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TEAM CREATION METHODS IN PRACTICE: UNDERSTANDING THE
POTENTIAL EFFECTS OF NONVERBAL COMMUNICATION IN THE
LEADERSHIP OF TEAM FORMATION

A Dissertation
Presented to
The Faculty of the Department of Educational Administration, Leadership, and Research
Western Kentucky University
Bowling Green, Kentucky

In Partial Fulfillment
Of the Requirements for the Degree
Doctor of Education

By
Troy A. Robertson

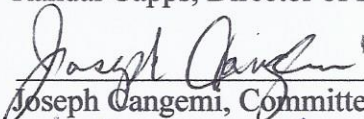
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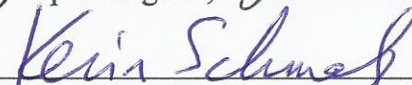
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Dean, Graduate Studies and Research

03/30/2020

Date

I dedicate this dissertation work to my wife and all my small business owner friends.

To my wife Lisa, you truly are an amazing woman. Without your support and intelligence, there is no possible way this work would have been accomplished. Thank you for enduring my many years of education that have led to this opportunity.

To a long list of small business owners who have navigated the world of leading and developing self-managed teams in their operations, thank you for your influences and the work we have accomplished that presses me forward to continually find a better way.

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The members of my dissertation committee are so much more to me than simply supporters of this work. These men are truly supporters of me. I am convinced they see straight through to the simple Kentucky boy who started an educational journey long ago and now finds himself achieving greater things because of their interests in his success.

Dr. Randal Capps, you have inspired me to pursue avenues of serving others I never knew existed before we met.

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Teams require leadership, even if they are self-managed. The group of individuals who make up a team must be gathered in some form or another. For self-managed teams to function successfully, the first step is the process of creating the team. Many aspects may factor into the creation process. Often time is of the essence and methods to quickly assess and form teams show merit. First impressions in general are based largely on nonverbal communication. The focus of this mixed-methods concurrent embedded study is to analyze the potential effects of nonverbal communication on influencing team creation. A group of mechanical engineering students placed randomly into teams provided a source of feedback on how they could have been affected if factors of nonverbal communication had been considered. Research has been conducted on small business hiring, self-managed teams, nonverbal communication, and team leadership; however, the author has not identified historical works concerning the potential impacts of nonverbal communication used by leaders in the formation of teams.

CHAPTER I: INTRODUCTION

The ability to interpret nonverbal communication effectively can have considerable advantages in everyday conversation if the receiver can appropriately understand the cues given by either individual in the conversation. “When a leader seems to give too much attention to ‘leadership’ this clue may inadvertently undermine collaboration” (Hernandez & Tatini, 2011, p. 21). Leaders are judged by their focus on things that obviously matter most to them. If the focus is primarily on leadership rather than those who support the leader, a realignment of priorities is needed. With a focus on followers, the leader should be observed by the followers as exhibiting responses that consider the followers’ specific circumstances. Truly understanding the aspects affecting the individuals one leads can improve the overall effectiveness of the resulting efforts in the outcomes.

Purpose

An essential component of communication is body language (Rao, 2017). Some scholars have proposed that first impressions appear within 100 milliseconds from nonverbal indicators (Anders, 2015). Unconscious levels are the places where nonverbal forms of communication are active (Koppensteiner & Grammer, 2010). These unconscious reactions are an area of great risk if left unchecked. Recovering from a misdirected reaction is not a speedy process. Undesirable predispositions may require as many as six months of close contact to disprove (Anders, 2015). According to the authors of *Team Genius*, Rich Karlgaard and Michael Malone, body language, which was a trend from over 30 years earlier along with other ways to communicate nonverbally, are in fact important (Karlgaard & Malone, 2015). The inquiries proposed by the researcher

in this work question the importance of nonverbal communication in the leadership of teams. If a leader is to focus considerable time and efforts on team formation, would an understanding of the mechanics of reading nonverbal communication be a time investment well spent? It is the intent of this research to unearth that which can be observed and is known on this subject to provide insight based on current research and experimentation offering guidance for the behavior of leaders.

Conveying emotion effectively as a leader may require specific expressions. Examples include displaying anger for reprimanding a follower, smiling to start or conclude negotiations, or offering a frown to display attention when listening to issues (Trichas & Schyns, 2012). Karlgaard and Malone (2015) supported the old phrase, “It is not what you say but how you say it” (p. 57), as a claim now proven to be mathematically accurate. If leaders, defined as those with influence and not simply managers with a title, acquire an understanding of nonverbal communication and focus a real practicing use of its interpretation, can this positively impact their leadership abilities? Leaders who present authentic expressions should be more favorable in comparison to others with less authentic expressions (Trichas & Schyns, 2012). Showry and Manasa (2012) wrote a great deal about communication in their article, *Effective Communication for Professional Excellence*. Showry and Manasa focused on the communication aspect, but much attention was given to the importance of body language. Silence and signals are nonverbal communication. Body language and embarrassing gestures that are ineffective transform communication into a tedious activity (Showry & Manasa, 2012). If leaders take the opportunity to comprehend actions being communicated directly in front of them rather than simply focusing on verbal responses, their ability to truly understand and react

within the context of the current situation could be heightened. For example, with an awareness of embarrassing gestures presented by Showry and Manasa (2012), a leader has the ability to shift a conversation in a more comforting or supportive direction. This would require the efforts of a truly transformational leader. A transformational leader can evaluate motives of their followers, meet their needs, and positively affect their humanity (Northouse, 2016). With a comprehension of leadership perception, leaders can profit from the proper meanings of facial expressions being accurate (Trichas & Schyns, 2012).

Teams as Small Businesses

Often the focus for a small business is its desperate desire to complete projects at hand by whatever means necessary. The time constraints are such that any miscalculation of where to direct efforts can either cost the organization money or even cost them a valued customer. Rarely, if ever, is the owner or management of such organizations afforded the necessary time to focus on strategic organizational objectives. Efforts of this scale are the brainchildren of university professors and large corporations with expendable resources. But, what if the owner of a small business took the time to organize and really think through an organizational plan for how the company should operate?

One rarely considers leadership in the confines of a small business environment. Often this fast-paced existence is devoted to a hierarchy of application engineers or small shop owners who dish out the work to a group of lower paid unappreciated craftsmen. A focus from the researcher's professional career generates the question: What if we invested larger portions of time in people and team creation rather than capital equipment

and technology? In a Tweet, Craig Groeschel (2017b) put it like this: “Don’t just see people as means to get things done. See getting things done as means to develop people.” Compare the value of one very committed and productive employee in contrast to one who is continually a time drain on other efforts. How much value would one invest in working with employees if they all could be as successful as the high performers? The logical thoughts this generates of employee turnover and loss of investments in people cannot be ignored. Richard Branson (2014) Tweeted, “Train people well enough so they can leave, treat them well enough so they don’t want to.” If teams are created within organizations that truly add more value than just a higher payrate for the employees, is there not more to gain than just employee retention?

Typically, employees become part of an organization by whatever circumstances brought them there. Those could be good or bad circumstances. On rare occasions small business owners may seek to build their organizations with the right people who can effectively accomplish the organization’s goals as a team. An existing organization may require a considerable amount of change to shift the workplace dynamics, but it certainly is not impossible. A new business or transitioning organization, however, has the opportunity to start this process in the early strategies by considering the factors required to build a team that functions productively. New employees should be considered under the magnifying glass of such concepts similar to what is required of a new partner in a law firm. Any new employee is exactly that—a partner in the organization. It is the researcher’s stance that business owners do not actually pay employees. Employees are hired to generate incoming revenue to cover their salaries and to continue the improvement and growth of the organization. If an employee cannot provide that level of

performance after all efforts of training have been completed, the employee is not pulling their weight in the organization.

How can one achieve this great utopia of small business productivity and teamwork? The researcher suggests the responsibility falls solely on leadership. Leadership, not management. There is a difference. Tom Peters explained it this way: "Management is about arranging and telling. Leadership is about nurturing and enhancing" (Totman, 2018, p. 65). To be successful in any profitable industry, leadership is required. Management can be found in acquired authority. Leadership, on the other hand, is rooted in influence. Kenneth Blanchard is noted as saying: "The key to successful leadership today is influence, not authority" (Jameson, 2006, para. 7). The researcher strongly suggested that effective leadership in a small organization should be focused on creating teams made up of the right people. These cannot be just any ordinary teams. A leader should focus on creating self-managed teams, which can help offset the invested cost required to create them. These teams have autonomous abilities that remove tasks and daily decision making from those in management to themselves, which can profit the operational flow. Organizational leaders are afforded the time to focus on high-level tasks with self-managed teams in place. Treating employees as partners in the organization builds a strong bond. A quote from Pat Summit (1998) stated, "Responsibility equals accountability equals ownership. And a sense of ownership is the most powerful weapon a team or organization can have" (para. 27). When employees act like owners, the strength of the organization grows exponentially.

Leading self-managed teams truly requires nurturing and investment in the team members. The leader must focus on building the skills of each member and pulling their

individual talents together. Robyn Benincasa (2012) said, “You don’t inspire your teammates by showing them how amazing you are. You inspire them by showing them how amazing they are” (p. xvii). To effectively lead such a team, the leader must continually gain influence by informal methods. Simply being identified as the manager has very little value in the areas of creating a team. For teams to become successful, the leader often must find ways for them to work through undesirable tasks. Craig Groeschel (2018) offered this definition of “motivation” in his leadership podcast: “The art of leading someone to do what you want them to do because they want to do it.” If true influence exists from the leader to the team, the coercive ability of the leader will be strong enough to convince team members why they also should see a need for accomplishing a difficult effort as a part of the organization, rather than merely adhering to an assigned task. Effective leadership in a small business environment requires strong efforts to build self-value in employees. “Leadership is communicating people's worth and potential so clearly that they come to see it themselves,” according to a Tweet by Stephen Covey (2018).

Returning to the overlooked necessity of hiring the right people, the researcher promotes the use of such tools as the Myers Briggs Personality Type, Strength Finders Assessment, Right Path, and other reputable tools for evaluating employees and potential employees, as there are many avenues to pursue in the exploration of forming a strong team. Often the value of using such tools is not sufficiently considered, e.g., if one could predict how a particular group of employees would work together on a specific task. Would an accurate prediction be of value? These assessment tools can be viewed as a

novelty and overlooked when they can truly be used to strengthen a small organization's environment especially seeking to build self-managed teams.

