects of team-based experiences on leadership development has focused mostly on the co-curriculum, with the aim of determining the correlation between the number of clubs and organizations that students report and their self-identification as a “leader” of their peers (Cress, Astin, Zimmerman-Oster, & Burkhardt, 2001). Most other research that examines the effects of classroom-based teams in academic courses has been conducted only in the context of formalized leadership-specific classrooms or co-curricular programs (Coers & Lorenzen, 2009). Few studies have attempted to disentangle the effects of classroom-based team experiences outside of a leadership development curriculum. For example, a national qualitative study of students’ experiences in group projects in classrooms that provided students with little or no group training or support showed a lack of students’ self-identified gains in problem-solving, communication, and conflict management skills (Colbeck et al., 2000).

Given the prevalence of collaborative learning in the classroom and the explicit goal to develop students’ leadership skills, more research is needed to understand the association between student leadership development and collaborative learning. To this end, the present

study uses, as its foundation, the framework of leadership development proposed by Keating, Rosch, and Burgoon (2014).

Framework of Leadership Development. Most modern models of leadership in professional and educational organizations posit the need for leaders to possess a combination of collaborative, ethical, and inspirational skills (Faris & Outcalt, 2001; Rost, 1993). Further, the ability to display such skills in action requires a degree of confidence in one's ability to lead others (McCormick, Tanguma, & Lopez-Forment, 2002; Murphy, 1992) as well as psychological motivation to engage in leadership behaviors (Amit & Bar-Lev, 2013; Chan & Drasgow, 2001). For students to possess the capacity to lead and, therefore, the potential to behave as a leader, they must first possess a sufficient degree of leadership skill, leadership self-efficacy (i.e., confidence in leading others), and motivation to lead (Keating et al., 2014).

Within this skills-confidence-motivation model, leadership skill includes both transformational skill (i.e., ability to inspire others and act in ethical ways) and transactional skill (i.e., ability to effectively "transact" rewards for effective performance). These skills were first conceptualized by Burns (1978) and later described more fully and in tandem in the transformational leadership model (Bass, 1998). According to the model, motivation to lead can stem from three separate sources: one's own self-concept as a leader, or "affective-identity" motivation; one's sense of responsibility to one's group to lead, or "social normative" motivation; and one's avoidance of determining a self-centered cost-benefit analysis of what the privilege of leadership provides oneself, or "non-calculative" motivation (Chan & Drasgow, 2001). Along with confidence (i.e., leadership self-efficacy), these conceptualizations of leadership skill and motivation comprise the framework of leadership capacity used in this study. Through this framework, we examine the degree to which collaborative learning experiences within academic courses can contribute to students' leadership capacity.

Research Questions

This study represents an effort to determine the degree to which team experiences, when isolated from other structured leadership curricula, can support student leadership development. To this end, the following research questions guided this study:

1. To what extent do students engaged in semester-long classroom team experiences display an increase in their leadership capacity over the course of a semester?
2. To what extent are leadership experiences in co-curricular student organizations associated with increases in leadership capacity?

Methods

Population and Sample. The research was conducted at a large public research-intensive university in the Midwestern United States and included participants from two "design" courses in the College of Engineering during the 2012–2014 academic years. These design courses are constructed as practical laboratories where undergraduate engineering students utilize the opportunity to implement theory learned in other classrooms by engaging with student teammates in projects. The aim of the projects is for students to spend the semester designing a solution to an engineering problem presented to them by either the course instructor or a

volunteer mentor assigned by the course instructor. These courses are noteworthy for their attention to the collaborative learning project as an outcome within the course. There were no tests or quizzes, no participation grades, and no individual assignments given; students' grades and success depended wholly on their team project. As such, these courses provide a laboratory in which to examine the effects of collaborative learning on student leadership development.

