Report Summary: This report is intended to convey the accomplishments and lessons learned of the project. The project was completed in three main stages. In Stage 1, we conducted a series of qualitative interviews regarding shared leadership experiences in team research settings. These interviews provided fruitful information that are the basis of conference paper submissions. These interviews allowed us to better ensure the validity of our shared leadership training program. Additionally, we conducted a literature review and a further examination of design of shared leadership training procedures. Stage 2 was dedicated to the training program development. Once created, Stage 3 focused on evaluating the training program using participants from Houston Action Research Teams with a pre- and post- declarative knowledge test. Please contact us for a copy of the shared leadership training program.
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Stage 1

The current investigation examines leadership in research teams--teams who “exist specifically to produce major, novel, and creative innovations in scientific and technological knowledge” (Bain, Mann, Pirola-Merlo, 2001, p. 57-58) that thrive on heterogeneous educational specialization and creativity (Shin & Zhou, 2007). The complexities of today’s scientific issues require teams of researchers to solve (NSF, 2006; NIH, 2006). Researchers from multiple disciplines are working together to achieve a common goal (Borrego & Newswander, 2010). At the same time, the modern workplace is shifting from hierarchical leadership structures towards leaderless teams that allow all team members to emerge as a leader. To extend the theory on team leadership in this setting, we conducted a qualitative field investigation of the leadership of teams executing an applied research project.

This study contributes to the literature in several ways. First, it attends to the lack of evidence-based research on self-managing teams leadership needs (Cohen, Chang, & Ledford, 1997; Wolff, Pescosolido, & Druskat, 2002) and the use of shared leadership (Pearce & Conger, 2003; Serban & Roberts, 2016). Second, it answers the call to understand the conditions under which shared leadership can be beneficial (Hooker & Csikzentmihalyi, 2003; Pearce, 2004). Third, it investigates these themes in a previously unexplored setting, research and development teams, which deserves attention given the extensive amount of interaction between the team members and the focus on knowledge integration, task interdependence, creativity, and innovation that could be affected by the leadership structure (Cooke & Hilton, 2015).

Stage 1 Literature Review of Leaderless Teams

Under certain circumstances, a team may not have a leader which is known as a leaderless team or a self-managing team. Teams can be purposely designed to lack a formal
designated leader; such as when an organization believes that everyone should feel entitled to a leadership role (Berkana-Wycoff & Nincic, 2014). Situations can also influence a leaderless structure. For example, when a team is confronted with a complex decision to make it may require everyone on the team to step up and contribute as a leader. Typically when a team is designed to be leaderless, the intention is for leaders to naturally emerge on the team. The idea of shared leadership (i.e., equally distributed leadership across the team), is that it is more effective than traditional leadership structures (Pearce & Sims, 2002). However, in a leaderless team, there is no certainty for whether a single leader emerges, or if everyone emerges as a leader. Research has found that certain behaviors and knowledge, skills, and abilities (KSAs) (e.g., emotional intelligence, cognitive ability, conscientiousness, extraversion, and emotional stability) can predict leader emergence (Smith & Foti, 1998; Taggar, Hackett, & Saha, 1999; Wolff, Pescosolido, & Druskat, 2002). Therefore, if only one individual has these characteristics, he or she might be the only one to emerge as a leader—resulting in hierarchical leadership. There is also uncertainty as to when the team members will emerge as leaders.

This study seeks to understand what kind of leadership emerges in a leaderless research team. Does a single person emerge as a leader or does everyone emerge as a leader? And, when do team members emerge as leaders during the team’s process? The leader outcome may differentiate across teams, depending on situational factors or the team composition. For example, gender or personality might come into play. Also, during crisis situation, a single person might emerge as the leader to ensure the success of the team. What conditions determine whether there is hierarchical leadership versus shared leadership?
Shared Leadership

As we mentioned earlier, shared leadership occurs when leadership is equally distributed amongst the members of a team. Shared leadership is defined as “a dynamic, interactive influence process among individuals in groups for which the objective is to lead one another to the achievement of group or organizational goals or both” (Pearce & Conger, 2003, p. 1). More specifically, shared leadership acknowledges that all members of a team can serve as leaders given their unique perspectives and expertise. Research on shared leadership is in its nascent stages. The limited findings have demonstrated a positive relationship between shared leadership and team morale, team performance, and team satisfaction (Avolio, Jung, Murry, & Sivasubramaniam, 1996; Pearce & Sims, 2002; Serban & Roberts, 2016).