Not only should assessments be used for hiring and team forming, but also internal evaluation methods should be a focus of anyone leading in an organization. Considerable efforts should remain on continuous improvement industry-wide. From a leadership perspective, this includes more than production-level improvement measurements and assessments. Andy Stanley's (2012) Tweet stated, "If you don't know why something is working when it is, you won't know how to fix it when it's not." Stanley is recognized for repetitively stating in his leadership podcast the need for measurement and evaluation. To consider the status of a team as effective or not requires data to back it up. It is the leader's responsibility to collect valuable information through a team's progression and then productively review the findings with the group. Without utilizing such growth tools, a team cannot grow or focus on limiting repeat mistakes.

From a management perspective, leadership is a choice—the choice to either invest in an organization's future or accept the results of the mere circumstances for which employer and employee relations exist. Choosing to be active in leadership by focusing and developing influence is to build on a long-term source of strength through which an organization using self-managed teams can function. When a group of strongly skilled persons can work so closely as to expect what each individual's strengths and weaknesses offer, the management of such a team is almost not required. However, leadership will continue to build the required bonds to take such a team even higher. Leading builds on shared concepts of communication and trust between the team and the leadership. The existence of this concept in an organization by nature creates leaders

within the teams who inspire others to lead from where they are and with the influences they have.

Research Questions

In this research, the questions are investigated for positive or negative effects of nonverbal communication on team formation. A sample of engineering students were available to survey and assess for feedback.

RQ1: Is it important to factor in aspects of nonverbal communication when creating teams?

RQ2: Do members of randomly formed teams see potential for improvement in the formation processes using nonverbal communication?

RQ3: Can leaders, who are not experts in nonverbal communication, successfully interpret nonverbal communication to assign individuals into a team based on a first-time meeting?

Limitations of the Study

The relative absence of meaningful research on a leader's role in team formation and a leader's use of evaluating nonverbal forms of communication in that process does not provide a wealth of historical information on these influences. Despite the demonstrated value that such information could bring to the team creation process, focused work is lacking in this area of research. The awareness of this gap in research for the leadership of teams seems to validate further study in this area.

Not a great deal of research has been conducted on nonverbal communication and team formation in comparison to the amount of work in team research. Some research does, however, exist on self-managed teams, which relates more specifically to the focus

of this study. Previous research with student teams, which ultimately is studied in this research, is very limited concerning the areas of forming such teams by the assessment of nonverbal communication. Examples from research on creating teams can be obtained from work on hiring concepts for small businesses. Teams in small businesses, as well as small businesses as models of teams, offer examples of self-managed teams that have been formed as a part of a hiring process.

CHAPTER II: REVIEW OF LITERATURE

A need exists for change in management styles in America to be more team-based and less hierarchical for small business. Everett Rogers' *Diffusion of Innovations* (2003) presents an idea of how a change initiative should be outlined. Rogers' innovation-decision process builds an organized framework on how to structure a change. Using the innovation-decision process to understand how each stage of the process can be planned supports efforts to attack such an innovation. The focus of such a change in management style is more on acquiring the right people in the organization along with aligning the right people with the right teams. Multiple methods of screening, raters, and criteria are suggested as best practices by researchers for hiring; however, organizations typically use the method of one interview and one interviewer (Bowen, Ledford, & Nathan, 1991).

The motivation for improving team creation efforts is to also improve job satisfaction, enjoyment, and personal ownership of organizational goals for the end results of stable employment and reduced turnover. A study from Kristof (1996) entitled *Person-Organization Fit: An Integrative Review of its Conceptualizations, Measurement, and Implications* addresses several concepts of personnel fit, including Person-Organization, Person-Environment, Person-Vocation, Person-Group, and Person-Job. Person-Group is discussed as becoming used more often as a more relevant aspect of fit because of the compatibility within groups (Kristof, 1996). Each personal fit will help to develop a defined model for small businesses to build their own personnel fit expectations. A potential candidate who appears to have a Person-Group fit with a team will be a wise choice for hiring. A reasonable source of positive information on the topic comes from studying German methods of organizational leadership and management.

According to Geert Hofstede (1995), in Wren's *Leader's Companion*, German business schools are not prevalent. A study is mentioned by Hofstede from the consulting firm of Booz, Allen, and Hamilton that offers an American perspective on German management claiming that German management concepts were weak in 1973. Hofstede stated, "the highly skilled and responsible German workers do not necessarily need a manager, American-style, to 'motivate' them" (p. 256). The ideas of Fredrick Taylor have found great resistance in such an environment. The structure of a Taylor-based system combats the very fabric of German cultural methods. Fredrick Taylor's Scientific Management pulls together a society of diverse people, rather than focusing on creating an organization built on having the most appropriately skilled people working in their skillset (Hofstede, 1995). Organizations hire based on a desperate need rather than taking the time and focusing on finding the best person for a team.

The German approach is effective from all levels of an organization from janitorial work to those in the boardroom and the need for all groups to work effectively to fulfill the goals of the organization. Mazda in Michigan, for example, invests \$13,000 for every employee hired, supporting the idea that such companies recruiting employees by this method place as much capital and effort on assembly positions as they do on executives (Bowen et al., 1991). Fredrick Taylor stated, "The principal object of management should be to secure the maximum prosperity for the employer, coupled with the maximum prosperity for each employee" (1967, p. 9). Taylor's sense of prosperity was focused on getting the most efficiencies out of every possible capability of the organization, rather than finding prosperity in success coupled with employee satisfaction. His method was to take individuals already in the organization and

maximize their work by utilizing their capabilities to the fullest. The proposition made in this research focuses on a team-based effort rather than on a hierarchy. Making the efforts of employee placement in the positions of proper fit at the beginning of their employment is an impactful decision on the success of their working and team-based environment.

The researcher's argument is for a change to spend more time on locating the right people rather than attempting to create the right people because of that which can be found within pressured time constraints for the situation. Researchers and managers speculate behaviors and individual performance are the combination of both the person and the situation (Bowen et al., 1991). Bowen et al. (1991) revealed their argument that the situation is overemphasized by the researchers and managers with mild attention given to the individual. Recovering from choosing the wrong person for the team is more difficult than finding the right person to begin with. "The best time to fire is before you hire," said Craig Groeschel in his April 2017 leadership podcast. Traditional hiring methods are focused more on finding employees to hire rather than what it may take to retain them (Bowen et al., 1991).

From the researcher's perspective, this study is important for successful growth of small business and entrepreneurship in the United States of America. Rather than small businesses looking to large corporate models of organizations and failing because they do not have the surplus of funding to recover from management failures, small businesses must be strategic and built on strong team-based foundations. From a related study by Barber, Wesson, Roberson, and Taylor (1999) entitled *A Tale of Two Job Markets: Organizational Size and its Effects on Hiring Practices and Job Search Behavior*, a focus

on big organizations is a concern from the stance that recruiting practices are different for small businesses. A full staff of human resources support is likely to be available in larger organizations, but conversely, in a smaller business members of management are required in the hiring process (Barber et al., 1999).

Proceeding with the Study

The vested interest of the researcher comes from sought after positive effects on supporting teams and small business efforts. Growing small businesses and developing markets in the U.S. economy would benefit from at least a modest understanding of the concept. Rogers' (2003) innovation-decision process offered an outline for structuring a focus, as it would involve a shift in thinking about what is successful in small business management and leadership. This targets the focus of small business from looking at what the "big guys" do in the ideals that larger companies are successful in their methods to an approach well suited for a smaller team. Rogers' innovations-decision process encompasses five stages: knowledge, persuasion, decision, implementation, and confirmation. Sequential stages happen over a period of time to develop the implementation of the decision. According to Rogers, "Most diffusion researchers who have probed the innovation-decision process for their respondents have arrived at a somewhat similar set of stages" (p. 169). Therefore, it is relevant to the researcher to evaluate a shift in such corporate-based management thinking to a smaller scale calling on small businesses to expect the process to unfold as described in Rogers' process.

Productivity is possible with a traditional approach or team-based approach, but the question is where to place the efforts. Should more time and expense be invested up front during the formation and hiring process, or should those efforts be held for future

development of readily available employees? The idea is to tip the balance in this study to investing more in the hiring process than later in employee training and management. The goal is to justify the investment in the proper hiring and team formation processes in order to reduce the levels of management required and the need for systematic training. From a related study by Aegean Leung (2003) entitled *Different Ties for Different Needs: Recruitment Practices of Entrepreneurial Firms at Different Developmental Phases*, recruitment through networks is discussed. According to Leung, this recruitment through networks uses informal channels to attract people to the organization. Perhaps this is a more effective method for finding potential employees rather than simple open position advertisements and postings.

If a system is fragile and the wrong individual is placed in a position, this could create a very high stress level environment for an employee (Bowen et al., 1991). Having the people with skills matching the job tasks, along with a personality that meshes well with the organization and its goals, appears to be a good recipe for success. This research investigates the possibilities to consider valid potential for adding to such scholarly research areas in team creation.

Hiring Practices for Self-Managed Teams

Leadership and management styles develop and change over time. Some organizations use self-managed teams in their organizational structure. Employees who have managers who are less authoritarian may be happier, leading to greater company success with higher rates of employee retention. In research by Kauffeld (2006) on self-managed and self-directed teams, if a manager desires to increase employee competence, formation of these types of teams is desirable. Employee acquisition and retention is a

problem that exists in most organizations. It is costly to recruit and train new employees. Small businesses may choose to recruit new employees using informal or formal recruitment methods. Business owners who are more open are more likely to experiment with and utilize more formal recruitment processes (Reda & Dyer, 2010). If organizations can retain employees in whom they have trained and invested, it would be beneficial to the company. Small businesses should strive to decrease employee turnover. Low employee morale leads to high employee turnover. A business may benefit from utilizing team-based methods instead of traditional hierarchical leadership methods as a way of boosting employee morale and performance. This type of leadership method often is focused on attaining the best personnel in the organization, along with proper alignment of those personnel in the best fit jobs.