The first design course was an elective freshman-level introductory course, "Projects-based Design," intended to provide students with an introduction to working on teams in a design-oriented environment. The course included not only engineering students but also students from other academic disciplines who might be interested in engineering as a future career. The second course for graduating seniors included three sections of "Senior Design," intended as the capstone class for engineering students within their discipline, where they worked with peers to solve a real engineering problem using knowledge and skills learned throughout their undergraduate career. The three course sections included Electrical Engineering, General Engineering, and Civil Engineering students, respectively. In both courses, students were assigned to teams of three to five early in the semester after rank-ordering topical preferences. Students worked informally with their course instructor and volunteer mentor for the remaining weeks to complete a finished product. For both courses, the groups' products are often too complex and comprehensive to allow a single individual to "carry" the team's performance; moreover, instructors collect group member feedback at regular intervals to ensure that work of the team is evenly weighted. Neither course, however, included curriculum on leadership development, and the Senior Design sections included only a 30-minute session on group dynamics, facilitated by the researcher early in the semester (a condition for instructors to allow their students to be invited to participate in the project).

In the freshman course, 158 students fully participated (i.e., completed a pre-test, a post-test, and a peer assessment), which represents approximately 80% of the course population during that time, across the fall semesters of the two academic years. Of the 158, 134 (83%) were male; and 90 (57%) identified as Caucasian, 34 (22%) as Asian-American, 6 as Latino (4%), 1 as African-American, and 26 (17%) as multi-racial. A total of 75 (47%) reported concurrent involvement in student organizations. Within the three sections of the Senior Design course, data were collected only in the Spring 2014 semester. At that time, 127 students fully participated, representing approximately 41% of students enrolled across these sections. Response rates were lower for the senior capstone due to post-tests' being collected after the course ended, as the course possessed no "final" class, only final project presentations conducted in small groups. Across the three sections, 105 (83%) students were male; while 66 (52%) identified as Caucasian, 40 (32%) as Asian-American, 3 as African-American, 2 as Latino, and 16 (13%) as multi-racial. In addition, 27 (21%) reported a "high" or "very high" degree of experience in holding positions in student organizations.

Variables and Instrumentation. Because the goal of this study was to evaluate comprehensive leadership development using Keating et al.'s (2014) model of developmental readiness, participants completed a survey that included scales of leadership skill, motivation to lead, and leadership self-efficacy. To measure skill, the Leader Behavior Scale (LBS; Podsakoff, MacKenzie, Moorman, & Fetter, 1990), a popular and non-copyrighted 28-item instrument designed to measure aspects of transformational and transactional leadership, was used. The

LBS was chosen due to its broad measurement of leadership capacity, as compared with the narrower but more popular Multi-factor Leadership Questionnaire (Bass & Avolio, 1997), and its association with the full range leadership model (Avolio, 2010) that often serves as a proxy for a measure of transformational leadership capacity. The LBS has been in use for over two decades as a psychometric leadership measurement instrument (Yukl, 2010), with reported Cronbach alpha reliabilities ranging from .71 to .89 (Yukl, 2010). In this study, strong alpha reliabilities emerged as well: .83 for the transformational leadership subscale and .79 for the transactional leadership subscale.

Students also completed the Motivation To Lead (MTL) scale, a 27-item questionnaire equally divided across measures of affective-identity, social normative, and non-calculative motivations to lead (Chan & Drasgow, 2001). The MTL assesses the degree to which people feel “called” to lead and the pressure that they feel and energy that they possess to engage in leadership behaviors. The MTL has been used primarily in professional and public organizations, with Cronbach alpha reliabilities ranging from .65, typically seen for the Non-calculative scale, to .91 for the Affective-identity scale. It has recently been extended to higher education as a tool to measure student leadership development (Rosch, Collier, & Thompson, in press), with similar reported reliability. For this study, Cronbach alpha levels were acceptable, ranging from a marginal reliability of .60 for the Social-normative scale to .75 for the both the Affective-identity and Non-calculative scales.