The literature on shared leadership emphasizes that team members have mutual influence and shared responsibility; however, there is little explanation on when and what conditions the team members emerge as team leaders. Burke, Fiore, and Salas (2004) clarify that shared leadership is the “transference of the leadership function among team members to take advantage of member strengths (e.g., knowledge, skills, attitudes, perspectives, contacts, and time available) as dictated by either environmental demands or the development stage of the team” (p. 105). It is possible that only one team member steps up as a leader at a given time, but throughout the entire team project, everyone has stepped up as a leader. For example, Klein, Ziegert, Knight, and Xiao (2006) qualitatively analyzed action teams and found that while extreme action team leadership is shared, it “is rarely if ever shared simultaneously. At any given moment, one leader, not three, is expected to be in the active leadership role, actively guiding the team’s treatment of the patient” (p. 601). As we mentioned before, team composition and situational factors can also influence when a member emerges as a leader.
Although there is little research to date on shared leadership, we are able to draw upon studies focusing on power dispersion, which relates to leadership and how power is dispersed in a team. High group dispersion is when one member holds most of the power. According to Tiedens and Fragale (2003), people find social settings to be more pleasant when there is high power dispersion. However, contradicting findings have shown that high power dispersion creates power struggles and conflict due to feelings of unfairness (Henderson & Frederickson, 2001). In high-power teams (e.g., management teams, or expert teams) there has been data supporting the idea of shared power being positively related to conflict resolution because it allows for equal participation and collaboration with the rest of the members while avoiding power struggles (Greer & van Kleef, 2010). As such, it stands to reason that sharing of leadership responsibilities would also have an impact on team satisfaction. The current study closely examines what shared leadership actually looks like in a research team. We seek to answer the questions: What does shared leadership look like in a research team? and Is shared leadership a desirable leadership structure for a research team? Following the footsteps taken by Klein and colleagues (2006) we use a process-oriented qualitative approach because “qualitative research may prove more effective than survey research in revealing the deep structures and the dynamic nature of leadership” (p. 594).

Stage 1 Methods

The research setting

For this study we focused on civic research teams based out of a small liberal-arts university in the southern region of the United States. These teams are interdisciplinary groups of undergraduate students who work on civic research projects on behalf of community partners to address issues and challenges facing the city and its residents. These teams are a partnership
between the university and community partners, which brings together skilled and motivated college students from a range of academic fields to develop creative responses to complex civic questions and community challenges. The program provides undergraduate students with knowledge, skills, and opportunities to apply what they learn in the classroom to real-world issues; learn from their teammates and community partners; develop team- and community-based leadership skills; and communicate their ideas effectively to various stakeholders.

Over the past few years these teams have been engaged with a range of civic issues, including: improving public transit, evaluating effectiveness of traffic management, public agency resource planning and allocation, and supporting non-profit advocacy through research. The topics worked on are based upon a charge from the community partner which depending on the project is more or less specific. Typically the team has a concept of the end product and perhaps some ideas on how to get there from the community partner, but exactly what the team will do in order to address the charge is up to the team itself.

Teams last for one semester, with the application process taking place 2-4 weeks before the team first meets each other and begins working on the charge from the community partner. On average the length of the teamwork is approximately 14 weeks, with each student on the team committed to spending 10 hours a week on the project. Generally in earlier weeks teams spend less time on the project and more time as the project nears completion; averaging out to about 10 hours a week. During the first few weeks the team is subjected to reflection exercises by their team coach to help them identify who among the team brings which knowledge, skills and experiences to the project.

Teams are comprised of three to five undergraduate students representing a broad range of knowledge, skills, abilities, and academic majors. Most teams include four students who are
either sophomores or juniors, but occasionally freshman and seniors are on teams. Students are selected for the team after an application and interview process. Selections are based on choosing students who together bring a wide berth of knowledge, skills and experiences that is expected to be necessary to complete the project. Additionally, applicant personality is considered in order to assemble a team that will likely work well together.

Over the last few years, application methods have changed slightly but have always consisted of both a written application where the focus is primarily on the applications knowledge, skills and experiences and a semi-structured interview designed to probe aspects of the written application, better understand the applicant's communication and interpersonal skills, and general demeanor.

Each team is also assigned a team coach who provides a mix of subject matter expertise, experience working with students in a mentoring or advising capacity, and who has been provided some training and resources on working with research teams. The teams report progress on their projects to both a faculty and staff advisor who meet with the teams weekly to provide feedback on performance and make suggestions for future actions. This meetings also reinforce that information provided by the advisors are merely suggestions and that decisions are in the purview of the team itself.

During the applicant interview process it is stressed that projects are team based and that there is no defined leader. However, it has often been observed by faculty and staff advisors that some students take larger roles in regards to presenting the status of the project at weekly meetings or in communication with advisors. It is believed that this is due to some students deciding to defer to others based on seniority (class year), previous team research experience, or personal introversion.
Data Collection

The focus of this research is on the team that assembles to complete a given research project. We conducted semi structured, confidential individual interviews with 14 members across eight teams. Interviews were conducted by one of the authors and transcribed by an undergraduate research assistant. The interviews were designed to 1) gather information related to the subject’s background as a student researcher both in general and as part of this team research program, 2) to understand how students perceive leadership in a seemingly leaderless team, and 3) identify competencies critical to emerging as a leader within this structure.

Stage 1 Results

This qualitative study of leadership in research teams uncovered a unique approach to shared leadership along with other important themes essential for effective teams. Now we will elaborate on the common themes that we found when analyzing the interviews. The literature on shared leadership mainly focuses on the idea that the team members have mutual influence (Carson, Tesluk, & Marrone, 2007; Day, Gronn, & Salas, 2004; Pearce & Conger, 2003; Pearce & Manz, 2005; Pearce & Sims, 2000; Perry, Pearce, & Sims, 1999; Small 2007; Spillane et al., 2004; Wang, Waldman, & Zhen, 2014; Yip & Raelin, 2012). The literature also mentions that all of the team members “lead one another to the achievement of group or organizational goals or both” (Pearce & Conger, 2003, p. 1). However, there is a gap in the literature on exactly how the team members share responsibility for the team’s goals.

