Examining the Impact of Team Dynamics on Academic and Professional Performance:A Cross-Sectional Study at Three Levels of Higher Education

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ABSTRACT

This study examined the impact of team dynamics on academic and professional performance through a two-part mixed-methods process. The first phase of this process probed students' ability – and willingness – to quantitatively evaluate the performance of members of their study teams, including a self-evaluation, over the duration of the class as each member's performance impacted the development and success of a group project. The author analyzed the quantitative data with SPSS™ to correlate individual, and team ratings collected through a peer-review process as predictors of team performance on group projects and found a strong positive relationship between peer-review scores and team outcomes.

The second phase of the team dynamics study explored the qualitative experience of the team members through a set of open-ended questions that examined the impact of the team dynamic on the students' academic and professional lives. Individual responses to the questions exploring the impact of the team project on personal and professional learning were analyzed with HyperRESEARCH™ through a series of coding passes to develop common themes and patterns from the questionnaire data. The resulting themes, patterns, findings, and conclusions may be useful in designing future team-based projects that improve critical thinking skills, enhance team performance, and produce graduates who are more effective in working with diverse teams in the workplace.

EXAMINING THE IMPACT OF TEAM DYNAMICS ON ACADEMIC AND PROFESSIONAL PERFORMANCE: A CROSS-SECTIONAL STUDY AT THREE LEVELS OF HIGHER EDUCATION

Over the past 15 years, the author has taught numerous classes at three levels of higher education. A common refrain from students in these courses relates to reluctance, and occasionally overt resistance, toward participation in team projects. These student teams are the equivalent of a self-managed work team in the business realm, with a potential disadvantage of a short and finite lifespan, which may not provide sufficient time to move beyond Tuckman's (1965) "storming" phase. Kirkman and Shapiro (1997) found short timeframes could increase resistance to team participation, which may manifest in sabotage, protest, withdrawal, and reduced commitment to team goals. These behaviors and attitudes can, in turn, limit the production of high-quality and timely deliverables. Workload assignments within the team, under these circumstances, can lead to fairness issues and "distributive justice concerns" (Kirkman, Jones and Shapiro 2000, p. 76). Kuruppuarachchi (2009) noted resistance to team-based projects might arise from work overload, the unstructured nature of the team, as well as internal and external pressures to produce speedy deliverables. In the case of academic teams, the author observed numerous instances of fairness issues that were attributable to student

concerns about the impact of team grades on individual grades. Based on empirical observations in both traditional classroom and online course teams, the author began collecting data to delve deeper into the academic team dynamic.

The author gathered data through a graded peer-review assignment from 2006 through 2013, inclusive, as part of information technology, business, and leadership courses at the undergraduate, graduate, and doctoral levels. The study examined the impact of team dynamics on personal and professional performance through a two-part mixed-methods process. The first phase of this process probed the students' ability - and willingness - to quantitatively evaluate the performance of members of their study teams, including a self-evaluation, over the duration of the class as each member's performance impacted the development and success of a group project. The author analyzed the quantitative data with SPSS Statistics Desktop (v21) to correlate personal and team evaluation scores with team performances on group projects. The strength and direction of this association were tested using Pearson's product-moment correlation (Pearson's *r*) coefficient and, due to the presence of outliers, validated through an application of Spearman's *rho* coefficient. Linear regressions were run visually to graph the relationships between the independent variables and the dependent variable.

The second phase of the peer-review study explored the qualitative experience of the team experience through a set of open-ended questions to measure the impact of the team dynamic on students' academic and professional lives. Individual responses to the questions exploring the impact of the team project on personal and professional learning were analyzed with the HyperRESEARCH (v3.5.2) Qualitative Data Analysis Software [QDAS] package to develop common themes and patterns from the questionnaire data. The resulting themes, patterns, findings, and conclusions may be useful in designing future team-based projects that improve critical thinking skills, enhance team performances, and produce graduates who are more effective in working with diverse teams in the workplace.

This study should allow instructors, as well as course and program designers, to gain a better understanding of team dynamics in academic projects through a mixed-methods study of actual team dynamics and the impact on individual students in their personal and professional lives. This understanding may help course and program designers develop team-based projects that support better team processes, provide better educational outcomes for students and institutions, and allow a smoother transition from the classroom to the business world.

PROBLEM STATEMENT

The problem is that students are often resistant to team-based projects in academia and may participate in these projects reluctantly. To overcome this problem, it is necessary to understand the reactions displayed by students to team projects to better understand the overall team dynamic in the academic milieu. Examining the results of peer-reviews over a period from 2006 through 2013 may improve this understanding and support the development of team-based projects that inform the student and align with the needs of the business world.

ETHICAL CONSIDERATIONS

No significant ethical considerations existed, as the archival data sets under examination in this study were collected over a period of eight years through a series of graded peer-reviews associated with group projects in classes held at the undergraduate, graduate, and doctoral levels. No individuals were identified when the quantitative and qualitative data sets were aggregated in SPSS and HyperRESEARCH respectively, and no individual data values were attributed to specific students or courses. Although the year and level of courses were captured in the data set to facilitate future data analyses, the individual data values for peer-review ratings and group project scores are untraceable back to the original student populations. Therefore, no inherent or residual risk accrues to the students who completed the peer-review forms as part of the group project assignments.