Employees placed under extensively structured processes within organizations typically have difficulty with that rigid structure. The more structure in an organization, the greater the need for management of that structure by rules, regulations, and policies. In place of creating a need for more management to oversee lesser tasks, it would appear to be more successful for employees to be aligned with their job duties and empowered to make decisions rather than require more managerial personnel. This research investigates a change to more time spent on locating the best fit personnel than on attempting to create the best fit from options found within pressured time limitations.

Collecting Literature Review

It is difficult to find research relating specifically to small business leadership hiring practices for self-managed teams, which suggests that this topic can add to the current available literature and bring new information to the field. Research is available

that has focused on leadership and management styles, hiring, employee satisfaction and retention, and self-managed teams; however, a review of literature does not reveal the impacts of nonverbal communication on the formation of self-managed teams as a whole. The available research has shown correlations between leadership and management styles and employee satisfaction and retention. Research also is available on leadership and successful hiring practices in small businesses. The current research also shows correlations between employee satisfaction and retention and self-managed teams. Because self-managed teams have potential to increase employee satisfaction and retention, the benefits of following this path for leaders in small businesses may develop multiple areas of their organization in positive directions.

The methodology used for collecting the information in this review of literature includes a search for relevant peer-reviewed articles relating to any portion of the research topic. Due to a lack of current relevant information, articles dating to the 1990s are included in the review of literature. Older sources remain relevant to the subject matter and offer supporting evidence from peer-reviewed sources surveying a time period when the presented styles of team structures developed. With limited sources crossing over small business leadership methods for creating self-managed teams, the historical research used as each source stands alone can be combined to collectively offer valuable literature in support of this effort.

The articles contained in this review of literature were obtained by utilizing WKU Libraries database, Google Scholar, EBSCOHost Databases such as ERIC, Business Source Premier, and Applied Science and Technology Source to search for peer-reviewed articles relating to hiring in small businesses, employee retention in small businesses,

self-managed teams in small businesses, and leadership or management style in small businesses. The search consisted of a combination of terms including the following: “nonverbal communication,” “team formation,” “student team,” “team creation,” “small business,” “engineering team,” “hiring,” “self-managed team,” and “leadership.” Some articles referenced multiple search terms, but again no articles were found relating to utilizing nonverbal communication to form teams. All references were reviewed and included in the review of literature only if the information in the article offered valid information to the research topic. The subject matter for small businesses includes information on comparison of small business practices to large corporations and what small businesses lack in the comparison. In efforts to obtain related research, literature discussing engineering student teams also was utilized. Literature discussing nonverbal communication, body language in the workplace, and in leadership also is included. Books also are utilized in this research. A portion of the book, *The Leader’s Companion*, as referenced previously along with a book by Frederick Taylor (1967), is a historical source of influential management literature that would contradict developing hiring practices for self-managed teams.

Research has shown there are many methods used by businesses and managers when it is time for a new employee to be hired. Fathi, Wilson, and Cheokas (2011) studied strategies for hiring employees and developing them after the initial hire. Some things a company can exist without, but employees are the most essential asset of a company (Fathi et al., 2011). If building and supporting employees is the benefit of self-managed teams, perhaps hiring and leading toward such an environment is a profitable direction. Barret, Neeson, and Billington (2007) studied how human resource

management practices impact hiring the correct employees for the organization. In order to find an employee who has the best skillset and is the best fit for the company, a small business should look for a wide range of candidates (Barret et al., 2007). Human resource management practices may allow a company to find a larger pool of applicants. If a hiring manager does not have a candidate who appears to be a good fit, it would be beneficial to consider other recruitment methods to have additional candidates from which to choose.

Once employees are hired, it is important that leadership and management styles have an impact on both employees and the success of the company. It is beneficial for managers to cultivate a positive working relationship with their employees. Relationship-oriented leaders raise employee satisfaction, which contributes to team accomplishments (Soriano & Martinez, 2007). Leaders who are relationship-oriented identify with their team members (Soriano & Martinez, 2007). One example of this can be found in a study completed by J. S. Huffaker. Huffaker (2017) completed a case study focused on collaborative leadership culture and how this culture is created within Tasty Catering, a company in Chicago. Huffaker contrasted collaborative leadership culture with more traditional top-down leadership. Huffaker found that employees need the ability to speak up, and leaders need to possess the ability to listen and be responsive to employees. Employees who believe they have a good working relationship with management are more likely to bring issues to management, and managers who have a good working relationship with employees are more likely to listen to employee concerns. Huffaker also found that collaborative leadership culture develops if the individuals in leadership positions of the organization are willing to listen to employees and then take action.

Huffaker also claimed that this collaboration between leaders and employees allows subordinates to feel more connected to the organization, which ultimately leads to more success for the company.

Small business managers are often business owners with an entrepreneurial spirit. Soriano and Martinez (2007) also studied the entrepreneurial spirit and how that spirit impacts leadership in work teams. It is beneficial to a small business for leaders to be able to spread their entrepreneurial spirit to members of their team (Soriano & Martinez, 2007). Employees who share in the entrepreneurial spirit are more connected to the company and are motivated to work with others on their team. The relationship between an employee and employer can have an impact on the success of a business. Marcketti and Kozar (2007) presented a case study of a small business entrepreneur with a focus on relationships with employees, including an example of an entrepreneur who was an effective manager and was setting the example of good employer/employee relations. According to Marckettii and Kozar, a manager's relationship with employees correlates to the success of the organization. The employer also focuses on allowing employees opportunities to learn and grow by providing opportunities for paid training through attendance of related conferences and seminars (Marckettii & Kozar, 2007). Leaders focusing time directly with employees is a valuable investment in those employees, who can increase a team's value and produce benefits for an organization. Employees are motivated when they feel that they contribute to the success of the company (Huffaker, 2017). As leadership strategically invests time on supporting a self-managed team, affected employees can connect team successes directly to leadership involvement and further strengthen their motivation to perform well.

Employees and businesses may benefit from employees working together in self-managed teams. Research has shown when employees work together they are more innovative (Soriano & Martinez, 2007). Employees working in self-managed teams can make contributions to the company that are not likely to be made by individual employees. Kauffeld (2006) pointed out these teams have superior problem-solving skills in comparison to traditional work teams. Self-managed teams appear to allow for a more positive working environment in which employees are comfortable in discussions and are motivated to succeed. Self-managed teams are more goal-oriented than traditional work teams (Kauffeld, 2006). Teams that are self-managed are more positive and voice fewer negative complaints than traditional work teams (Kauffeld, 2006).

Within a self-managed work team often is a team leader. Great leaders can produce great teams (Soriano & Martinez, 2007). When employees work in groups, the team leader has an impact on the attitudes and performance of the members of the team (Soriano & Martinez, 2007). It can be difficult for small businesses to train and develop their employees (Fathi et al., 2011). Utilizing self-managed teams can assist with training of new employees, as the members of self-managed teams learn from one another. McKeown (2012) studied team learning in small and medium organizations. Individuals working in teams learn from one another (McKeown, 2012). Team learning is cultivated in climates where there is trust and mutual respect among leadership and team members (McKeown, 2012). A positive relationship is important between management and employees, employees trust for one another, and a willingness to participate with work in teams. For team learning to occur, members of the team must participate in the process (McKeown, 2012). Team learning also occurs when team members work together to

compile their knowledge, share their knowledge with one another, and combine their knowledge by experiences (McKeown, 2012). Leaders create an environment where team learning can occur by conversing with the team and discussing assumptions and ideas (McKeown, 2012).

Working as a part of a self-managed team gives employees the opportunity to learn and increase competence and skills. Team competence can be increased by allowing the team to work on more challenging projects (Kauffeld, 2006). The ability to learn as a team is important for employees and leaders or managers. Power and Waddell (2004) presented research obtained from a survey on Australian-based organizations that studied the relationship between self-managed work teams and the learning organization. Team learning is a slow process (Power & Waddell, 2004). Self-managed work teams and learning organizations are positively correlated (Power & Waddell, 2004). Managers should focus on developing a learning organization, and organizations that support learning programs often have greater overall performance (Power & Waddell, 2004). Integrated into Kauffeld's (2006) research, self-managed work teams increase overall team competence. Employees increase their competence levels when they are allowed to participate in making decisions for the company (Kauffeld, 2006). Team members learn from one another when they trust each other, have listening skills, and are open to learning (McKeown, 2012). If trust does not exist in a team, tension and frustration may result (McKeown, 2012).

Importance of Retaining Team Members

Employee retention is important for small business owners, as the process of finding, hiring, and training new employees can be costly and time consuming.

Employees are more easily retained and report higher levels of job satisfaction when they are allowed to learn and grow as a part of the company (Marckettii & Kozar, 2007). If an employee feels involved in the process, he/she may be more willing to adapt to changes and be loyal to the company. Companies that allow employees to have a high level of autonomy can expect employees to be more satisfied and, therefore, the company may experience less turnover. Participative management leadership involves giving employees responsibilities for their own work, which can lead to employee innovation and improved company performance (Soriano & Martinez, 2007). Participative managers work alongside their teams. Leaders with a participative leadership style work with employees on their team to make decisions (Soriano & Martinez, 2007). Peters (2005) presented a literature review and survey analysis of apprentices working for owners of small to medium hotels in Italy. Peters' data analysis found that employees reported higher levels of job satisfaction when allowed high levels of autonomy and reported positive evaluations of management.

Employees who are a part of self-managed teams are allowed high levels of autonomy within the team. These teams are correlated with increased productivity, a decrease in turnover, and an increase in job satisfaction (Kauffeld, 2006). Leaders who are relationship-oriented are able to increase collaboration and teamwork in employees (Soriano & Martinez, 2007). Peters (2005) found that managers should motivate employees and ensure that the work environment is perceived as fair and empathetic to the employees. If employees perceive their managers and environment to be fair and empathetic, they may be satisfied with their jobs. When employees are satisfied with their jobs, they are more likely to be retained by the company than employees who are

not satisfied (Peters, 2005). Employees also need to be satisfied with working as a part of a self-managed team. Employees working in teams benefit from being open and transparent, which allows for honesty (McKeown, 2012). Team members need to trust their leadership to be willing to share their vision, ideas, and knowledge (McKeown, 2012). Leadership can also cultivate an environment for team learning (McKeown, 2012).

Culture is another aspect to consider. As discussed previously, German leadership styles clearly differ from American leadership styles relative to business management. Culture can impact the types of management styles that are most effective. Based on the existing literature, employer management or leadership styles have an impact on employee satisfaction and overall company success.