Our interviews revealed that team members will gradually recognize their part in the project and take on a leadership position when their specialty or expertise is needed. Across all of the teams that we interviewed, almost all of the student researchers felt like a leader at certain points of the project. Team Member 14 stated, “Everybody had their niche. My thing was
numbers but more like data and what it represents and interpreting it. The fourth team member was good at writing and designing. We each had our strengths and weaknesses. The person with the niche took the lead for that role.” This supports the idea that shared leadership is an emergent team property that occurs in leaderless teams (Carson, Tesluk, & Marrone, 2007; Pearce & Conger, 2003; Wang, Waldman, & Zhen, 2014). Table 1 (shown in Appendix A) displays quotes from the interviews that demonstrate this theme.

Theme 1: Shared leadership emerges in leaderless research teams.

Still, as we mentioned, this process occurred gradually. For a semester long research project, researchers stated that it typically took a few weeks for the team members to recognize their role as a leader and that their roles were well-defined enough to complete the project; however, clearly defining their roles in the beginning of the project would have helped. Team Member 6 stated, “Sometimes it was a little struggle of transition because we would kind of wait for the next leader to step up…It would have been helpful to know that ahead of time—to be able to know how your expertise was going to require you to lead at a certain point.”

The teams did not complete any formal leadership training prior to starting the projects, but they were encouraged, and some took it upon themselves to take time to figure out each other’s roles and who would lead what part of the project given their specializations and interests. Table 2 (shown in Appendix A) displays quotes from team members that expressed a need for training or explicit role clarification.

Theme 2: Without training, the emergence of shared leadership in a leaderless team is a gradual process.
An interesting caveat to the concept of shared leadership was that within these teams, even though they felt a sense of shared leadership, a single person still tended to emerge as a traditional leader. Rather than emerging as a leader for his or her expertise, the individual emerged due to other factors such as age, research experience, gender, or personality. Table 3 (shown in Appendix A) displays the characteristics of individuals who emerged as the overall team leader. While they all identified as leaders, they pointed out that one person emerged as a leader more so than the others and carried them through the project.

This overall team leader served as a facilitator, coordinator, boundary spanner, and director-which fits the more traditional idea of a leader. A facilitator makes sure that all team members are able to express their own ideas. This builds psychological safety which is “a shared belief that the team is safe for interpersonal risk taking” (Edmondson, 1999, p. 354) and gives everyone a license to speak up. A director distributes the tasks to team members and makes sure that deadlines are being met. A boundary spanner brings in collaborators from outside of the team. The leader can link the team to the outside to gain resources and buffer them from any conflicting external forces (Kolb, 1993). In this case, the leader functions as a public relations figure. Kolb (1993) found that speaking and acting as a representative for the group was significantly correlated with team performance.

For the most part, teams favored having a single leader emerge because as Team Member 14 mentioned, “it kept the project going. It kept us efficient.” Table 4 (shown in Appendix A) provides examples of interview quotes on the effectiveness of having a single individual emerge as a leader. The main finding was that traditional leadership exists within the shared leadership structure. There is still room for one individual to emerge above the others in terms of leadership, while still allowing the team to feel as though they all held a position of leadership.
Theme 3: Within a team with shared leadership, a traditional leader still emerges and is beneficial for the team to progress with their goals.

Another common theme that emerged in the interviews was the need for psychological safety. It does not come to a surprise that teammates should create a climate that allows everyone on the team to take interpersonal risks. Essentially, a climate that is psychologically safe provides teammates with a license to speak up (Edmondson, 1999). Characteristics of a psychologically safe climate include a blend of trust, respect for each other’s competence, and compassion for one another (Edmondson, 1999). In order to facilitate creativity and innovation, teammates should feel comfortable brainstorming and sharing ideas, regardless of how good or bad, without being degraded by the other teammates. According to Google, psychological safety is the most important key to a successful team (Rozovsky, 2015). Scientific evidence has shown that psychological safety is positively related to innovation, idea generation, decision quality, team performance, team confidence, creative team performance, and the list goes on (Amabile, Conti, Coon, Lazenby, & Herron, 1996; Baer & Frese, 2003; Edmondson, 1999; Edmondson & Lei, 2014; Hülsheger, Anderson, Salgado, 2009; Keller, Julian, & Kedia, 1996; Kessel, Kratzer, & Schultz, 2012; Tiwana & McLean, 2005; West & Anderson, 1996). Specifically for research and development teams, it has been shown to lead to lowered team turnover and improved performance (Chandrasekaran & Mishra, 2012).

When asked “As a whole, did the team work well together?” interviewees constantly described the team as having a psychologically safe environment. For example, Team Member 13 said, “All team members were accepting and had a mutual understanding on how to work together adeptly.” Many of the team members did not feel intimidated speaking up when they had an idea, and they typically felt that their ideas were being taken into consideration.
Theme 4: Psychological safety is desired and beneficial for research teams.

Prior to conducting the interviews, we assumed that some teams would have high psychological safety and others would have low psychological safety. In the low psychological safe environments, we would expect an individual who is overpowering, mean, or inconsiderate. However, this did not seem to be the case. Interviewees did not express any overt behaviors that showed low psychological safety. Instead, an unexpected theme emerged.