Leadership self-efficacy was measured using the Self-Efficacy for Leadership (SEL) scale, an 8-item measure of a person’s confidence in engaging in leadership behaviors (Murphy, 1992). The SEL has been in use for more than two decades in professional and educational environments to assess leadership self-efficacy and has undergone extensive psychometric examination, with reported Cronbach alpha reliabilities typically above .76 and appropriate convergent and discriminant validity with more broad measures of general self-esteem and experience in leadership environments (Hoyt, 2005). For this study, the SEL scale had a Cronbach alpha reliability of .82. The three measures were combined with a variety of social identity and demographic items into a single survey instrument for research participants to complete and served as the comprehensive measure of leadership capacity utilized for this study. One demographic item asked students to rate the degree to which they have participated and occupied formal positions within student clubs and organizations on a 5-point Likert scale ranging from 1 (“Never”) to 5 (“Always or almost always”).

To assess the level of leadership skill displayed by their peers in their project teams, students completed a modified version of the LBS for each member of their team. Rather than self-focused survey items (e.g., “I help other group members develop a team attitude and spirit among ourselves”), the language of each item was changed to focus on their teammates (e.g., “This person helps other group members . . .”). Cronbach alpha reliabilities for both peer-evaluation measures were strong: .89 and .79 for the transformational and transactional leadership scales, respectively.

Data Collection. Data were collected at two specific times over the course of each semester-long class section. After an introduction by the researcher and students’ signing an IRB-approved consent form, students completed a pre-test of their leadership capacity within the

first week of the semester (and before engaging in the beginning steps of their project). They also completed a post-test and peer assessment of leadership skills at the end of the course, during the final class for the freshman course and after each team's final presentation in the senior course. The data of participants who did not complete a phase of the collection process or of participants whose teammates did not complete a peer leadership skill assessment for them were not considered in this study.

Data Analysis. To determine the extent of students' overall increases in their leadership capacity, matched-sample *t*-tests and corresponding Cohen's *d* effect size calculations (Cohen, 1987) were conducted, and the results were statistically significant ($p < .05$). To provide further validity to the assessment of leadership capacity, an analysis that compared students' self-reported post-test scores of leadership skill to each of their peer-evaluated leadership skills scores was conducted. Within this analysis, a separate set of matched-sample *t*-tests was conducted as well as a Pearson product-moment correlation analysis across all self-reported and peer scores to determine the association between self-reported and peer-reported scores. To further examine the nature of gains that students made over the course of the semester, a confirmative factor analysis (CFA) of both students' pre-test scores as well as their post-test scores across the combined leadership scales within the instrument was conducted. This analysis allowed for the ability to examine the strength of students' mental models of leadership, an emerging field of study with leadership education (Caza & Rosch, 2013; Rosch & Caza, 2011). The use of CFA allows for a "model-fit" application, whereby students' mental models of their leadership beliefs and behaviors prior to the semester can be compared to their models at the conclusion of the course. In this analysis, an increase in capacity is represented by a better model fit across all scales within the broad leadership measurement instrument (Hu & Bentler, 1999).

To determine the degree to which leadership experiences in co-curricular student organizations might affect the development of students' leadership capacity over and above course-based collaborative learning experiences, students were placed in separate groups based on their reporting of their past and current experience in formal student organizations. Their score gains were calculated by subtracting their pre-test scores from their respective post-test scores. Separate analyses of variances (ANOVAs) of students' self-reported gains on all scales and their peer-reported scores on the LBS measure, using the student organization participation variable as the criterion for comparison, were conducted. Finally, post-hoc Tukey *t*-tests on significant findings were run. Given the number of variables involved in the comparison, a Bonferroni correction was performed to reduce the probability of intra-family measurement error stemming from related data's being collected (Spicer, 2005), which resulted in a *p*-value of .0125 to denote a significant effect.