THEORETICAL FRAMEWORK

This study is grounded in the theory and concepts espoused in previous studies relative to team dynamics. Any study on team dynamics should start with a review of Tuckman's (1965) seminal theory on team development. Tuckman defined four sequential phases in small group development as (a) forming, (b) storming, (c) norming, and (d) performing (p. 396). The author's observations in the traditional classroom have identified forming as relatively easier than in virtual teams in the online milieu. This is assumed to happen because the team members meet at least weekly in a face-to-face environment and, thus, have the opportunity to relate better to each other. On the other hand, "virtual project team members rarely meet or sometimes never meet" (Kuruppuarachchi 2009, p. 20). This phenomenon applies to most online academic teams and may contribute to some teams' inability to progress beyond Tuckman's second "storming" phase.

Tuckman and Jensen (1977) modified the germinal theory to add adjourning as a new final phase of the Tuckman model for small group development. Bonebright (2010) identified several limitations of the model, including (a) the initial sample of settings for small group

development, (b) the lack of a complete explanation of how teams change over time, and (c) the complexity of many groups that may not fit Tuckman and Jensen's linear model (p. 115). The first limitation aligns with the author's initial interest in a cross-sectional study across three levels of higher education. The second limitation may not be germane to academic teams due to the short-term lifespan of such teams; however, it may apply to professional teams working on long-term projects. Student teams tend to be relatively small with projects of limited scope so that these teams may be less complex than those cited in Bonebright's third limitation.

Adjourning may not apply to academic teams as most academic group projects are designed to exist only for a single course over one term. Once the students receive their grades, they are typically ready to move on to the next course as they pursue their degrees. While it is to be hoped these students will carry the lessons learned forward to future classes and projects, there is no guarantee this learning will occur. To further address the need to develop effective teams, the author examined literature relative to elements of the team experience. A sampling of recent peer-reviewed journal articles was reviewed to develop further the theoretical framework necessary to guide and inform this study.

Most, if not all, university courses and teams have heterogeneous populations consisting of students from numerous professional disciplines and backgrounds. To examine the impact of team dynamics in diverse endeavors, articles from various professional fields were considered. These works examined professional fields such as software development (André, Baldoquín, and Acuña. 2011; O'Connor and Basri 2012; Rosen 2005), healthcare (Curry et al. 2012; Mitchell et al. 2013), and engineering (DeFranco, Neill, and Clariana 2011; McNair et al. 2011). Other career areas that rely heavily on team dynamics include the Department of Defense (Hudas et al. 2012), global project management (Thamhain 2013) and knowledge management (Vasileiadou 2012). In addition, Whitchurch (2012) explored various concepts about academic team pursuits.

The theoretical framework for this study is also built on prior studies that examined specific elements relevant to the team experience in education, including social networks (Warner, Bowers, and Dixon 2012), routines (Smedlund 2010), behaviors (Rousseau and Aubé 2010), as well as learning theory and approaches (Gardner and Yun 2010; Park et al. 2013). Additional concepts about the online learning team experience included studies on virtual teams (Dixon and Panteli 2010; Gilson, Maynard, and Bergiel 2013; Kuruppuarachchi 2009) and the prediction of team performance (Walker et al. 2013). Finally, other studies were examined for resistance to change (Bareil 2013; Kirkman, Jones, and Shapiro 2000; Kirkman

and Shapiro 1997) and to explore methods of improving team performance through various stratagems (Byrd and Luthy 2010; Fulk, Bell, and Bodie 2011).

Elements of the Team Experience

Most of the studies read in preparation for this paper shared common team structures and attributes. Some studies covered specific elements of the team experience, which are relevant to the study at hand. Warner et al. (2012) examined social networks and team cohesion and identified team cohesion as having a positive correlation with team performance. Students will often inquire about specific team assignments to remain in their social sets or cohorts, but instructors may or may not comply with these requests. Smedlund (2010) discussed the importance of team routines and idea networks, which flow differently depending on the specific task. This study may have implications for the current study as knowledge flows and team communications are entirely dependent upon the skills and capabilities of the particular student team. Rousseau and Aubé (2010) studied team members' self-managing behaviors and found a positive relationship with team effectiveness, as defined by team viability, performance, and process improvement. Other studies examined team learning theory and approaches (Gardner and Yun 2010; Park et al. 2013), which may be useful in aligning the findings of this study and making recommendations for future research.

Several studies identified good interpersonal communications (Giesbers et al. 2014; Higgins 2014; Reed and Watmough 2015) and collaborative practices (Beccaria et al. 2014) as significant in developing strong learning experiences and healthy team dynamics. Reed and Watmough also found that low instructor participation levels could be a dissatisfier in virtual learning environments. Articles cited critical thinking capacities as support for collaborative learning outcomes from team projects (Heijltjes et al. 2014; Shebab and Nussbaum 2015). Strong project management skills may also contribute to successful team experiences in varying disciplines (Too and Weaver 2014).