Identifying Team Members for a Small Team

Small businesses can benefit from effective team creation and nurturing, yet it can be difficult for small businesses to attract enough applicants to find a suitable candidate. Small businesses are often looking for employees with multiple skills (Barret et al., 2007). With small businesses that have few employees, they often rely on each employee to perform multiple tasks. Small businesses have the tendency to require an employee to have a wide range of job responsibilities (Reda & Dyer, 2010). This makes it difficult to find the appropriate new hire when the small business owner is desperate for an employee. Although having one individual performing multiple jobs may not seem ideal, research has shown that when employees are given a variety of tasks, their skill levels increase (Kauffeld, 2006).

It would be beneficial to a business to hire an employee who is not only qualified to perform assigned job duties, but a person who also is a good fit based on the organization's mission and values and a person who will be a good fit with the existing team. Many businesses find it difficult to hire employees who are capable and skilled in appropriate areas (Fathi et al., 2011). Aligning the best person for the task approach would be effective from all levels of an organization. In order to effectively fulfill the organization's goals, the employee should have values that align with the goals. Taking the time to select and train employees who are the right fit for the company can be an expensive task.

Small businesses should strive to hire employees who will be loyal to the company. To be successful in keeping employees, small business owners and managers need to focus on retention.

Creating Teams in Small Businesses

As of 2010, there were approximately 30 million small businesses in the US (Fathi et al., 2011). Reda and Dyer (2010) researched how to find and retain employees who will be loyal to the business. Small businesses can improve their ability to retain employees by creating an employment niche in which employees feel they are able to develop professionally and personally (Fathi et al., 2011). Such a niche could possibly include the utilization of self-managed teams. Small businesses can also retain employees by offering in-house developmental programs to employees (Fathi et al., 2011). Employees who are learning and developing skills as part of a self-managed team within a business may be more likely to be loyal to the company.

Hiring poses a significant problem for most small business owners (Reda & Dyer, 2010). When creating new employee teams, it is important for a small business manager to make an effort to hire employees who will be a good fit for not only the job, but also for the organization. An issue with small businesses being successful in hiring individuals who are the best fit for the job and organization is that often there is only one individual in charge of hiring, and that is the business owner, and some business owners do not have human resource management knowledge or experience (Abraham, Kaliannan, Mohan, & Thomas, 2015). Having a smaller number of employees overall can cause small business managers to have less experience with selecting, interviewing, and hiring employees, making it more difficult to select the best candidate (Reda & Dyer, 2010).

Small businesses often hire employees based on informal recruitment methods (Barret et.al., 2007). Small businesses often rely on referrals from current employees or family members as a recruitment strategy (Reda & Dyer, 2010). Employees hired from informal strategies have been proven to be associated with lower productivity and report lower wages (Reda & Dyer, 2010). Informal recruitment strategies, such as word-of-mouth, are related to a perception that the business owner is not committed to employees (Reda & Dyer, 2010).

It is presumed to be much easier for large businesses to attract and hire quality team members. Small businesses lack the resources of large business relative to finding, attracting, and retaining quality employees (Fathi et al., 2011). Large businesses have dedicated human resources departments that are trained to handle hiring new personnel. Small business owners and managers can benefit from learning interview skills typically

used by human resources management in larger companies (Barret et al., 2007). Small businesses may have more success in finding the right employees to hire when using more formal recruitment processes (Barret et al., 2007). It is vital that small business managers become experts at hiring because in small business, each employee who is hired plays an important role in the success of the company (Fathi et. al., 2011). Small businesses that have started utilizing formal human resources strategies have reported it is easier to hire competent staff (Reda & Dyer, 2010).

Small businesses can have trouble attracting candidates for open positions. Small businesses may be able to improve their ability to find and attract new employees by partnering with local community colleges or technical schools (Fathi et al., 2011). If a small business owner attends job fairs or reaches out to college or university job placement offices, it can lead to increased loyalty of current employees as well as a perception of stability from potential applicants (Reda & Dyer, 2010). However, small business owners are not likely to utilize these advanced recruitment methods (Reda & Dyer, 2010). Recruitment methods also can impact an employee's perceptions of how committed the company is to employees. Employee loyalty was found to be correlated with the perception of employer commitment to employees (Reda & Dyer, 2010). It is important for small business owners to communicate their commitment to employees if they want employees to be loyal to the company (Reda & Dyer, 2010). Communication from leadership assists in building relationships with employees. Leaders who are relationship-oriented often recognize and reward employees, which increases loyalty to the team (Soriano & Martinez, 2007).

Bowen et al. (1991) in *Hiring for the Organization, Not the Job*, suggested that “A new model of selection is emerging however, that is geared toward hiring a ‘whole’ person who will fit well into the specific organization’s culture” (p. 35). This 90s era evaluation appeared to ring true. Deal and Kennedy (1995), from Wrens *Leader’s Companion*, discussed the Tandem Corporation from Silicon Valley. Organizational charts do not exist at Tandem and formal rules are very limited (Deal & Kennedy, 1995). “Tandem seems to maintain a balance between autonomy and control without relying heavily on centralized or formalized procedures, or rigid status hierarchies” (Deal & Kennedy, 1995, p. 288).

A study by Da Silva, Hutcheson, and Wahl (2010), *Organizational Strategy and Employee Outcomes: A Person-Organization Fit Perspective* suggested that effects on attitudes and behaviors can be from an employee’s characteristics as they align with the organization. Da Silva et al. presented two hypotheses in their study focusing on employees’ intentions to leave a position. Their first hypothesis involved how employees commit based on their view of the company’s strategy and their fit in that strategy in combination with the thought process of other job opportunities. Da Silva et al. also presented their second hypothesis within the same employee-to-company perceptions, but this hypothesis involved employee intentions to stay with the organization. The study successfully supported both hypotheses with its findings.

Person-organization fit can be more difficult to achieve in a small business. From Barber et al. (1999), “Larger firms have the resources available to design or acquire (and validate) multiple screening devices (e.g., psychological tests, physical abilities tests)” (p. 845). A business can increase the success rate of hiring an individual with job and

organizational fit by utilizing pre-employment tests, practicing behavioral interviewing, and giving realistic job previews to applicants (Abraham et al., 2015). What additional costs will be incurred, and will they balance out future costs if expended up front? What costs are involved in acquiring the right person-organization fit (Leung, 2003)?

“Personal-organization fit” is defined as “the compatibility between people and organizations that occur when at least one entity provides what the other needs, they share similar fundamental characteristics or both” (Kristof, 1996, p. 4). If there is potential to decrease turnover rates or increase job satisfaction for employees, the upfront costs of implementation may easily outweigh the efforts required to overcome obstacles indirectly resolved by a shift in management styles. A more formal recruitment process is linked to increased productivity and performance for the entire company (Reda & Dyer, 2010). Reda and Dyer (2010) found that utilizing professional recruiters could increase employee loyalty due to employees being less likely to believe their employer has broken promises. This was thought to be due to reducing the likelihood of the manager or business owner to making rash statements or promises during the hiring process (Reda & Dyer, 2010). Because of quickly changing technologies and products, an employee’s actual job responsibilities as analyzed may become out of date, which presents another demanding reason for an organizational analysis of fit to be addressed for a potential employee (Bowen et al., 1991). Professional recruiters also assist new hires in feeling that the small business owner is thorough and committed to employees (Reda & Dyer, 2010).

A person being hired needs to be a good fit for the organization and the job. To acquire the proper placement in hiring, two types of fit should be accomplished: first

between the individual's knowledge skills and abilities and the job requirements, and second the individual's personality and the organizational culture (Bowen et al., 1991). An applicant may have the aptitude for the job, but if the applicant will not fit into the organizational culture, it would be advisable to recruit an alternative candidate who is a good fit for the job and the organization. Abraham et al. (2015) studied recruitment and selection of employees in small and medium enterprises. Finding an individual who will be a good fit for the job and the organization requires a focused recruitment process (Abraham et al., 2015). A clear objective for recruiting employees should be established (Abraham et al., 2015). Small business owners and managers can benefit from learning how to write job descriptions (Barret et al., 2007). The manager should develop a strategy to fill vacant positions (Abraham et al., 2015). An organization also should develop and utilize recruitment activities to assist in appealing to the right type of applicants (Abraham et al., 2015). Small business managers want to hire individuals who share their values and passion (Barret et al., 2007). If a manager is successful in hiring someone with strong person-organization fit, the employee is likely to report higher job satisfaction and be more committed to the organization (Abraham et al., 2015). A hiring manager should learn to determine what kind of individual is needed to be a good fit for the job and organization by evaluating the applicant's values, needs, interests, and social skills (Abraham et al., 2015). It also can be difficult for a small business to fire an employee who is not a good fit if the organization has previously hired individuals who were friends and family of the owner (Abraham et al., 2015).

Small businesses struggle with recruiting new employees because the small business is not as recognizable to job seekers (Reda & Dyer, 2010) or as well known as

large corporations. Qualified applicants may not know there is an available job opening in that business. Small businesses often are seen by job seekers as less desirable places to work because of the perception that these businesses do not offer all the resources that large organizations offer (Reda & Dyer, 2010). Job seekers often believe that small businesses are not able to be competitive with salaries and benefits (Reda & Dyer, 2010). Potential applicants may not seek out openings at these companies due to a fear that compensation packages will not be adequate. Small businesses also have trouble recruiting new employees because job seekers tend to question the ability of a small business to exist long term (Reda & Dyer, 2010).

Purpose of the Study

Employee acquisition and retention as discussed previously is a problem that exists in many organizations. It is costly to recruit and train new employees who are added to the team. If organizations can retain employees they have trained and invested in, it would be beneficial. There are potential factors for creating self-managed teams that will have a positive impact on employees. If factors exist that can increase employee morale, this would be valuable information to company owners and managers. This research is conducted to find factors effecting team formation that organizations and their managers can use to provide better working environments so employees will become more vested in their organization.

There is limited research regarding effective ways to create and lead a self-managed team. Self-managed teams are generally created somewhat organically. If the success of a self-managed team is dependent on leadership, it was not evident in previous research. Teams have been a strong factor in the development of civilization (Karlgaard

& Malone, 2015). Team formation is often a rushed and underrated concept. The task at hand may rush the process of team creation through a state of unimportance. The purpose of this research is to find factors relating to nonverbal communication that positively or negatively impact the formation of self-managed teams. This research is conducted using a student engineering program that uses self-managed teams to prepare students for future employment in organizations.