Results

The overall means and dispersion statistics for each of the relevant criterion measures are presented in Table 1. Overall, students rated their leadership skills as slightly higher than their motivation to lead or confidence in leading, but their scores remained relatively flat from pre-test to post-test. In addition, students' self-reported skill-based means were higher than those reported by their peers.

Table 1
Measures of Leadership Capacity by Course

Course/Measure	Pre-test Mean (SD)	Post-test Mean (SD)	Peer Mean (SD)
Freshman course			
Transformational Leadership	3.79 (.35)	3.83 (.39)	3.76 (.48)
Transactional Leadership	3.97 (.53)	3.95 (.53)	3.78 (.54)
Affective-identity MTL	3.48 (.74)	3.44 (.63)	
Non-calculative MTL	3.78 (.45)	3.77 (.55)	
Social-normative MTL	3.53 (.45)	3.74 (.46)	
Leadership Self-efficacy	3.80 (.49)	3.82 (.52)	
Senior course			
Transformational Leadership	3.82 (.36)	3.83 (.41)	3.67 (.59)
Transactional Leadership	4.07 (.52)	4.00 (.57)	3.77 (.56)
Affective-identity MTL	3.33 (.65)	3.36 (.62)	
Non-calculative MTL	3.80 (.56)	3.72 (.54)	
Social-normative MTL	3.66 (.43)	3.61 (.45)	
Leadership Self-efficacy	3.83 (.49)	3.85 (.51)	

Research Question 1. To what extent do students engaged in semester-long classroom team experiences display an increase in their leadership capacity over the course of a semester? To answer this question, paired sample *t*-tests utilizing pre- and post-test scores across both courses were conducted. The results of these analyses can be found in Table 2. As can be seen, only freshman students' transformational leadership skills and social-normative motivation to lead scores were significant. Cohen (1988) suggests describing an effect size difference of .2 as "small," .5 as "moderate," and .8 as "large." Using this classification, student's transformational leadership scores were moderately higher at post-test, while, their social normative score increase can be described as "large." No significant increases related to the senior course emerged, although transactional leadership skill and non-calculative motivation to lead scores displayed marginally *negative* effects.

Table 2
Results of Paired-Samples t-tests for Self-reported Increases in Leadership Capacity

Course	<i>T</i>	<i>df</i>	<i>p</i>	<i>d</i>
Freshman Course				
*Transformational Leadership	2.65	159	.009	.42
Transactional Leadership	-0.29	159	.772	
Affective-identity MTL	-0.91	159	.367	
Non-calculative MTL	-0.52	159	.602	
*Social-normative MTL	4.88	159	<.001	.87
Leadership Self-efficacy	0.69	159	.505	
Senior Course				
Transformational Leadership	0.50	126	.617	
Transactional Leadership	-1.71	126	.090	.30
Affective-identity MTL	0.95	126	.345	
Non-calculative MTL	-1.88	126	.062	.33
Social-normative MTL	-1.48	126	.140	
Leadership Self-efficacy	0.70	126	.485	

* $p < .05$

To examine differences between self-reported and peer-reported leadership skill scores, an unpaired *t*-test using students' post-test scores (i.e., scores that were collected at the same time as students' respective peer ratings) was conducted. The correlation between students' self-reported scores and their respective peer scores also was examined. The results of these analyses are found in Table 3. For both courses, the peer-reported scores for students were lower than students' self-ratings to a moderate to large extent, while seniors' transformational skill self-rated scores were lower to a similar extent. In addition, students' self-reported scores and their peer scores for the freshman course were not significantly correlated.

Table 3
Differences and Correlations between Self-reported and Peer-reported Leadership Skill

Course	<i>t</i>	<i>Df</i>	<i>p(t)</i>	<i>d</i>	<i>r</i>	<i>p(r)</i>
Freshman Course						
Transformational Leadership ^b	1.60	148	.112		.01	.240
Transactional Leadership ^{a,b}	3.21	148	.002	.53	.15	.067
Senior Course						
Transformational Leadership ^a	2.49	105	.014	.49	.26	.007
Transactional Leadership ^a	3.84	105	<.001	.75	.20	.038

Note. a = self-ratings lower than peer ratings ($p < .05$); b = self-ratings not correlated with peer ratings.