Perhaps most relevant to this study were studies on team performance and virtual teams. Various studies (Dixon and Panteli 2010; Gilson et al. 2013; Kuruppuarachchi 2009) examined virtual teams. A common thread in these studies related to efficient use of technology and communications as critical success factors for virtual teams. Gilson et al. pointed out the necessity to instruct students in how to work on a virtual team. For the most part, this type of instruction has been an overlooked element in forming academic teams.

Walker et al. (2013) correlated cognitive readiness – defined as the "knowledge, skills,

and abilities … required to establish and sustain competent performance levels" (p. 69) – among team members as a predictor of team performance. Byrd and Luthy (2010) described the use of a team charter as an effective method for improving team performance within MBA cohorts. The team charters establish ground rules and create a team culture to establish the team norm quickly. The author has used team charters with varying degrees of success at the different levels of higher education under study.

Studies on Professional Teams

The author teaches in programs that target the production of skilled and capable leaders and practitioners in the business world and determined a further review of literature about professional teams was also relevant to this study. André et al. (2011) developed a formal model for assigning human resources to software teams that take into account necessary roles and competencies. While interesting material, instructors often do not have intimate knowledge of student capabilities and may assign students to teams in some random or predetermined fashion. O'Connor and Basri (2012) examined the effect of team dynamics on software processes. These researchers found high-performance teams often share common characteristics, such as "high skill levels, strong motivation, dynamic approach, teamwork, open communications, … meet project deadline" (p. 23). These characteristics may or may not be present in academic teams. Rosen (2005) explored intra-group dynamics on systems development teams and found a set of social-dynamic factors, including personal, interpersonal, and group factors must be understood holistically to provide effective interventions on the team. Limited contact by instructors coupled with short team lifespans may not allow for gaining this understanding of the group dynamic on each team.

Curry et al. (2012) looked at the role of group dynamics in mixed methods research teams and found diversity and complementarity often presented challenges for teams, such as "(a) dealing with differences, (b) trusting the 'other,' (c) creating a meaningful group, (d) handling essential conflicts and tensions, and (e) enacting effective leadership roles" (p. 5). Mitchell et al. (2013) found medical errors can be attributed to dysfunction on teams caused by "professional diversity in terms of affective conflict" (p. 8). Given the random nature of academic team member assignments and student diversity, it is to be expected that similar findings may arise as a result of this study.

The engineering field relies heavily on interdisciplinary teams to perform its tasks effectively. DeFranco et al. (2011) looked at team outcomes and developed a framework, the

Cognitive Collaborative Model, to promote collaborative processes and improve team outcomes. McNair et al. (2011) sought to understand how engineering students and faculty interact to promote interdisciplinary identities but found structural boundaries may create obstacles for collaboration. McNair et al. also identified conflict management, scaffolding by instructors to define group projects, and an appraisal of the students' disciplinary grounding as necessary to develop stronger interdisciplinary identities.

Other career facets that rely heavily on team dynamics include the Department of Defense (Hudas et al. 2012), global project management (Thamhain 2013) and knowledge management (Vasileiadou 2012). Hudas et al. reviewed online adaptive learning as a means of improving team decision-making and strategies. Thamhain examined the management of geographically dispersed teams and found many of the technical challenges were attributable to social, psychological, and organizational issues. On the positive side, "personal interest, pride, and satisfaction with the work, professional work challenge, accomplishments and recognition" (Thamhain, p. 154) often created a bridge between organizational and personal interests. In the academic realm, adaptive learning may be limited by the particular online learning system. While instructors may be able to provide work challenge and recognition, the remainder of Thamhain's bridge components must arise intrinsically from the students. Vasileiadou explored the use of information and communication technologies [ICTs] to improve knowledge management on teams.

The final professional area examined lies in academia itself. The author found little literature addressing academic teams at the student level, although Whitchurch (2012) explored several concepts relative to academic team activities. While not specific to student teams, Whitchurch found academic and professional staff in her study populations at universities worked on multi-professional teams, which tended to blur the rigid lines between academic and non-academic positions. Whitchurch identified three models of academic teamwork

- (a) the integrated model, in which academic roles were recognized and engrained into the institutional structure and team members tend to contribute to the group based on their specialties;
- (b) the semi-autonomous model, in which teams are fully or partly self-funded and provided team members with a stake in the team outcomes; and
- (c) the independent model, in which individuals operated within traditional structures, but worked around their formal positioning. Of these models, the integrated model appears to align best with current academic student team structures.

RESEARCH QUESTIONS

The research questions in this mixed-methods study are two-fold. The quantitative segment of the study (Phase 1) examined the impact of the peer-review evaluations upon the overall team performance on group projects. The research question for this segment asked, "What is the relationship between peer-review scores and the team project outcomes?" The hypotheses being tested to determine the strength and direction of the association are:

H_0: There is no positive, strong relationship between the peer-review scores and the team project outcomes.

H_1: There is a positive, strong relationship between the peer-review scores and the team project outcomes.