Interestingly, while the teams did not struggle with achieving a psychologically safe environment, some of the teams had an issue related to developing psychological safety. It seems that they were overly concerned with not hurting each other’s feelings that it hindered the decision making process. Some struggled with finding a balance of trying not to offend others, but also being open to providing each other with constructive criticism. As Edmondson (2002) mentions, psychological safety is not “a cozy environment in which people are necessarily close friends, nor does it suggest an absence of pressure or problems” (p. 7). It almost seems that teammates are too concerned with being considerate of others that it negatively impacts the team’s progress and performance. As Team Member 11 pointed out, “You always think of the really bad team members – the aggressive person, extreme, person not pulling their weight, but really people try to avoid conflict, and it shouldn’t actually be avoided, it’s harder with these smaller aspects.” Therefore, navigating how to develop a psychologically safe environment can be difficult for those who are overly friendly and considerate. This can be especially challenging for those who are unfamiliar with one another and begin to work together, which occurs frequently in a research team setting. Table 5 (shown in Appendix A) displays more quotes that point out this challenge.
Theme 5: A common challenge for research teams is creating a psychologically safe environment that is friendly but still allows for providing constructive criticism and dismissing others’ ideas.

Stage 1 Discussion

To face the challenge of performing in research teams, groups use a spectrum of shared leadership. This style can sometimes appear very traditional, while other times one individual takes some of the decision-making and managerial responsibilities. The data shows a consistent need for psychological safety in these teams to function properly, regardless of where they fall on the leadership spectrum. There is also evidence that a training program could assist in expediting the team processes that will lead to better leadership functioning.

Psychological safety in Research Teams

Psychological safety, or a shared feeling of interpersonal security in risk-taking is an important team-level process (Edmonson, 1999). It is incarnated in organizational contexts as the ability to speak freely without fear of rejection or punishment and accompanies acceptance by the group (Baer & Frese, 2002). High levels of psychological safety have been associated with higher levels of performance at both the team (Kessel, Kratzwer & Schultz, 2012) and firm (Baer & Frese, 2002) levels.

From our research, we can see that the data we collected has clear connections to the theory behind psychological safety. The evidence gathered further points to the need for psychological safety as a precursor to team performance. Team Member 8 was quoted as saying “Once I realized everyone wanted each other to have an equal role and get something out of it I was more able to speak up.” Before the individual could contribute to the discussions, decisions,
and directions to pursue research, there was a need for validation that each member was an equal part of the team. This finding points to psychological safety as a cornerstone for performance in interdisciplinary, leaderless research teams.

Our study also provides support for the connection between task conflict and performance benefits, a relationship moderated by psychological safety. Only in cases where high levels of psychological safety exist do task conflict lead to better performance (Bradley, Postlethwaite, Klotz, Hamdani, & Brown, 2012). According to Team Member 7, “everyone took everything in stride, nothing was personal, feedback and constructive criticism was conveyed well.” This removal of personal emotions from the task is key to achieving the positive connection between task conflict and performance enhancement, and many teams seemed to do this by offering a safe environment for the student researchers to focus on the job at hand rather than think about their team’s opinion of them.

**Decision-Making and Delegation in Leaderless Teams**

Our data showed that one team member will take on some leadership functions. Particularly with the delegation, there were gaps in teams’ ability to accomplish goals depending on a specified delegator. A researcher who worked on two separate teams mentioned, “Since the leader from Team 1 delegated tasks there is more accountability there. In Team 2 there was no delegation and things tended to be pushed to later deadlines” (TM 2). Here there is a clear contrast between effectively meeting deadlines when one member takes on a delegating role, and when this does not exist.

In our study of research teams, there were occasions where individuals would take the lead during group decision-making times. Occasionally this was accepted by the team as it
expedited the decision-making process, but other times members preferred to make decisions together. Table 2 (shown in Appendix A) contains some of the differing opinions on this topic. During decision-making situations, a common issue that leaderless research teams faced was being too cautious. Sometimes the team would hesitate to exclude someone’s idea, even when it was not suited for the project at hand. Table 5 (shown in Appendix A) displays examples of how team members struggled to balance a psychologically safe environment with being assertive and critiquing others’ ideas. In these cases, members preferred to have a leader emerge who would make the hard choice to choose one direction for the project. In both of these two situations: task delegation and decision-making, there is sometimes a single leader that emerges from a shared leadership team. This can lead to higher member satisfaction.

**Training Programs for Shared Leadership Teams**

Our data indicates that there is room for improvement for training leaderless teams. Despite that some of the teams in our study spent time doing simulations and exercises that encouraged proper team communication, we do not believe this to be as effective as structured training. As shown in Table 2 (in Appendix A), additional formal training program could be helpful. For example, encouraging each member of the team to work together on a task before their main project can expedite team processes so that the group is ready to cooperate and accomplish their goal at the start of their research project. Such an experience would allow for a greater sense of familiarity which may help foster a collective sense of psychological safety. Table 3 (shown in Appendix A) contains further evidence related to this topic. According to the table, role clarification is helpful and happens naturally in leaderless research teams. However, training could accelerate this process, leaving teams prepared to accomplish their projects at a
quicker rate. Thus, there is a role for training team members to be aware of differing roles including shifting managerial responsibilities.