To assess the mental models of students' leadership beliefs and behaviors, a CFA was conducted using maximum likelihood estimation structural equation modeling. CFA allows for the examination of data "fit," whereby actual responses can be compared to theoretical data produced through the equations specified within a theoretical model (Blunch, 2008). Presumably, students who have a developed mental model of their leadership beliefs and behaviors would give responses to the leadership assessment instrument that represent a good fit. In addition, one would expect to see an appropriate degree of covariance (approximately .30 to .40; Kremelberg, 2010) between each of the measurement scales, representing the association between an effective leader's application of skills, confidence in leading, and motivation to engage in leadership behaviors.

Prior to the semester, the CFA model of students' responses represented a marginally acceptable, but not good, statistical fit of the data (CMIN/DF = 2.34; CFI = .62; RMSEA = .07). These results help to support the validity of the leadership framework used for this study and suggest that students' mental models of their leadership skills, motivation, and confidence were related, but not strongly so. A very low degree of covariance between the instrument's scales, ranging from .04 to .24, further supported the weak correlation between students' leadership skills, motivation, and confidence. By the end of the semester, model fit data only slightly improved (CMIN/DF = 2.02; CFI = .74; RMSEA = .06), while scale covariance statistics ranged only from .09 to .18. These results suggest that, by the end of the semester, students had only marginally more appropriate mental models of their leadership capacity than at the beginning, while the association between students' skills, confidence, and motivation remained low.

Research Question 2. To what extent are leadership experiences in co-curricular student organizations associated with increases in leadership capacity? To answer this question, ANOVAs of students' self-reported leadership capacity gains were conducted, using their reported participation rate in formal student clubs and organizations as the criterion. For students in the first-semester freshman course, no effect emerged in any aspect of leadership capacity. For the course for senior students, the only participation effect that emerged was a gain in social normative motivation to lead ($F(4,112) = 2.71, p = .034$). When conducting follow-up

t-tests, a Bonferroni correction was used and resulted in a *p*-value of .0125 to denote a significant effect. Utilizing this criterion, significant differences emerged between students who reported “no involvement” or “one” involvement in clubs as compared to those who reported “always or almost always” being involved in clubs (*p* = .012).

ANOVAs that compared students’ peer-reported LBS score gains were then conducted, using the same criterion. For students enrolled in either course, no participation effect in regard to peer-rated leadership skills scores was found.

Discussion

This study was designed to determine the degree to which students made gains in their leadership capacity when engaged in classroom-based team experiences. The results suggested that only first-year students reported higher scores at the end of the semester and only in regard to their transformational skills and social normative motivation. Senior students made no gains in any leadership-oriented area as related to their team experiences. Moreover, students’ peer-evaluated leadership skill scores were significantly and moderately lower than were their self-reports in both settings, while first-year students’ scores displayed no correlation between self-reports and their respective peer evaluations. Further, students’ mental models of their leadership-oriented beliefs and behaviors did not improve over the course of the semester.

The results also suggested that involvement in co-curricular clubs and organizations could make a difference in students’ leadership development. Seniors who were highly involved showed a slight increase in their social-normative motivation as compared to students who reported very little to no involvement. Involvement in clubs and organizations, however, did not appear to affect the degree of leadership skill seen by one’s peers over the course of the semester.

These disappointing results suggest that leadership development largely did not occur within the environment of a rigorous, goal-oriented collaborative team experience, which, intuitively, seems well tailored for such a goal. First-year students did note self-report increases in their transformational skills, which are important for leadership success in non-hierarchical and collaborative teams. It is of concern, however, that their peers rated them less highly, while peer-evaluated scores were not correlated with self-ratings. Seniors made no self-reported gains over the course of the semester and even displayed marginally significant deficits in transactional skill and non-calculative motivation. This suggests that a larger sample could lead to results that indicate that seniors become more self-centered in their motivation to lead as their skill in organizing and rewarding those they lead deteriorates.