The qualitative segment of the study (Phase 2) examined open-ended responses from the students for two questions that explored the most important concepts learned from the team experience and how students would use these concepts to improve both personally and professionally. The students' responses to these questions were analyzed and coded in a series of passes to develop a better understanding of student responses to the qualitative set of research questions:

1. What are the students' perceptions of the value of the team experience?
2. How did the team experience impact the students' perceived personal and professional growth?

RESEARCH METHODOLOGY

This study examined team dynamics in the academic environment through a mixed-methods research design. SPSS Statistics Desktop and HyperRESEARCH were selected as the quantitative and qualitative data analysis software packages for the mixed-methods data analysis processes. Both software packages are effective on the MAC OSX platform used by the researcher to analyze the data.

Collecting and Preparing the Data

The data sets were collected through a series of graded peer-review evaluations gathered by the author from 2006 through 2013, inclusive, over three levels of higher education (undergraduate, graduate, and doctoral) programs at Cochise College, the University of Arizona, and the University of Phoenix. The first part of this evaluation process probed the students' ability - and willingness - to quantitatively evaluate the performance of members of their study teams, including a self-evaluation, over the duration of the class. The peer-review form examined four quantitative components of team participation levels:

1. Participated in planning sessions [Planning],

2. Coordinated work with other team members [Coordination],
3. Performed assigned tasks promptly [Promptness], and
4. Contributed to the success of the project [Contribution].

Each of the four primary components was measured on a five-element Likert scale (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree]. During the grading of the peer reviews, numerical values from 1 to 5 were assigned to the responses (Strongly Disagree to Strongly Agree, respectively). The Average attribute was calculated by averaging the Planning, Coordination, Promptness, and Contribution attributes for each case during the data collection phase.

The Group attribute represents the student's raw score from the Group project for that course. The actual points available for the Group projects in individual courses ranged from 10 points to 300 points depending on the particular course and points assigned to the group project. The researcher converted the Group score for each case to a calculated Normalized score by multiplying or dividing the group score by an appropriate constant value that would increase or reduce the group score to a proportionate value on a standard 0-100 scale. The Year and Level attributes of each case were also captured during the data collection process for future analysis and comparison but were not included in the current study (Table 1).

Table 1 Quantitative Data Codes for Team Dynamics Study

Code	Description
Year	Calendar year of class
Level	1 [Lower Division]; 2 [Upper Division]; 3 [Graduate/Doctoral]
Planning	Participation in project planning sessions
Coordination	Coordination of work with other team members
Promptness	Prompt performance of assigned tasks
Contribution	Contribution to the success of the project
Average	Calculated average of Planning, Coordination, Promptness, and Contribution
Group	Actual group score earned for the project [10-300 points].
Normalized	Conversion of actual group scores to normalized 0-100 values.

Each case represents one complete student record, which includes collected and calculated values for all attributes. Incomplete cases were typically created when students dropped the course after the groups were formed, but before the final group project grade was awarded. Some group members evaluated the missing students, but no final group grade was

received. Thus, 43 incomplete cases were purged from the final data set to avoid skewing the data analysis results, which left 506 complete cases:

- 105 lower division undergraduate cases (2006-2013)
- 133 upper division undergraduate cases (2006-2013)
- 268 graduate and doctoral cases (2009-2013)

Analyzing the Quantitative Data

The data analysis process considered how each member's participation levels – as measured by the five components of the peer-review (the independent variables) – impacted the group's normalized project score (the dependent variable). The author analyzed the quantitative data with SPSS to correlate personal and team member evaluation scores with team performances on group projects. The researcher employed Pearson's product-moment correlation (Pearson's *r*) coefficient – using a two-tailed test – to measure the strength and direction of the association that exists between the variables. This statistical test was considered appropriate for the study because the data was expected to meet the four assumptions required for Pearson's correlation;

1. The two variables are measured at the interval or ratio level,
2. A linear relationship is assumed to exist between the two variables,
3. It is assumed there are no significant outliers, and
4. The variables are assumed to be approximately normally distributed.

Once the data sets were loaded into SPSS, assumptions 2, 3, and 4 were verified to ensure Pearson's correlation was the appropriate statistical test. Due to the presence of significant outliers (assumption 3) revealed by scatterplot analysis, the researcher opted to validate the results of the Pearson's *r* coefficient analyses by running a second set of statistical tests on the same datasets using Spearman's rank-order correlation (Spearman's *rho*) coefficient as the peer ratings provided an initial rank order [1-5]. The author also ran linear regressions on the data to help visually determine the direction and strength of the relationships between the independent and dependent variables.

The researcher identified Pearson's *r* correlation coefficients, which indicated the five correlations are significant at the 0.01 level for two-tailed tests. The Spearman's *rho* analyses on the variable pairs were also found to be significant at the 0.01 level for two-tailed tests for each of the five variable pairings (Table 2).