**Future Implications**

The focus of this study was on leaderless research teams in a student population. Although the nature of their projects makes them very similar to non-student research teams, a natural next step would be to test the need for psychological safety and the degree to how much decision-making responsibility the delegator should hold in this type of population. A particularly interesting follow-up could be comparing the level of psychological safety in newly formed teams with established teams to determine whether experience in the team is a moderator on the effects of psychological safety on team commitment and performance. Another study could include examining the rate of leader emergence in shared leadership teams. It could be that leader emergence is more common in action teams than in research teams, due to a need for faster decision making in action teams. Lastly, there is a clear need to create and validate a training program for leaderless research teams to enhance group cohesion and performance.

**Summary**

This qualitative analysis of civic research teams informed our analysis in several areas. We found evidence that traditional shared leadership occurs in leaderless teams. More surprisingly, single-leader emergence also occurs frequently in these same settings, and is sometimes preferred to wholly shared leadership. Training may be able to help advance the formal role clarification process that naturally occurs in leaderless teams. The data also served as a reminder of psychological safety’s key role in team processes. The lessons from our study can be applied in the ever-growing world of leaderless teams, particularly research teams.
Below are the conference submissions with these research findings:

- **Investigating the Spectrum of Leadership in Leaderless Research Teams**
  
  **Submitted to** 12th Annual Interdisciplinary Network for Group Research Conference, 2017

- **Leadership in Research Teams: A Deeper Look into the Nuances of Shared Leadership**

  **Submitted to** 77th Annual Meeting of the Academy of Management, 2017

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**Stage 1 References**


Stage 2

Please contact PI for a copy of the Shared Leadership Training module.

After interviewing 15 previous HART students as subject matter experts and leveraging the literature on training (Salas et al., 2015), we created a shared leadership training that provided (1) information on shared leadership, (2) demonstrations in the form of video examples, and (3) practice opportunities in the form of vignettes.
Stage 3

We developed a shared leadership training program and administered it to the current Rice University Houston Action Research Teams (HARTs) operating out of the Center for Civic Leadership. The purpose of this was to influence their behaviors and encourage them to embrace the concept of shared leadership. Training is an intervention that uses persuasion and motivation to alter cognition and behaviors by providing trainees with evidence-based strategies and knowledge (Salas et al., 2015).

Stage 3 Background

HART students work together to address a community based issue in collaboration with a community partner through the creation of a joint interdisciplinary research based deliverable. The interdisciplinary nature of HART projects demand a team based approach to address issues and solve problems that would be too complex for any single individual. Based on our subject matter expert interviews, students on a team shift towards either a dominant or passive role on projects, allowing more dominant individuals to take on the role as a leader. However, a meta-analysis has shown that approaching a team project with a shared leadership approach can help facilitate group interactions and increase their overall team effectiveness (Wang, Waldman, Zhang, 2014). Shared leadership is a “dynamic, interactive influence process among individuals in groups for which the objective is to lead one another to the achievement of group or organizational goals, or both” (Pearce & Conger, 2002, p. 1). With all team members completing our shared leadership training and assuming they both find it useful and learn from it, we hope to instill values regarding shared leadership as a tool for group work. Moreover, we hope that this training is effective in modifying behaviors of group members, such that they embrace shared leadership as a technique in working together to achieve their goals. The literature on leadership training suggests that interventions alter cognitions (i.e., learning) and behaviors (i.e., transfer of training) (Lacerenza, Reyes, Marlow, Joseph, & Salas, 2017). To our knowledge, there is only one other training program that has been evaluated that specifically targets shared leadership training, and it is in the context
of nursing teams (Allen, 2010). Therefore, we believe it is beneficial to develop and evaluate a shared leadership training program for undergraduate student teams.

**Stage 3 Training Delivery**

Initially our plan was to administer the training early in the semester to see how the training itself influenced behaviors of the students in the HART program. However, due to delays with building the training module and student absences, we were unable to give the training to the HART students until October 24, October 25th, and November 3rd. A total of 11 students completed the training (one student had dropped out of the program in early October due to personal/medical reasons). The students were asked to take a pretest, the training, and the posttest. They were informed that the intention of this was to test the effectiveness of the training and solicit feedback for the training which would be used for future teams as well as potentially for other courses and projects around campus. In each group the students first filled out the pretest consisting of 10 questions (Appendix B). Upon completion each student watched the training on their own laptop using headphones to allow students to have some individual control over the pace of the training. Upon completion of the training module, students were given the posttest consisting of the same 10 questions, as well as a series of questions designed to solicit feedback on the training. Feedback was solicited along a five-point Likert scale (1 = Strongly disagree" to 5 = "Strongly agree"). Two students provided written feedback on the questionnaire in addition to responding to the feedback questions.

**Stage 3 Training Evaluation**

As part of the Kirkpatrick’s (1959) framework, we were able to assess reactions and learning. Reactions were rated with 10 questions on the importance and satisfaction of the program. Students were generally satisfied with the training experience. Table 1 displays the items and scores on a 1-5 point-Likert scale (Appendix B).