As organizations age, there is a complacency that often erodes the necessity of focus on priorities, such as hiring effectively or strategically creating teams. The science of the brain is proving that human beings are intended to work together by design (Karlgaard & Malone, 2015). It is the researcher's proposal that lack of focus on this very critical development piece of a team could be the deciding factor that makes for team success or team failure. The efforts by leaders to form a team that is suitable and maintainable must address all the required activities expected from the team (Fathian, Saei-Shahi, & Makui, 2017).

Team Development and Leadership

For a team to achieve its goal, the team must possess the skills required to do so. A healthy organization or team environment requires proper focus and attention to the details that develop it. In order to have high performing teams, a focus must be placed on the proper formation of these groups. In the study of teams, one of the crucial behavioral processes that has been researched is communication (Hossain, Hasan, & Murtuza, 2017). Is an understanding of nonverbal communication techniques a valuable tool missing from the team creation process?

Teams can work together to accomplish tasks that are too large for one individual to pursue. Teams are not only practical reactions to current challenges, but they are at the center of being human (Karlgaard & Malone, 2015). The capabilities of teams should justify a focused importance to accomplish the first step in focused team success. A critical element for any size team with a multitude of skills necessary for creating successful outputs is the formation of the team (Hossain et al., 2017). As human beings, we profit by functioning in certain organizational schemes (Karlgaard & Malone, 2015). Organizing efforts collectively through teams increases the likelihood of success by sharing the work as well as multiplying the expertise. It is important for leaders to understand the strength of accomplishment that can be reached with proper team creation. Top leaders are limited to six to 10 individuals within their span of control (Karlgaard & Malone, 2015). As an organization grows in numbers of participants, it is important for leadership to recognize the need to develop lower level reports and teams that function without direct dependence on leadership. By dispersing direct reports throughout an organization, intelligent leaders empower multiple teams to work under their new leader (Karlgaard & Malone, 2015).

Team Diversity and Personality Types

Consideration must be given to the nature of team members when forming teams (Fathian et al., 2017). Jerry Hirshberg diversified teams by coupling free-form thinkers and analytical types and found the tensions developed an innovative collaboration that resulted in successful automobiles for Nissan (Karlgaard & Malone, 2015). The significance of functional collaboration efforts among individuals is considered by some researchers to be achieved in team formation itself (Fathian et al., 2017). Conflict occurs

even in cases of highly qualified team members when they fail to collaborate effectively, which generates struggle, indecision, and incomplete milestones (Hossain et al., 2017). It is important to not only take advantage of diversity, but also to capitalize on creative abrasion (Karlgaard & Malone, 2015). This idea of going against the grain in productive ways develops concepts that might not be created any other way. Diversely broad teams across a variety of disciplines are valuable in today's economy; requiring these arrangements in an academic setting provides preparation for workplace preparedness (Hossain et al., 2017). Team diversity is not a guarantee for higher performance (Hossain et al., 2017). There are more factors at play than simply depending on healthy conflicts for a team to be effective. For the success of a team, the selection of its make up is the first priority (Hossain et al., 2017).

Research in the last decade has revealed some interesting discoveries. One of them is that the value instilled in a team at its formation will shape the way its members approach tasks and their social interactions, and that over time those attitudes will solidify as the feature of the group's structure. That means that how your team begins will determine how it ends, and how it will perform during its existence. (Karlgaard & Malone, 2015, p. 92)

Conventional studies have focused on personality traits of the individual for the performance of teams (Hossain et al., 2017). Some aspects of proper team formation could be devoted to similarities rather than complete opposites. Teammates perform well when collectively they have egalitarian values developing extremely interdependent connections; conversely, teammates with meritocratic values are not as interdependent but still perform well according to scientific discoveries (Karlgaard & Malone, 2015).

Egalitarian individuals have a stronger focus in equality for all people, where meritocracy is a stronger inner focus on their own elite talents but not by class or wealth (“Egalitarian,” 2002). If a mixed group of egalitarian and meritocratic members are grouped in a team, they lack consistency and underperform (Karlgaard & Malone, 2015). Personality types aid in comprehending member behavior and directing the personality forces at work within the team concerning team interaction (Hossain et al., 2017). Having the ability to perform personality type indicators can provide a wealth of information in team formation efforts.

Time is of the essence and not a commodity that is easily traded. If a method of understanding nonverbal communication exists that could be used with near accuracy to analyze personality types, this would expedite a portion of the team creation process. The value of personality type awareness still offers a great deal of value to the process. The awareness of member personality types provides potential for improvement by increasing diversity of behaviors and viewpoints (Hossain et al., 2017). For example, from the Myers Briggs personality type, an ESTJ type would be narrow-minded while following conventional methods; in comparison, the ISTJ type would remain calm and focus on personal aspects (Hossain et al., 2017). The information that can be gathered is valuable, but there also are automated systems used in education for forming student teams. An alternative to common methods of distributing students into teams by student self-selection, random selection, or instructor choice is the use of a computer-based alternate (Loughry, Ohland, & Woehr, 2014).

The composition of a team defines and limits or expands the potential success for their efforts, thus placing a strong emphasis on gathering the most effective means for the

creation of a team. Leadership involvement is crucial to team success (Boies, Fiset, & Gill, 2015). It is important for team members to encourage and motivate one another (Read, 2007). Leaders, as referenced in this research, are separate individuals filling two different roles. There are leaders who act on the team, as they are the formers or creators; and there are leaders who arise from or are inside the actual team. The term “team creation” is intentionally differentiating between team formation aspects and what is commonly known as teambuilding. Team building often references efforts to strengthen existing teams, most popularly with teambuilding exercises or activities. The discussion focus referenced in this response pertains to the actual gathering of individuals to form a group referenced as a team.

Team Building

To offer specificity to the research subject, an explanation of team building is justified for an understanding of the team aspects of this research. The topic of team building is very different from that which is studied in this research. A brief review is needed to assist in identifying the difference between the research focus on team formation/creation and team building. These are two very different aspects and should not be confused with the efforts researched here. The terminology related to the building of a team has very little connection to the formation of a team.

Team building is a term that often is seen, as teams are becoming more common in both the workplace and in education. It can be argued that team building is the most popular trend in the overall global workforce (Lacerenza, Marlow, Tannenbaum, & Salas, 2018). Teamwork is trending as teams become more popular across a variety of companies, including service organizations, engineering companies, and technologically

based companies (Lacerenza et al., 2018). Employers who want their employees to practice working together in a difficult situation may choose to invest in a collaborative team building experience. An escape room offers a thrilling experience that can also be educational (Guth, 2017). Escape rooms allow corporate clients to have an experience that allows the team to work together and develop critical-thinking skills (Guth, 2017).

Indoor team building activities are becoming more popular because they can happen anytime, anywhere, and are not dependent on the weather (Columbo, 2018). Team building activities that occur indoors allow employees to connect with one another and later allow the employees to work better together (Columbo, 2018). A company can choose activities that are best suited to the current employees. There are a variety of activities that can be classified as indoor team building, including game show themed activities, Myers-Briggs Type Indicator Training, cooking competitions, or building completions (Columbo, 2018). Most popular team trends appear to be based around the aspects of team building rather than team structure or formation. It is the goal of this research to focus on the potential validity that the process of team creation provides an initial jumpstart to a team's success.

Tuckman Team Development Stages

Bruce Tuckman discovered four developmental stages of a team: forming, storming, norming, and performing (Tuckman & Jensen, 1977). It is important to note that Tuckman's stages of development occur after a team has already been formed. The forming stage includes testing and dependence on the group leader (Tuckman & Jensen, 1977). The storming stage includes criticism and conflict among group members (Tuckman & Jensen, 1977). The norming stage is optimistic and is where the group

starts to become cohesive (Tuckman & Jensen, 1977). The performing stage of development is the final stage in which the group is ready to work together as a productive team (Tuckman & Jensen, 1977). Tuckman reported that additional researchers' conclusions support this four-stage model, but few empirical studies have been completed since the development of this model in 1965 (Tuckman & Jensen, 2010). Tuckman's research differs from the focus in the current study because Tuckman's research did not include team creation.

Benefits of Small Team Size

Small teams are trending because of the idea that a small group may be more productive or successful than large teams. Small teams can be found in industry and also in education. The students surveyed in this research were grouped into teams of five to six members. Fewer team members allow introverts to feel comfortable sharing and contributing ideas. Jeff Bezos, CEO of Amazon, is known for his "two pizza rule," in which he believes that a team should be small enough that all team members can be fed by ordering two pizzas (Cain, 2017). Bezos believes that large groups are less productive. Smaller teams can be beneficial as they minimize groupthink and social loafing (Cain, 2017). In considering Bezos' two pizza rule, a team being too large can paralyze its ability to be productive. One could argue the critical nature of defining what roles need to be represented on the team and limiting the size of the team to only those who need to be involved. This could protect the integrity of the team and keep the team focused on the task at hand, rather than being pulled in unproductive directions by those who most likely should not be serving in a particular team.

Team Creation or Formation

Efforts in team building are used after the team exists and is looking for an approach to strengthen the team. For this research, it is critical to understand the difference from team building as explained by the previous examples in comparison to team creation or formation. The researcher is cautious not to reference the creation of a team as a process of building a team.

Appearances based on first impressions are typically correct (Bradley, 2014). Any efforts focused on initial connections and observations are therefore valuable to team formation. Assessing information provided by nonverbal communication, as the topic of this research, is one aspect of many in creating teams. From an academic example, some students are allowed to create their own teams, but this can cause issues such as arguments, conflicts, or lack of creativity within the team (Bani-Hani, Al Shalabi, Alkhatib, Eilaghi, & Sedaghat, 2018). Personal conflicts increase when there are several strong personalities in a student team (Bani-Hani et al., 2018). An understanding of nonverbal communication and interpretation of such is an input for the team construction decisions. Nonverbal communication includes body language, physical environment, and personal attributes (Gupta, 2013).

To observe nonverbal communication, it is necessary to interact in an environment that provides physical observation of the participants or candidates for the team. When communication occurs primarily through e-mail or other electronic means, there is a risk of losing interpersonal skills (Read, 2007). Observations of these interpersonal skills provide opportunities for nonverbal communication to take place. Assumed tone or reactions in electronic communication are merely that—assumptions.