Implications. These results do not support those of previous research in regard to the benefits of classroom-based team experiences (Colbeck et al., 2000; Smith et al., 2005). Past research, however, did not focus on leadership development specifically or on experiences isolated from a corresponding leadership development course curriculum (Coers & Lorensen, 2009). The results provide an initial indication that simply placing students into teams, in which they possess motivation to succeed and must act interdependently, may not be enough to accelerate the development of their leadership capacity. Colbeck et al. (2000) reported that the vast majority of course instructors do not possess the skill or time to support the development of

classroom-based teams. Absent support for team development or individual relationships' forming, students may not be engaged in their own leadership development in a conscious or deliberate way, even when their environment seems well suited for such practice.

While exploratory in nature, this study provides initial evidence in regard to the degree to which a supporting curriculum and structured thinking serve as keys to student leadership development. Without a space for intentional practice informed by content knowledge, simply placing students in an environment in which they engage in goal-oriented group behaviors seems insufficient as a catalyst for leadership development. While leadership education courses focused on such pedagogy abound (Jenkins, 2012), other academic disciplines often do not include them. If these exploratory results prove more widespread with subsequent research, it may be that instructors in higher education are squandering what would seem a pedagogy well suited to leadership development.

Following Colbeck et al.'s (2000) recommendations, course instructors should provide space for structured forethought and post-experience reflection to aid in students' leadership development. Within classrooms, providing students with space and time at the beginning of their work together as a team, or even a simple template for a group contract for behavior, while paired with post-assignment reflection focused on assessment and future goals, may spur leadership development. Creating and distributing digestible information about leadership behavior "best practices" or simple cases in group communication, conflict management, decision making, and cross-cultural issues also can provide students with increased content knowledge to apply to their work in teams.

Limitations and Future Research. While this exploratory study may provide important insight into the benefits of teambuilding, within corresponding institutional support, for aiding students' leadership development, it also possesses several noteworthy limitations that indicate a need for additional research. The setting for this research included two engineering courses that were male dominated and discipline specific. It is possible that a sample more diverse in regard to social identities may have resulted in different outcomes. Similar assumptions could be made regarding how academic discipline, or even classroom vs. co-curricular programs, may influence results. Future studies that utilize a similar design could decrease differential selection by ensuring that a different population of students participates.

This study also did not examine a concept that may prove influential: students' motivation to develop leadership is different from their motivation to lead. Motivation to develop leadership indicates energy to learn, while motivation to lead indicates energy to act. Students' motivation to develop leadership may prove a significant factor in the degree to which students gain from unsupported team experiences.

The current study also found a disappointing drop in in the number of participating seniors during the post-test data collection period at the end of the spring semester, due to the fact that the final week of the course involved only small-group presentations made outside of class time. While participant mortality was not likely due to the fact that assigned presentation time seemed the most relevant factor to non-participation, such a steep drop in participation

level, from most of the class during the pre-test to 41% at the end of the semester, is still a matter of concern.

Finally, while an effort was made to separate students into respective levels of co-curricular involvement, this variable served only as a rough indicator of the degree to which students serve on teams in environments other than what took place in this study. Follow-up analyses should include more rigorous and comprehensive measurement of students' team experiences in past academic courses and in their co-curriculum and in secondary school and higher education. It is possible that a lack of significant effects seen in the current study was due to the relative lack of information collected in regard to these experiences.

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Author Biography

David M. Rosch, Ph.D., is as an Assistant Professor in the Agricultural Education program at the University of Illinois at Urbana-Champaign. His areas of interest include student leadership development and the assessment of leadership effectiveness. He holds a Ph.D. in Higher Education Administration from Syracuse University.