Table 2: Correlations, Significance, and Regressions

Normalized	Pearson's		Spearman's		Linear Regressions		
(N=506)	*r*	*p*	*rho*	*p*	*Y'* =		
Coordination	.605	.000	.653	.000	52.539	+	9.284(*X*)
Planning	.612	.000	.647	.000	48.699	+	10.104(*X*)
Promptness	.626	.000	.659	.000	50.322	+	9.828(*X*)
Contribution	.650	.000	.675	.000	47.341	+	10.441(*X*)
Average	.647	.000	.682	.000	46.673	+	10.664(*X*)

The data for the correlation of each independent and dependent variable pairing were mapped into scatterplots to provide a graphical view of the data (Asuero, Sayago, and González 2006) and to allow plotting of a linear regression line for each data pairing to illustrate the direction of the relationship between the variable pairs. Each linear regression revealed a strong positive relationship between the independent and dependent variable pairing (e.g., Figure 1). Pearson's product-moment correlation (Pearson's *r*) coefficient on each independent variable, when paired with the dependent variable [Normalized], indicated all five coefficients were in the $0.605 \leq r \leq 0.650$ range. A common description (Steinberg 2011) of Pearson's *r* coefficient describes these values as indicative of a strong positive relationship between each of the five independent variables and the dependent variable.

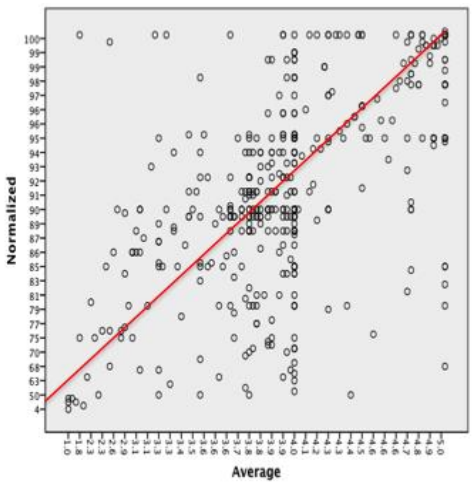

Figure 1: Example of linear regressions showing the Normalized and Average scatterplot [*Y'* = 46.673 + 10.664(*X*)]

Due to the presence of outliers and the potential for skewed results, running Spearman's *rho* correlation tests on the same data sets validated the Pearson's *r* statistical tests. The Spearman's *rho* coefficients calculated on the five variable pairings were within the $0.647 \leq rho \leq 0.682$ range, which indicates a positive relationship between each of the five independent variables and the dependent variable. Finally, the linear regressions when plotted and overlaid on scatterplots denoted strong positive relationships between the variable pairs.

All Pearson's *r* and Spearman's *rho* coefficients were significant at the 0.01 level, so we can minimize the probability of variances with an assessment of the probability of a Type 1 error (incorrectly rejecting the null hypothesis) at less than 1% under a two-tailed test. To reject the null hypothesis (H_0), the critical *r*-value, as determined by the use of a correlation table, should be less than the Pearson's *r* coefficients calculated during the SPSS statistical tests. According to Steinberg's correlation table (2011, *Appendix G*, p. 531), the critical *r*-value

is listed as 0.115 at a level of significance of 0.01 for a two-tailed test and a *df* of 500. Thus, the statistical tests indicate the null hypothesis (H_0) can be rejected and statistically significant strong positive relationships do exist between the peer-review rating components and team project outcomes (H_1). The next step was to examine how individual learning team experiences impacted student performance and determine how course designers and instructors could provide team assignments that improve individual performance and help ensure successful team outcomes.

Analyzing the Qualitative Data

The second part of the study explored the qualitative aspect of the team experience through two open-ended questions to examine student perceptions of the impact of the team dynamic on the students' personal and professional lives. Individual responses to the peer-review questions were analyzed in HyperRESEARCH. Through a series of coding passes, the raw questionnaire data was refined to develop common themes and patterns that addressed the qualitative research questions. The primary unit of analysis was the phrase, but whole sentences were included in the coded segments when appropriate to maintain context.

The analysis used multiple coding passes (Corbin and Strauss 2008) to group initial and axial codes into major themes and patterns through a third selective coding pass to develop findings and conclusions. A provisional start list of codes (Miles and Huberman 1994) was suggested by the initial preliminary review of the data set as the researcher loaded the raw data segments into text files for subsequent analysis using the QDAS package (Table 3).

Table 3: Provisional Start List of Qualitative Codes

Collaboration	Expectations	Patience
Commitment	Goals	Planning
Communication	Leadership	Responsibility
Execution	Participation	Time Management

Additional data codes were developed during the initial or open coding pass (Seidel and Urquhart 2013, p. 239). The researcher renamed and combined various codes during the initial and axial coding passes. After two coding passes, the data set included 46 codes and 1837 coded segments. The 46 codes were grouped into three major themes: (a) Project Management, (b) Soft Skills, and (c) Team Skills. Communication, Collaboration, and Critical Thinking were deemed to be core components for team success that incorporated all three themes, while there was some additional overlap of codes between the three selective code groups. Figure 2 provides a graphical view of the relationships between the major themes and

their component codes.