To truly evaluate interactions requires a face-to-face experience. Most communication is nonverbal (Bellou & Gkorezis, 2016). Team dynamics are impacted by behavior and communication methods (Makris, Ferrante, & Mody, 2018). A heightened awareness to what is being communicated nonverbally provides input from individuals who may not express in words how they are affected or where their strengths reside; however, if understood correctly, nonverbal communication offers a conveyance of that which is not spoken.

The skills of a potential team member can be assessed from aspects of their nonverbal communication. Professionalism is judged based on the interpretation of body language (Kurien, 2010). What is reflected by a potential team member's actions may convey an interest that supports their strengths. For example, hand gestures that are relaxed are a sign of confidence (Kurien, 2010). An awareness of what simple nonverbal actions communicate provides a wealth of value in the team formation decision process. Team members with potential to fill leadership roles and to be influential within a team may provide evidence of such strong cues from their own ability to communicate consistently through nonverbal gestures. Teams that trust each other have greater success in their performance (Boies et al., 2015).

Trust is built as the team communicates by moving forward in their project efforts. Communication is required for a team to develop an approach to plan work (Boies et al., 2015). As plans develop, leadership roles emerge when responsibilities are agreed upon. Individuals focused on being team players are developing themselves as future leaders (Read, 2007). More progress in the team environment expands opportunity to further trust one another. A leader who is trusted based on nonverbal communication

is seen as effective (Bellou & Gkorezis, 2016). Communication in general is an aspect that increases trust between individuals (Boies et al., 2015). Nonverbal communication, having a strong influence on interactions, provides a means to interpret levels of trust. The less inconsistency observed between a potential team member's verbal and nonverbal communication, the greater likelihood for them to interact similarly in potential team leader roles.

When small business leaders and educators interview or interact with individuals to make decisions about placement on a team, the availability for a mythical truth serum would be a desirable aid in the process. Fortunately, nonverbal communication is typically not voluntary (Gupta, 2013). Purely from the authenticity of what nonverbal communication conveys, this value is worthy of consideration. Body language should look natural in order to be accepted as authentic (Gupta, 2013). Trust and interest are revealed by open hand gestures (Kurien, 2010). With the ability to assess involuntary reactions in as simple a situation as proposing a question, this may offer a glimpse into the future of what a potential team member can offer or detract from their potential group. It is important to know how to interpret nonverbal communication that is not consistent with what is being said (Bradley, 2014). When words and actions are opposite, people look more at actions to interpret the message (Mehrabian, 1971). Something as simple as a shaking of the head back and forth that is inconsistent with a positive verbal answer of yes is one example of such an action. Joe Navarro provided another example of inconsistent verbal and nonverbal communication (Navarro & Karllins, 2008). In *What Every Body is Saying: An ex-FBI Agent's Guide to Speed Reading People*, Navarro documented a story of catching a suspect who was not being

truthful by noticing that the suspect's hand gesture pointing to the right did not match his comments that he had gone to the left (Navarro & Karlins, 2008). The observance of an involuntary nonverbal answer coupled with the verbal inconsistency of left, or any opposing remark, can bring to light integrity issues in such an instance.

While nonverbal communication discrepancies are a very small example, the levels of information communicated nonverbally reveal the need to value such readily available and decision-shaping input. Approximately 70% to 90% of communication is nonverbal (Gupta, 2013). Armed with the knowledge of what nonverbal communication can convey provides information not only on integrity, but also on skill and competency. Team leaders can increase trust within a team by encouraging team members to communicate with one another (Boies et al., 2015). Teams perform at higher levels when trust is present (Boies et al., 2015). Simple actions of a positive nature bring positivity to a team. Positive gestures include hands that are face up, clasped at waist level, or steepled with the fingertips touching (Talley & Temple, 2015).

An additional aspect of leading the process for creating a team involves the leader's ability to effectively convey information. In order to encourage and motivate team members, one must have a knowledge of his or her own behavior and its effect on others (Read, 2007). Many leaders place an emphasis on the words they speak, but research has shown that the message from nonverbal communication is equal or more important (Talley & Temple, 2015). As potential team members can be assessed for aspects of fit, authenticity, and ability to connect with a topic, leaders are subconsciously observed by team members or followers on how they convey information using nonverbal communication. People can control their verbal communication to an extent,

but body language is difficult to control and causes confusion (Kurien, 2010). When a leader offers verbal information that is inconsistent with their nonverbal communication, followers pick up on it and struggle to grasp the information provided. Positive body language and paralanguage are correlated to trusting a leader (Bellou & Gkorezis, 2016). Attempts to overplay or communicate nonverbal exaggeration inconsistent with the information shared may create a cause for concern. If a follower or team member is suspicious of a leader, they may perceive positive body language as extravagant or unreliable (Bellou & Gkoerzis, 2016). Equally important are the followers' interpretations of a leader's body language. Nonverbal communication can make a follower perceive a leader's message in a positive way (Talley & Temple, 2015). Leaders can use positive hand gestures so a message is accepted by followers (Talley & Temple, 2015). Teams need to stay informed and must be motivated by observing progress to produce top quality work (Makris, et al., 2018). To support the need for proper information transfer not only verbally but nonverbally, there is a need for increases in exposure to nonverbal communication concepts. Leadership training and development programs should include training on nonverbal communication (Talley & Temple, 2015). Communication among team members increases by both inspirational motivation and intellectual stimulation (Boies et al., 2015). Expectation of becoming nonverbal communication experts should not be assumed in all cases, but an understanding of establishing baselines and deviations from them seems a worthwhile addition to team success.

Many aspects could be considered that affect how leaders form teams and how leaders within these teams perform. The truths that can quickly be gathered by the

assessment of nonverbal communication offer an expedient, in-the-moment, feedback collection for use in decision-making situations needed with limited background knowledge on the individuals. Returning to an academic example, students in a class may be told to simply “get into groups.” Those groups are formed at random with complete disregard to the composition of members. If simple steps were taken to assess student reactions and nonverbal communication that accompany the reactions, perhaps student teams in this example could be more successful. Reactions could be gathered from proposed topics that are class project related or other aspects to specifically determine what is needed based on the situation. Each instance in which this approach is used will have its own variables but should draw from the same researched understandings of nonverbal communication.

There can even be specific variations in body language based on gender (Anders, 2015). Females have an openness to sit face to face, where males are observed to prefer side by side because face to face for males may seem threatening (Anders, 2015). In the 1960s, a branch of psychology, Neuro-linguistic programming, included spoken communication, movement of the body, and thought as it improved several aspects including relationships with others (Rao, 2017). Techniques in more recent years have related heavily to this earlier concept, one of which includes an approach to synchronize the body language of the speaker and the listener (Rao, 2017). This technique helps to connect the speaker and the listener and build a relational bond between the two. This stimulated atmosphere comforts the listener and generates for them a more relatable and agreeable connection to the speaker. Taking the steps necessary to create this environment could open valuable doors of communication for someone in leadership.

The ability to transfer information clearly is a requirement for leaders, as they should be concerned with the distinctions of the communication allowing others to feel a sense of equality (Anders, 2015). Building a level operating condition for followers should strengthen their trust and connection to the leader.

Facial expressions and body movements communicate emotions that are spontaneous and often unconscious. These are considered affect displays, such as a smile or frown conveying fulfilment or displeasure (Showry & Manasa, 2012). If the demeanor of a leader is agreeable with their emotional displays, there is more positive influence on a follower's behavior (Trichas & Schyns, 2012). Implicit leadership theories according to Kenney, Blascovich, and Shaver (1994) are expectations of a leader's abilities and actions based on previous practices. Aspects of perception, especially facial expressions as possibly the most important, are fundamental to implicit leadership theories (Trichas & Schyns, 2012). In the typically overcomplicated interactions leaders have with others considered to be their followers, the hurried pace prevents natural observation of such affect displays. For leaders to effectively utilize feedback communicated by nonverbal expressions, a focused level of concentration is required to correctly analyze and react appropriately to the actions as presented. Articulating degrees of intensity in emotions such as fulfillment or the opposite is shown by facial expressions (Showry & Manasa, 2012).

The leader's influence without formal understanding or proper research into accurate interpretations allows the leader to run the risk of misunderstanding what they observe. Properly describing facial expressions from emotional displays is required for validity to exist in a context for leadership research (Trichas & Schyns, 2012). Middaugh

(2017), with a focus on employees, promoted the need to focus on follower reactions to their manager (leader) appearing in their work areas. The reactions observed in this situation can reveal a leader's influence. Is the follower's reaction to avoid eye contact and continue with their work, or do they make eye contact, smile, and acknowledge the interaction (Middaugh, 2017)? For leaders to pursue effective messages by means of understanding nonverbal communication, a necessity to be aware of such circumstances arises. If the response is averted eye contact, there may be some mistrust or deceit present (Middaugh, 2017). Table 1 from information offered by Hernandez and Tatini (2011) illustrates reactions employees or followers directly relate to their associated characteristics of a good boss verses a bad boss.

Table 1

Good Boss vs. Bad Boss

Good Boss	Bad Boss
Great listener	Blank wall
Encourager	Doubter
Communicator	Secretive
Courageous	Intimidating
Sense of humor	Bad temper
Show empathy	Self-centered
Decisive	Indecisive
Takes responsibility	Blames
Humble	Arrogant
Shares authority	Mistrusts

Note. Adapted from "What Physician Leaders Say and Do Matters- The Spirit of Mudita," by J. S. Hernandez & U. Tatini, 2011, *Physician Executive*, 37(6), p. 21.

Followers, defined for this research, are not brainwashed individuals who mindlessly seek the approval of someone considered to be their leader. Followers are partners in the leader/follower relationship (Northouse, 2016). The term "follower" in

the general North American culture may be interpreted as a lesser vessel; however, the follower should have an equal passion for common goals along with the leader. The unified goal is what allows the leader and follower relationship to function. One is not greater than the other; rather, they have their individual roles in the task that is to be accomplished. Followers in this research are team members affected by those who are leaders in their group or those making decisions on how the team is formed.

Interpretation of Nonverbal Communication

Nonverbal communication offers the observer an interpretation of the information conveyed that influences how the observer receives the transmitted message.