Next, we assessed learning from the training. To do this, we used the internal referencing strategy (IRS; Haccoun & Hamtiaux, 1994). In lieu of a control group, the IRS requires mixing training-relevant
questions with training irrelevant questions, allowing researchers to compare results on both types of questions. If the improvement in participants’ knowledge of training-relevant material is reliably greater than their improvement in knowledge of training-irrelevant material, the training program is deemed to be effective at enhancing learning.

There were 5 relevant items and 5 irrelevant items. First, we conducted a two-way repeated measures ANOVA, 2 (pretest and posttest) by 2 (relevant and irrelevant items) analysis. There was a statistically significant two-way interaction between type of items and time, $F(1, 10) = 8.71, p = .01$. There was a statistically significant score improvement from pretest ($M = 3.36, SD = .67$) to posttest ($M = 5.00, SD = .00$) for relevant test items; $t(10) = 8.05, p < .001$. However, there was no difference in pretest ($M = 2.73, SD = 1.27$) and posttest ($M = 3.18, SD = .87$) scores for irrelevant test items; $t(10) = 1.17, p = 2.71$. Figure 1 displays the results (Appendix B).

Discussion

Due to complications in training development and having to push back our training dates, we were unable to examine potential behavioral changes among the students or identify if they made use of the behaviors suggested in the training. Despite this limitation, we did find that students were both satisfied with the training and learned from it. These findings lead us to believe that the training will be effective in changing behaviors, because cognition does relate to behavior.

Stage 3 References


## Appendix A

### Table 1.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expertise determines role</strong></td>
<td>“In terms of leadership it felt like there were different moments where different people “stepped up to the plate”. All of us had our strengths. When it comes to a team you have to play on their strengths” (TM 11).  &lt;br&gt;“Everyone was a leader and had their strengths where they could in the project it felt like everyone was invested in the project and had their own area of expertise” (TM 5).  &lt;br&gt;“We all had different strengths so we could lead in specific aspects. Everyone knew what role they fit into and took leadership in the role they felt best in” (TM 8).  &lt;br&gt;“Leadership on the team was taking initiative to do the things best suited to your individual skill set” (TM 9).</td>
</tr>
<tr>
<td><strong>Feeling like a leader</strong></td>
<td>“I felt that different people took responsibilities in coordinating different parts of project” (TM 4).  &lt;br&gt;“The leader is the one who spearheads the initiative that they are best at” (TM 9).  &lt;br&gt;“[It was] Nice that everyone acknowledged each other’s expertise” (TM 13).  &lt;br&gt;“Felt like everyone was a leader. Everyone had an interest in following the plan we had for the project. Everyone equally cared about the project” (TM 5).  &lt;br&gt;“[In my experience] everyone on the team was mellow so I felt like I was the leader on that team. It was mostly coordinating stuff between everyone, understanding different skillsets, delegating tasks, checking in throughout the week” (TM 6).</td>
</tr>
<tr>
<td><strong>Availability determines role</strong></td>
<td>“In moments where someone was too busy, others stepped up” (TM 11).  &lt;br&gt;“Way it worked out time-wise, ended up wrapping up with different pieces after classes, since she had more time, took leadership role in terms of getting final report together because she had ability to time-wise” (TM 4).  &lt;br&gt;“One thing we were good about was knowing when certain members of our team were having a tough week with other work, so there were times when one of us would be out of town or were doing other leadership programs, so during those times the other people on the team were good about making sure everything got done without them” (TM 8).  &lt;br&gt;“Took turns [leading] based on availability and expertise that was needed at the time” (TM 13).</td>
</tr>
</tbody>
</table>

*TM = Team Member. The number following the “TM” corresponds to the specific person interviewed who said the specified quote.*
Table 2.
Evidence that role clarification can be expedited.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Evidence</th>
</tr>
</thead>
</table>
| Direct role clarification is helpful | “I guess if we more well-defined what we were talking hold of. So, if we knew specifically what we’re going to be working on, if we said you’re doing this lit review and you’re doing these statistics, it would be easier to figure out. Everybody had their niche... We each had our strengths and weaknesses. The person with the niche took the lead for that role” (TM 14).  
“Naturally different people assumed leadership in different areas. [One member] and I took the classical traditional leadership roles – made sure group was meeting, organized, kept track of work [that] needed to be done” (TM 10).  
“I don’t remember if we officially defined our roles in the beginning but obviously we were all doing a little of everything but I was the designated communications person – I volunteered to contact through email. And others must have volunteered because we did work pretty well – that might have even been something that our advisor suggested, that we designate someone. it’s important, it has worked well with groups if they did” (TM 10).  
“We definitely made sure to take time what we were supposed to be doing and what each person’s role was at the beginning of the project” (TM 8).  
“I think that roles were as defined as needed to be to finish the project, but it was still a bit of a struggle to find the intellectual roles of each person” (TM 6). |
| Training helped group              | “We did a few exercises at the beginning of our project that were leadership exercises… I think part of what was helpful about those was, this one person doesn’t always speak up when they have an opinion. This other person speaks up when they don’t know what they are talking about. I think to that extent, simulating a tense situation, it was helpful to see one girl was somewhat reserved. But I don’t know, it seems like the time put into those exercises and what we got out of it was a little skewed. That was, from what I remember, those, I think they were particular to our group, would be useful for a group that didn’t already know each other” (TM 6). |

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### Table 3.