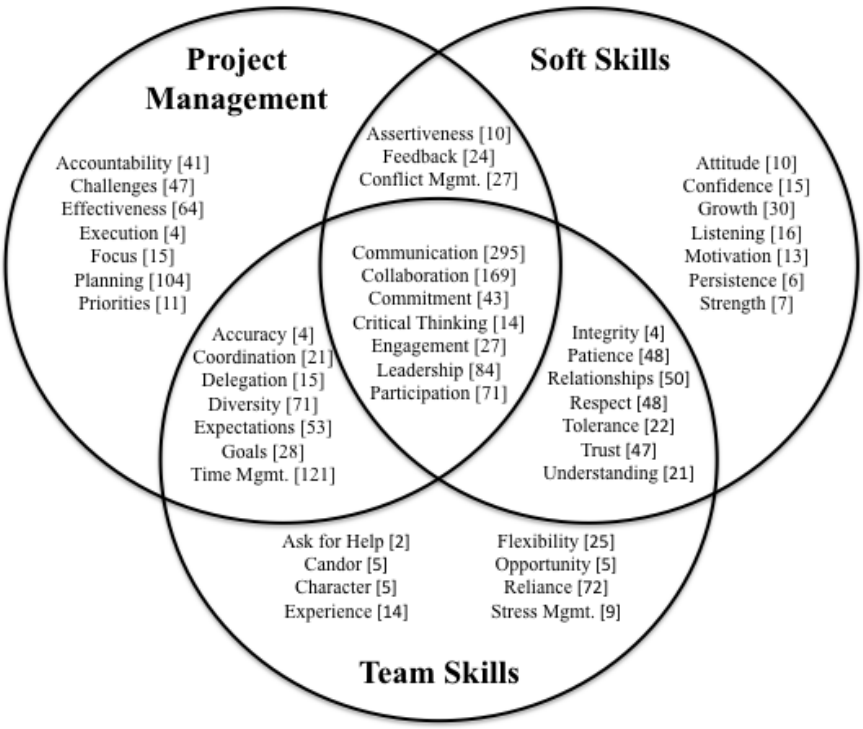

Figure 2 Mapping Codes (Code Frequency) Into Major Themes

Discussion on Selected Themes

As mentioned in the introduction, students often resist team-based projects and may participate reluctantly, if at all (Kirkman and Shapiro 1997; Kuruppuarachchi 2009). Student comments relative to this perspective included:

- "I believe that this exercise has done nothing for me personally and professionally."
- "It seems that you need to be on the learning thread constantly, so you are not lost in the exercise. I truly see no value in the group exercises."
- "Personally, I don't even like working in teams across the world, and will more than likely never have to in my chosen profession."
- "There was no choice in team members, most of whom never responded at all to the posts."
- "I am not likely to use this in the near future."
- If I had been able to change teams when I realized I was in a dead-end group, it may have gone better. Lesson learned."

Students remarked in a significant manner on the importance of interpersonal and intra-group communications (Giesbers et al. 2014; Higgins 2014; Vasileiadou 2012). The data indicated strong interest by team members on improving levels of collaboration (Beccaria et al. 2014), engagement (Giesbers et al. 2013), and participation (Kirkman, Jones, and Shapiro 2000; Reed and Watmough 2015) for all team members. Student comments also pointed to a

need to develop project management skills (Kuruppuarachchi 2009; Thamhain 2013; Too and Weaver 2014). Course developers and instructors can assist students with the development and enhancement of these learning aspects through improved group project designs.

Communication

Developing good communication between team members was the number one concern across all levels in the study and was widely recognized as an area for improvement:

- "I realize more than ever that open communication is important when working within a team environment."
- "I have learned that I need to not be just a passive participant and work in the background but need to put myself more out there.
- I need to communicate more with email (I dislike it as a form of communication)."
- "My approach to communicating with others should ensure I continue to make progress to behaving appropriately in personal and professional settings."
- "The absence of directly meeting face to face has been a challenge for me because the virtual team loses the essence of group dynamics and personal interaction."
- "I have learned that effective communication, collaboration, and time management are essential for a successful team."

Collaboration

This theme also incorporated similar themes, such as participation, commitment, and engagement, and diversity. Students widely recognized the importance of collaboration for successful team projects and the detrimental effects of poor collaborative practices:

- "Each LT experience strengthens my ability to work with others in a team setting."
- "It takes everyone in the group to complete a task successfully and on time."
- "I will use this learning to improve both personally and professionally by realizing the value of working in a team environment, sharing information, and supporting new ideas."
- "Working in a team, communicating and sharing ideas to accomplish a goal is something that I can apply to both home and work."

Many students commented on the adverse impacts of failure by team members, including themselves, to fully participate in the team process. Some students also commented on instructor participation levels:

- "*I found it frustrating* when <names redacted> failed to complete the SAS conflict assessment and submit their scores before the Team Charter being due.
- Unfortunately, this was a scenario that *each team member had to complete the test him or herself, so the assignment was incomplete.*"

- "*Due to a severe lack of participation by some of our members, we failed as a group* to schedule meetings and stay on track early."
- "Given my schedule and school work load, *I was not able to provide my best, and that troubles me*."
- "*The team worked hard, but unfortunately not equally*. Some people do the minimum required and expected others to pick up the slack."
- "I understood that *I had help from the instructor if I needed it* and his proper guidance to know when to step in and direct and when to step back and let the student's figure it out themselves."