Koppensteiner and Grammer (2010) offered research on the interpreted feedback from a small sample size in which they conducted an experiment concerning motion patterns and personality ratings. The experiment did not use actual speaker videos; however, it did use stick figure simulations of the actual speaker's body movements. Mentioned in their research results was the observance of openness. When representative stick figure simulations offered distinct variations in their path of body motion, the respondents reported a heightened sense of openness (Koppensteiner & Grammer, 2010). As more information is gathered in support of the idea that leaders should strongly consider a focus on their abilities to interpret nonverbal communication, there also emerges a need to be aware of their own body language when attempting to communicate effectively with their audience of followers and team members.

General communications, verbal and written, are proving to be more enhanced by one's awareness of situations and message delivery based on body language in face-to-face occurrences. In situations observed to have considerable head motion, listeners

interpreted the speaker as less conscientious, lacking emotional stability, and contrary to the distinct variation in movement less open (Koppensteiner & Grammer, 2010). With a concentration on these factors of communication, one might consider this to be an effort to search too intensely for influential techniques. However, the very details within motions of the body during aspects of communication have revealed a proven influence. Compelling leaders establish correct stances to impact, influence, and motivate others by their efforts of consciousness in body language either with a direct or indirect approach (Rao, 2017). How a movement is interpreted can depend on how fast it occurred or for how long it persisted (Koppensteiner & Grammer, 2010). If the speed at which the motion occurs can affect how it is interpreted, how much deeper should leaders dig to find more influential nonverbal means of communication?

Nonverbal Communication Regulators

In the Showry and Manasa (2012) research, regulators involved actions that the communicator displayed in efforts to maintain the conversation and drive the communication or preserve the reactions of the listener. The mixture of numerous positive nonverbal techniques by a leader generates a more positive view from their followers (Bellou & Gkorezis, 2016). A listener's regulators may include nodding of the head, leaning forward or opening the mouth, showing interest in responding (Showry & Manasa, 2012). Too often when communicating a message leaders may be so focused on their own words and proper formation of their own conversation points that they overlook a follower's desire to offer feedback on their topic. If the spoken word is not understood, body language aids the listeners in comprehending information successfully (Rao, 2017).

Often soft-spoken individuals find themselves overshadowed by the pressing of individuals to convey their own message, neglecting valuable insight into their topic. From this perspective the listener is placed in a situation in which forcefulness to assert a point could be misunderstood as disagreement. This occurs simply because of the communicator's lack of focus on the listener's interest in offering a response. Being aware of the most obvious nonverbal communication, eye contact, has an influence on feedback, sought after opinions, and control. These influences are dependent upon course, length, and quality of the eye contact (Showry & Manasa, 2012).

Nonverbal Communication Adaptors

Regulators, in addition to being aware of adaptors during the communication process, offer valuable information to a leader that should be used to understand the direction in which the conversation is developing. By rubbing the eyes, scratching of the head, or the like, one is conveying through adaptors the nervousness and desire to be relieved from the pressure of a current situation (Showry & Manasa, 2012). By observing adaptors and applying methods of transformational leadership, a conversation the creates tensions could be effectively defused before the listener finds the need to completely escape the conversation. Such a need to escape does not benefit the follower or the leader, as they have simply been forced off course by a poorly executed conversation.

Interpreting adaptors can be broken down into positive and negative effects resulting from conversational situations. Self-adaptors include the rubbing of the eyes or touching of the cheeks, as they are methods of self-touch (Showry & Manasa, 2012). These adaptors were referenced in the previous paragraph as results to be observed in a

listener. These actions occur within the listener's personal space and to themselves.

Conversely, alter adaptors affect those to whom one may be speaking, e.g., adjusting a listener's tie or folding of the arms to convey a feeling of comfort to the listener (Showry & Manasa, 2012).

Efforts by a leader to communicate care and concern could be proper responses to a follower's discomforts as observed by cues from their nonverbal communication. For example, effective eye contact includes sustaining it through 90% of the communication (Showry & Manasa, 2012). It is the communicator's responsibility to maintain this effective nonverbal communication tool as they lead the conversation. From the standpoint of observing a follower's eye contact, it can offer their stance or unspoken response to the leader's position on a subject. The lack of eye contact reveals disagreeableness or disinterest (Showry & Manasa, 2012).

Consistency of Verbal and Nonverbal Communication

A leader's outward expressions of being tired and slouching can convey he/she is not interested (Middaugh, 2017). Consistency between verbal communications and what is displayed nonverbally is pivotal to a follower's trust in their leader. Rao (2017) offered this example of discrepancy between body language and verbalization:

For instance, if an authoritarian leader says that s/he believes in participative or consensus style of functioning by thumping the desk aggressively, it reflects that s/he believes in dictatorial or authoritative attitude although s/he declared himself as a democratic leader orally. (p. 76)

Leading in Public

Leaders are often required to speak to their groups in larger public settings. It is important for leaders to place emphasis on understanding their behaviors during such public address. Information on the subject has proved that importance exists for leaders to study and understand correct methods for body language, especially in applications for public speaking. Finger pointing to an audience delivers negative influences in contrast to using open hands that conveys honesty and openness (Rao, 2017). Nonverbal presentations of touchiness, exacerbation, or irritation could limit a subordinate's exchanges with their leader (Middaugh, 2017). Leaders must not only be aware of their one-on-one interactions with those they influence, but also should be very aware of what they convey in a corporate setting. Warmth and empathy are conveyed by effective managers through nonverbal signals (Middaugh, 2017). What the leader's actions convey in these settings could drastically affect how their individual interactions are perceived as authentic or failures to be consistent.

For success in public speaking, correlating oral presentation and body language must be accomplished (Rao, 2017). Nonverbal communication strengthens the message reducing uncertainty; however, followers with tendencies of suspicion potentially view the leader to not be authentic, generating a need to dig beneath the true meanings of their provided information (Bellou & Gkorezis, 2016). If a leader is seen as open and understanding with their direct daily connections but from a platform of public display, they convey a converse message with the improper connections of their speech to their body language. The inconsistency may tear apart what the leader has built at individual levels. In addition to body language, it is important to prevent barriers from existing

between the speaker and the audience, such as a desk or any blockage of view (Middaugh, 2017). The emotional state of a presenter can be judged more effectively when the entire body is visible (Middaugh, 2017). Leaders within the healthcare field, possibly unrecognized by themselves, are observed continuously with possibly the greatest outcomes on reward or external effects coming from their nonverbal communication (Hernandez & Tatini, 2011).

If observing a presentation from the observer's perspective, consider the presenter's feet. The truth can be revealed by watching an individual's feet (Middaugh, 2017). This may seem strange but if tested simply under daily circumstance, one might easily observe the same conclusions. Increased movement of the feet can reveal existence of nervousness or anxiety (Middaugh, 2017). Anders (2015) asked a noticeable question in his discussion of behavior in nonverbal communication: "How often have you seen someone go absolutely still during a performance review (freeze), lean away from the interviewer (flight), or clench a jaw, narrow their eyes and grip the chair tightly (fight)?" (p. 83). Anders was referencing former FBI counterintelligence special agent Joe Navarro and that there are three reactions (freeze, flight, fight) to uncertain outcomes. These three reactions appear to have distinct differences based on meaning. Applied awareness of these indicators alone has a great deal of value for someone in leadership.

Kinesics and Paralanguage

The shaking of hands, nodding, body positioning, and eye contact are what make up the study of kinesics (Bellou & Gkorezis, 2016). Vocal pitch and variation along with fluency and constructive conveyance evoke responses of laughter, vocal relaxation, and proper understanding as prompts within paralanguage (Bellou & Gkorezis, 2016). To

increase an authoritative influence, the voice pitch should go down at the end of sentences (Middaugh, 2017). Bellou and Gkorezis (2016) investigated kinesics and paralanguage in their research on nonverbal communication. The specific focus on kinesics and paralanguage directly relates to the questions presented in this research concerning the importance of a leader's use of nonverbal communication. Bellou and Gkorezis focused on how a leader's constructive utilization of kinesics and paralanguage affects their followers. Constructive uses of kinesics entail regular displays of large smiles, facial expressions, and gesticulations (Bellou & Gkorezis, 2016). The general understanding of the positive effects of gestures such as a smile should be self-explanatory without a great need for in-depth research for one to understand the effects they can have on followers.

Understanding Followers as Individuals

A one-size-fits-all approach would be a lost cause when attempting to understand nonverbal communication messages from every individual. However, there are a few generalizations that can be made (Anders, 2015). Table 2 shows a few generalization examples offered by Scott Anders, MD.

It is important to establish a baseline with each individual according to their voice cues and appearance (Anders, 2015). Nonverbal communication includes five major types of movements: regulators, adaptors, and affect displays discussed previously, as well as illustrators and emblems (Showry & Manasa, 2012). Emblems are simply signaling that can be understood as words or phrases (Showry & Manasa, 2012). An example of an emblem would be a thumbs-down hand signal offering a disagreement reaction. Illustrators are displayed, e.g., when a speaker directs the listener in a desired

physical direction (Showry & Manasa, 2012). Emblems and illustrators could be considered at least within specific cultures to be body language that is generalized to have near reliable consistency in meaning. From the researcher's interpretation of regulators, adaptors, and affect displays, there appears to exist a need for greater levels of understanding as required based on the observed individual. Leaders would be wise to take great care to not generalize body language ineffectively, as a misdiagnosed meaning could certainly have negative effects.

Table 2

General Cues in Nonverbal Communication

Nonverbal Communication	Cue
Crossed arms	Closed off
Thighs crossed away from other participant	Lack of interest/confrontation
Leaning back	Not interested, anxious
Leaning forward	Conveying interest
Hands steepled	Confidence
Hand under chin	Thinking/making a decision
Hand on back of neck	Not in agreement, has questions
Feet pointed toward the door	Flight, desire to flee
Closed mouth/tightened lips	Distress, anger

Note. Adapted from "What Are You Really Saying," by S. Anders, 2015, *Physician Leadership Journal*, 2(2), p. 83.