**Characteristics that predict who emerges as the traditional leader.**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personality</strong></td>
<td>“[Our leader] exuded calmness, wasn’t anxious. If she needed to call someone out, she would. She was really good at communication skills, not aggressive, welcoming, and approachable [not] passive aggressive—something that needs to be improved upon, no one wants a leader who is passive aggressive” (TM 11). “Strong voice versus guiding voice. Strong: project, large-focus and goal, Guidance: steps and small details” (TM 4). “Other girl took the leadership position, she was a perfectionist and didn’t mind that she was younger” (TM 2). “Everyone on the team was mellow so I felt like I was the leader on that team” (TM 7).</td>
</tr>
<tr>
<td><strong>Seniority</strong></td>
<td>“The senior emerged as a leader. He had the most experience in leadership roles, was the oldest, and was the most comfortable talking and breaking silences in meetings” (TM 8). “I think I had a vision for what I wanted to get out of the project and pulled my team along and wanted to work hard to have the client’s vision realized, and being the oldest student could have had something to do with it” (TM 10).</td>
</tr>
<tr>
<td><strong>Experience</strong></td>
<td>“He was on a team before and knew the ropes and started out as the primary leader in discussions… whereas the other 2 of us didn’t know the big picture, being that he had the role of data analysis, he knew the platform of the project and how the data was created and what we were looking for rather than me who was just interpreting – he would try to describe it to me but it was in stats terms – he knew the details” (TM 12). “All of us looked up to [one member] because she was one year above us and had done a lot of research before and it was a new experience for me so I was happy to listen to others but I was fine with stepping up to the plate to communicate with all the players involved. Towards the end, she delegated tasks based on what the final picture should look like and what we had to get done” (TM 11). “Faculty members were more of leaders, and they were fine as they were! They were not pushy – it was still very much our project” (TM 9).</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>“This leader was a sophomore male, whose knowledge applied more to the project” (TM 4). “[Leader] would want to start and end – he was very bold, forceful, prominent, he knew what he was going to say and how he would describe it, where as the other 2 of us didn’t know the big picture” (TM 12).</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Topic</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>It was helpful to have one coordinating leader</td>
<td>“It kept the project going. It kept us efficient” (TM 14).&lt;br&gt;“General group organization could have been better, scheduling things ahead of time, trying to timeline the project, being logistically more organized, with our time and with progression of the project. Sort of secretarial duties in one light, more coordination would have been great. Meeting with different parties involved, sometimes the schedule got messy because there was no schedule master. Someone who delegates tasks would be helpful and who coordinates everybody’s schedules” (TM 6).&lt;br&gt;“Despite having the least relevant experience, I was still able to take the lead on certain stuff like organization and deadlines and certain meeting times” (TM 8).&lt;br&gt;“It is not helpful when nobody steps up so you just kind of politely squabble over certain aspects and it can hold you up… we had different ideas and didn’t want to rule anybody out but it slowed down the process a little bit—ruling out process” (TM 10).</td>
</tr>
<tr>
<td>Experience helped determine leadership</td>
<td>“He was on a team before and knew the ropes and started out as the primary leader in discussions… whereas the other 2 of us didn’t know the big picture, being that he had the role of data analysis, he knew the platform of the project and how the data was created and what we were looking for rather than me who was just interpreting – he would try to describe it to me but it was in stats terms – he knew the details” (TM 12).&lt;br&gt;“All of us looked up to [one member] because she was one year above us and had done a lot of research before and it was a new experience for me so I was happy to listen to others but I was fine with stepping up to the plate to communicate with all the players involved. Towards the end, she delegated tasks based on what the final picture should look like and what we had to get done” (TM 11).&lt;br&gt;“I think I had a vision for what I wanted to get out of the project and pulled my team along and wanted to work hard to have the client’s vision realized, and being the oldest student could have had something to do with it” (TM 10).&lt;br&gt;“Faculty members were more of leaders, and they were fine as they were! They were not pushy – it was still very much our project” (TM 9).&lt;br&gt;“The senior emerged as a leader. He had the most experience in leadership roles, was the oldest, and was the most comfortable talking and breaking silences in meetings” (TM 8).</td>
</tr>
</tbody>
</table>
| Different opinions of extent of leader’s role | “Nice for someone to make those decisions and ultimately execute them. Sometimes I am not so decisive, so it’s nice when someone says “we just have to go ahead and move forward because we..."
have 3 weeks” in the beginning of the project it was clear whose responsibilities were whose, it wasn’t necessary for one person to take control – each person taking control of their own. I have no problem if I like and respect the person and respect the decision they make” (TM 11).

“I would say when it comes to managing, it helps when someone takes control, but when it comes to the direction we should go on, and what we should be spending our time on [that should be distributed]” (TM 1).

“It is not helpful when nobody steps up so you just kind of politely squabble over certain aspects and it can hold you up… When individuals did step up to make decisions, being in a leadership role – when one individual made the decision instead of a drawn out debate for logistical things it was helpful to move us forward”

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Table 5.