Numerous students recognized engagement through better communication as an area of improvement and an opportunity for deeper learning:

- "What I have really absorbed about the Learning Team Experience is the way in which *the general principle of Staying Engaged is magnified in the e-learning environment*, but how important it is to all interactions."
- "*Staying engaged in a team dynamics is always required* in either setting."
- "The e-environment magnifies this component to such an extent, for me, that it brings home *the importance of staying engaged in all dynamic interactions*."

Despite challenges cited in the literature relative to diversity on teams (e.g., Curry et al. 2012; Mitchell et al. 2013), this study found diversity was generally considered a source of strength for the team assignments and appreciated by the students for the values and perspectives a diverse set of students brought to the team assignments:

- "I benefited personally as well by learning to work with different types of people, effectively lead a team, and deal with issues that may arise in the group."
- "This learning will help me to make sure to build on the strengths of the team members, by allowing people who are experts in certain areas to do the work in those areas, everyone learns more and benefits."
- "Different people look at the same problem from different angles, and a group that works efficiently together can accomplish much more than individuals."
- "A learning team is a microcosm of life experience. It helps to mirror the diversity in real life. We cannot be effective leaders if we do not appreciate that people are different."
- "This learning team experience has opened my eyes to my ability to work with individuals from different backgrounds with different personalities and a different way of getting their point across."

Project Management

The need for sound Project Management skills – including planning, leadership, and setting priorities – was repeatedly expressed, but tended to be more prevalent in capstone courses that focused on project management concepts:

- "I have learned that a team leader and *a plan of action with a timetable is important to a group project* and that there should be some sort of accountability other than a grade for a project to succeed."
- "Having a plan of action in place with concrete timeline kept the team on track."
- "We developed a team charter and stuck to it. When assignments were due, *we planned ahead of time and divided the assignments up equally* and without any difficulty."
- "What I have learned is that *it is not possible to work together as a group without a shared vision, with no agreed-upon mission, without basic communication standards, and with a rejection of any planning*."
- "*An effective team has at its helm an efficient and decisive leader* who is able to communicate objectives to her peers, letting her actions be an example of how to work effectively."
- "What I will take with me from this experience is that *we as leaders have to find the true essence of the people that we lead or work with and leverage that ability."*
- *"Leading and modeling high expectations will increase my team willingness to do their best* and support the team objectives."
- "*I need more priority setting as I juggle* individual and team assignments."
- "I believe that a huge part of *being a good leader is to be able to balance your individual workload without sacrificing the team*."
- "No one needs to lead, but *everyone needs to be on the same page for the final paper to work*."
- "I have learned to expect that *everyone's prioritization of their personal time is very different* and this, in itself, may contribute to reduced levels of commitment in taking projects to the end."

Time management emerged as a significant factor, but was often intertwined with other codes related to the Project Management theme:

- "Important concepts learned from the learning team experience was the importance of identifying project goals, assignments, and due dates at the beginning."
- "I will use this learning to improve personally and professionally by collaborating more in the workplace, being proactive, paying attention to detail, and adhering to timelines."
- "Advance planning and preparation are important when last minute revisions and unexpected situations occur within a team."
- "No matter how much we prepared for the challenging team papers, time was still the most critical element to beat."
- "I will use this learning personally and professionally to advance my level of communication, time management, and positive behavior."
- "The lessons learned in this course and this team on how to manage my time, prioritize assignments, and respond to changing situations will help me in both my personal life and career."

Critical Thinking

Although Critical Thinking was not directly referenced in a significant manner, this theme is perhaps more significant for its relative absence regarding overall learning:

- "I have learned from my learning team *how to promote a critical and innovating thinking environment,* by receiving and providing team member advice."
- *"Effective adult learners must be able to think critically, self-regulate their learning process*, be eager and willing to learn new things, and yet not be afraid of making mistakes or failing. This is what I am learning in this program."
- "Individuals who are willing to *challenge their long-held assumptions and question the very with which their assumptions were formed are considered to be critical thinkers.* This is an important concept that I feel is crucial with the Learning Team."
- "The *key concepts I use when approaching a team environment are communication, enquiring [sic] and fact finding, appreciation for differences, and reflection* once the assignment is complete."

There are initiatives in nearly every higher education learning institution to enhance critical thinking capacities and develop critical thinking skills (e.g., Bloch and Spataro 2014; Higgins 2014). As part of the general movement to increase critical thinking capacities across the curriculum, group projects should be designed to help develop such capabilities.

IMPLICATIONS OF THE STUDY

This study captured the grading practices of a single instructor, the researcher. As any single instructor may have idiosyncratic grading patterns, it could be useful to pursue the same study across multiple courses taught by different faculty members to minimize the impact of grading patterns on the team project scores. The source and the impact of the outliers should also be considered. Small group sizes may have magnified the perceptions of non-participation by individual members. Team members were not hesitant to award low ratings for members who were perceived to provide less support for the project, even though all team members received the same grade for each group project. This dynamic certainly contributed to the presence of outlier scores. It may also be productive to implement a variable grading scale for group projects that take into account individual participation levels and allows for an adjustment of individual project grades up or down from the static team grade.