**Challenges related to developing psychological safety.**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>High levels of psychological safety allowed for task conflict.</td>
<td>“Everyone took everything in stride, nothing was personal, feedback and constructive criticism was conveyed well” (TM 7). “I remember them saying sometimes that specific people weren’t working hard enough, that things should have been done, just criticizing openly. I don’t think that led to us disliking each other. I think in the end although we were students it was clear that we wanted to treat this as a professional environment where we could disagree but still work together” (TM 2). “We felt comfortable with saying to each other maybe you should do this a certain way. We were able to give constructive criticism” (TM 5).</td>
</tr>
<tr>
<td>Psychologically safe teams empower members to lead</td>
<td>“At the beginning, I was nervous about being a leader because it was clear that I had no data analysis or experience with research or research papers, so my own worry and feelings of inferiority set a barrier for myself. I was a bit confused sometimes and was scared to speak up about that, but once I realized everyone wanted each other to have an equal role and get something out of it I was more able to speak up” (TM 8).</td>
</tr>
<tr>
<td>Range of levels of psychological safety across teams</td>
<td>“All team members were accepting and had a mutual understanding on how to work together adeptly” (TM 13). “Didn’t felt like my voice would matter, and definitely a lack of psychological safety. [I had a] lack of familiarity with a topic and a fear of sounding like I didn’t know” (TM 4).</td>
</tr>
</tbody>
</table>

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Appendix B

Questions for Testing Knowledge of Shared Leadership

Relevant Items:

1. Which of the following is not a correct representation of the SHARE strategy for promoting shared leadership?
   a. S- Shift leadership
   b. H- Hear all the ideas in the team
   c. A-Assign a project coordinator
   d. R- Recognize personality differences
   e. E- Encourage and motivate the team

2. Robin’s Tea Shop is trying to spread its brand across an area made up of mostly upper class elderly people, yet it has no viable strategy at this point. They assigned Joe, the VP of marketing and 3 other members from separate departments to come up with a new marketing strategy. Based on SHARE, which of the following would theoretically lead to a stronger sense of shared leadership?
   a. Joe becomes the leader of the whole team due to his experience in the field and let him lead all the discussions and decisions.
   b. Each member decides to do their own thing without input from the others due to their lack of experience, and only meet when required.
   c. Let the owner of the company lead the direction he wants to go, with the team working based of his ideas.
   d. Joe and the team explain their areas of focus, and then divide task depending on experience. They also meet regularly and have a free flow of ideas and inputs with constructive criticism and praise.

3. Which of the following is not one of the characteristics of a project coordinator?
   a. Well organized
   b. Good note taking skills
   c. Most experience on the team
   d. Interested in the role of project coordinator

4. What is psychological safety?
   a. The absence of stress or conflict
   b. Everyone likes each other
   c. A shared belief that the team is safe to take risk
   d. A safe zone for anyone facing psychological problems

5. What should be done about personality differences in the team?
   a. They should be categorized and placed together to increase level of efficiency
   b. Give everyone similar task so that personality differences will not come into play
   c. Make every person take a turn to speak around the table
   d. Recognize there are personality differences and implement strategies to make them effective

Irrelevant Items:

6. Which of the following is not a way that norms form?
   a. A recent acceptable action
   b. Explicit statements
   c. Critical events
d. Objective behavior evaluation

7. The situational leadership perspective includes which of the following leadership styles?
   a. Delegating
   b. Readiness
   c. Maturity
   d. Laissez-faire

8. Identify four of the five steps in team formation and development:
   a. Storming, Warming, Norming and Performing
   b. Forming, Storming, Norming and Performing
   c. Storming, Norming, Practicing and Adjourning
   d. Starting, Norming, Performing and Adjourning

9. Team creativity can be promoted in which of the following ways?
   a. Establishing a competitive environment to promote creative ideas
   b. Establishing challenges for the team
   c. Evaluating ideas during the idea generation stage
   d. Inducing Stress

10. Which of the following are benefits of brainstorming when compared to nominal group technique?
    a. Brainstorming is more effective in eliciting a greater number of ideas
    b. Brainstorming can create a positive organizational climate
    c. Brainstorming can encourage talented and highly skilled members to remain in an organization
    d. All of the above

Table 1. Reactions to Training
<table>
<thead>
<tr>
<th>Items</th>
<th>Average Score (Out of 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am satisfied with the overall quality of this training course.</td>
<td>3.73</td>
</tr>
<tr>
<td>I am satisfied with the match between training objectives and my idea of what would be taught.</td>
<td>3.91</td>
</tr>
<tr>
<td>I am satisfied with the relevance of the training content to my team.</td>
<td>3.82</td>
</tr>
<tr>
<td>I am satisfied with the extent to which the course prepared me to perform team tasks more effectively.</td>
<td>3.91</td>
</tr>
<tr>
<td>I am satisfied with the length of training course.</td>
<td>4.00</td>
</tr>
<tr>
<td>I am satisfied with the pace of the course material presented.</td>
<td>4.00</td>
</tr>
<tr>
<td>The training program allowed me to develop specific skills that I can use on my team.</td>
<td>3.64</td>
</tr>
<tr>
<td>The training program, overall, is useful.</td>
<td>3.82</td>
</tr>
<tr>
<td>I would recommend this training program to others who have the opportunity.</td>
<td>3.73</td>
</tr>
<tr>
<td>The course provided me with new ways of thinking about my team.</td>
<td>3.82</td>
</tr>
</tbody>
</table>

Figure 1
Figure 1. Test score differences between pretest and posttest for relevant and irrelevant items.