Course developers and instructors may use the results of this study to design group exercises that support the improvement of communication and collaboration practices, while developing and enhancing critical thinking capacities. As a direct result of this study, the researcher now requires a mandatory learning team charter as the first graded group assignment. Effective learning team charters can improve communication and engagement

practices while helping students begin the project management process with an initial collaborative exercise. As one student noted, "The most important concept I learned from learning teams is the dynamic process in team management … *The LTC is a great team tool;* understand, however, *it is a living document*." A sound learning team charter template should include sections that target and define specific team goals:

- Rules and guidelines for overall team behavior
- Communication section
  - Individual contact information
  - Best times for contact
  - Preferred communication modes
  - Communication technology capabilities
- Guidelines for team conflict resolution
- Expectations for team participation levels
- Expectations for individual task deliverables and deadlines
- Expectations for instructor feedback and participation
- Signature blocks for each team member to develop ownership of the team process

Other developmental actions may include helping students manage time on task by introducing phased group assignments, rather than one large assignment due at the end of the term. Instructors should consider requiring regular formal status updates during project and providing timely constructive feedback to help students focus on specific issues. As another result of this study, this researcher began designing and implementing group projects that challenge higher-order thinking skills. Course developers may wish to design or modify group projects to incorporate Bloom's revised taxonomy (e.g., Armstrong n. d.) and include specific components to challenge, develop, and enhance critical thinking skills that:

- Apply knowledge in a new way,
- Analyze data to develop new connections,
- Evaluate the project plan to justify decision-making,
- Create new or original work,
- Reflect upon the project deliverables, and
- Incorporate lessons learned from the project in a final assignment paper

The researcher has identified several possibilities for future research in this arena. Since the researcher has started incorporating some of the findings from the study in recent courses, it may also be fruitful to examine the impact of changes that have been implemented in the

course designs since 2014, including learning team charters, more challenging group exercises, and phased deliverables. As mentioned above, there may also be some value in pursuing the same study across multiple courses taught by different faculty members to account for idiosyncratic grading practices by a single faculty member. Finally, the current dataset may be reordered and analyzed by academic level, year of attendance, and specific course groups to compare and contrast learning experiences across the three levels of higher education.

CONCLUSION

This study examined learning team experiences through a mixed methods study across three levels of higher education. Statistical tests performed during Phase 1, including Pearson's product-moment correlation (Pearson's r) coefficient and Spearman's rank-order correlation (Spearman's rho) coefficient, indicated the null hypothesis (H0) "There is no positive strong relationship between the peer-review scores and the team project outcomes" can be rejected. The application of linear regressions to the data sets supported the existence of strong positive relationships between peer-review rating components and team project outcomes (H1).

Phase 2 of the study explored student perceptions of the team learning experience. The qualitative data set was robust as many students were quite verbose about the impacts of the team projects. The findings indicated strong interest in improving communications and collaboration levels as well as increasing the quality and amount of team member participation levels. The author gained valuable insight into team dynamics as a result of this study and has begun to roll this insight forward into current and future course designs and implementations to improve the learning team experience, as well as enhance students' critical thinking capacities and skills.

The study also generated ample information relative to the learning team experience for course developers and instructors. Three important takeaways from this study include (a) mandatory learning team charters, (b) phased deliverables, and (c) challenging team projects. These components of the learning team experience may be useful in designing team assignments that improve critical thinking skills, enhance team performance, and produce graduates who are more effective in working with diverse teams in the workplace. Requiring a mandatory learning team charter as the initial group assignment will establish team communication paths and interpersonal interactions early in the course and may help teams form in a timely manner and avoid some of the storming components of team exercises.

Implementing phased deliverables during the course for group projects instead of one

monolithic deliverable at the end of the course will support the development of team project management and time management skills. Rather than waiting until near the end of the course to start the group process, students would be required to work together throughout the course with phased deliverables. This approach to team assignments should also help students develop better planning skills and set appropriate priorities for their individual and team workloads. Instructors who provide timely and effective feedback on these phased deliverables can also enhance the group learning processes and allow the team members time to integrate instructor feedback and suggestions successfully for improvement into future project deliverables.

Designing challenging team projects that require students to think critically, reflect upon their choices and decisions, and communicate with each other on a regular basis may improve the overall learning process of a given course. This approach may also ensure students will carry the lessons learned from their course projects ahead to future courses and ultimately to the workplace. In the end, the mission of learning institutions at all levels is – or should be – to develop knowledgeable and effective graduates who can bring value to their organizations as they begin their professional careers, no matter the discipline.

Perhaps one of the most valuable lessons that instructors can impart through group assignments is to engender an appreciation for diverse perspectives and approaches that may help develop and improve communication and collaborative skills among team members. This study demonstrated learning team experiences can be painful, valuable, or both to students at all levels of higher education. It is the duty and the responsibility of the course designer and the instructor to provide challenging team assignments as well as appropriate and sufficient support to promote student success in any given course, as well as in post-graduate activities and careers.

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