Mehrabian's 7/38/55 Percent Rule

Conveying inclusion and likability occurs by using gestures of an open palm, leaning forward, maintaining eye contact, and using a head tilt when listening (Middaugh, 2017). Rao's (2017) research mentioned the 7/38/55 percent rule by Albert Mehrabian. This rule appeared in two studies by Mehrabian on what makes humans like or dislike each other. Mehrabian (1971) uncovered results showing 7% of a message is based on the words, 38% comes from the tone of voice, and the remaining 55% from the

speaker's body language and facial expressions. Mehrabian believes facial expression has the greatest impact, followed by tone of voice. Touching is also an important form of nonverbal communication (Mehrabian, 1971). This conveys how body language and voice, not words, are the most powerful assessment tools in communication.

Mehrabian's concept of 7/38/55 often is misused to convey that only 7% of communication is verbal, but that is incorrect as referenced by Mehrabian himself at <http://www.kaaj.com/psych/smorder.html>. Mehrabian's rule is applied to the like or dislike of the message receiver, not a communication principle to be generalized.

Mehrabian noted contradicting speech and behaviors impact the message, with nonverbal communication having the most effect on what is communicated. When nonverbal and verbal messages are not consistent, a negative impact is seen (Mehrabian, 1971).

Mehrabian believes almost everyone can profit from a greater understanding of nonverbal communication.

Conclusion

As a result of the literature referenced, the researcher concludes a need for heightened awareness by leaders as they communicate nonverbally. Motivating, increasing productivity, and strengthening bonds, along with having more impact and authenticity skills in body language, should be a focused development (Middaugh, 2017). It is important to physically show interest. As a leader, one should not attempt to multitask while others are conveying a message, as with checking a watch or phone (Middaugh, 2017). The information leaders communicate nonverbally should be taken very seriously and deserve their undivided attention to detail. Followers' perceptions are

heavily impacted by what is observed through that which is communicated by body language.

Displays of negative emotions provide a significantly harmful effect concerning the assessment of leadership efficacy (Trichas & Schyns, 2012). Followers observe their leaders to be more effective when they use constructive nonverbal communication including kinesics and paralanguage (Bellou & Gkorezis, 2016). In general, suspicions exist by subordinates and should therefore give cause to reducing the preserved ulterior motives of a leader (Bellou & Gkorezis, 2016). Bellou and Gkorezis (2016) suggested a transparent approach to decision making, providing as much evidence as subordinates may require to alleviate their suspicions.

Many other factors that could be detailed in separate reviews can influence the efficacy of leadership. This review reveals that nonverbal communication has its own need for attention and appropriate understanding in reference to leadership. Making the effort to modify appearances, gestures, and exchanges affects the perceptions of an individual (Anders, 2015). “Successful leaders are great communicators on a behavioral level” (Koppensteiner & Grammer, 2010, p. 378). An interesting nonverbal communication observation by Rao (2017) concentrated on the effort of a speaker sharing a message with those of a foreign language other than the speaker. The message was conveyed by offering a greater use of body language to deliver the message (Rao, 2017). Rao’s simple observation helps one to understand how desirable it is to use body language effectively to communicate.

If inherently we make attempts to visually communicate nonverbally when we know a discrepancy exists in language instinctively, we are understanding the importance

of body language. Anders (2015) surmised the major points concerning communication by saying, “In the end, the only message that matters is the one received” (p. 83).

Leaders need the best understanding they can possibly gather to be certain their intended message is what has been received.

CHAPTER III: METHODOLOGY

To discover how a team formation experience could be affected by additional factors of consideration, such as interpreting nonverbal communication, this research analyzed student engineering teams that are initially formed by randomization. Later in their program these teams were introduced to team formation by computer-based methods. If additional steps had previously been in place to assess effectiveness and team dynamics based on nonverbal communication, how would this have changed the dynamics of the team formation process? Tools for teamwork support in college courses give professors the ability to gather, interpret, and share information concerning teams made up of their students (Loughry et al., 2014). One such tool supported by the National Science Foundation (NSF) and hosted by Purdue University is the Comprehensive Assessment of Team-Member Effectiveness (CATME) (Loughry et al., 2014). According to Loughry et al., CATME has been used with 150,000 students by over 3,300 instructors, and almost 700 institutions representing 50 countries. This tool is used broadly for the formation of student teams. It is relatively safe to assume this tool is an acceptable standard for its function. Along with team formation, CATME provides training on teamwork and tools from feedback that instructors can utilize in grading (Loughry et al., 2014).

CATME has several abilities to form teams based on survey completion information. The instructor is able to make a number of selections for team members to be categorized. For example, if skills in a specific software tool are required to be represented in the group, CATME can assign a member to a team based on the distribution of a group with those skills. Skill distributions support the operations of the

created teams. Operative teamwork depends on proper team formation (Hossain et al., 2017).

The CATME tool also collects information based on participants' availability. This information allows the teams to consist of individuals with the most similar availability times for project work. Some information is provided here about the CATME tool itself; however, the accuracy and validity of the actual tool was not being questioned in this research. CATME builds teams based on a number of factors that are reasonable to its purpose by finding and aligning availability of participants and their appropriate skills for engineering projects. The interest of this research was focused on the actual functionality of the team and collecting feedback from students on how the team's organizational structure could have been improved by assessing team member nonverbal communication. For creating, evaluating, and producing inputs from members in a team, communication is vital (Hossain et al., 2017). Feedback from the students concerning how their peers communicated, revealed how team formation decisions based on nonverbal communication could help future team formation processes.

The fact that CATME is the means by which the teams are currently built in later classes was irrelevant to the desired information to be collected. One caution suggested that any results found in this project would not negate the value of the CATME tool. That tool has been used productively and successfully for developing engineering student teams worldwide. In this research, the tool simply served as an example of an existing method of team formation based on separate factors than those assessed in this study. From CATME, teams are systematically built based on logical reasoning and application. The critical factor in the random style of team formation used in this research

concentrated on a team that was created by an outside acting leader. The intent of this research was to focus on the formation of teams and the information that should be elevated as critical to the leader who created them.

The CATME tool collected information over various semesters of participation and used this data to form teams as more data were made available from students' previous team experiences. CATME guided the professor through steps to set up questions for their students that were selected from CATME's library (Loughry et al., 2014). The system then generated emails to students based on the professors' desired timing requesting they perform a self and peer-evaluation of their team (Loughry et al., 2014). This compounding data were an incredible resource for student teams to be refined as they progressed through their programs. For this research, the status of the original teams without compiled historical data was the population desired for study. Using feedback from student teams that were created based on compiled feedback swayed the desired findings collected from original team formation. The compound data were based on feedback from students in the teams as they completed peer reviews in the feedback system provided by CATME. The researcher proposed that potential issues created in original team formation would be corrected over time based on student interactions. By studying the original team formations, the teams were not created with bias from their previous experiences. The researcher proposed to determine how the originally formed teams could have been affected if the leader or instructor creating the teams would have employed methods of individual interview making observation of nonverbal communication. Participants offered feedback through survey responses on what they observed and reflected on their team composition from their view of nonverbal

communication. “What-if” style questions were presented in these surveys to assess what the team organizer leading this effort could have evaluated had there been actual face-to-face nonverbal communication feedback considered. The questions prepared for these surveys were structured to produce research findings on nonverbal forms of communication and then participants were asked for their assessment of themselves and teammate interactions based on their nonverbal communication.

Recognizing the uniqueness of individuals when forming teams was important in order to understand or predict the success of the team. Without communication, the value of each individual’s uniqueness was not provided to benefit the team (Hossain et al., 2017). In the sample for this study, an engineering professor acted as the leader forming teams that could function autonomously. Using teams that were built by this method provided a population of random samples for evaluation. The desired teams created by this system were directed to be self-managing teams. The teams in fact did have a faculty member who oversaw their work and kept them within boundaries for the benefit of their learning experience. The faculty member, however, made no decision on the team’s behalf. The teams were fully responsible for their own actions and final products. The goal was to assess how the effects of nonverbal communication factors would have played into the creation of such teams.

It was the goal of this research to evaluate the randomly formed teams based on feedback provided by members of each team. This was a hindsight study for evaluating information concerning the nature of effects on team creation. Expecting individuals to function in teams as machines connected to one another for performing their tasks would not have been a real-world expectation (Fathian et al., 2017). Actual team formation

based on more than functional concepts may have required a focus on nonverbal communications to assess the nonverbal feedback as an additional factor in developing successful self-managed teams. The participants answered survey questions focused on gathering feedback on their assessment of team formation from aspects that could have modified their current team member composition if considered in the formation process. The population of participants involved undergraduate engineering students who had been placed on project teams randomly without the use of the CATME tool. Based on what was known about these formed teams, the feedback from the participants generated how the team could have been affected if nonverbal forms of communication were considered. Fathian et al. (2017) demonstrated that modifying communication structure among team members affects the team's organization abilities. How the team communicated had a potential to affect their success.

Research Questions

The following questions guided the research to explore the positive or negative effects of nonverbal communication on team creation. Engineering students who were randomly assigned to a self-managed team were available for providing feedback.

RQ1: Is it important to factor in aspects of nonverbal communication when creating teams?

RQ2: Do members of randomly formed teams see potential for improvement in the formation processes using nonverbal communication?

RQ3: Can leaders, who are not experts in nonverbal communication, successfully interpret nonverbal communication to assign individuals into a team based on a first-time meeting?

Research Background

Western Kentucky University Engineering Department used the CATME tool provided through Purdue University. It was the goal of CATME and team formation within the Engineering Design courses to generate student teams that could collaborate effectively based on each student's previous performance. Teams with contributing activities in higher percentiles performed more proficiently than those with fewer members in their groups (Swigger, Hoyt, Serçe, Lopez, & Alpaslan, 2012). In the Mechanical Engineering Freshman Design I (ME 176) course, no such data could be collected; therefore, team formation was based completely on random assignment of teams. The experience level of the student participants in Mechanical Engineering at that point did not offer specifics according to their abilities and strengths as they would have applied in course work teams. This early formation of student teams without data was an opportunity for this research to take place. The major overarching goals for student team formation in this early stage were:

1. Student understanding that selection was at random without other influences.
2. Proper breakdown of the overall classroom into student groups.
3. Levels of diversity or other factors did not influence group formation.
4. Groups were primarily random based on the available population.

Past team member experiences, when data were available, was a factor to consider for student teams (Adams, 2003). In the early stages of forming teams as they enrolled in this first-year Mechanical Engineering course, no data existed for the CATME tool to assess what it determined to be proper team formation.

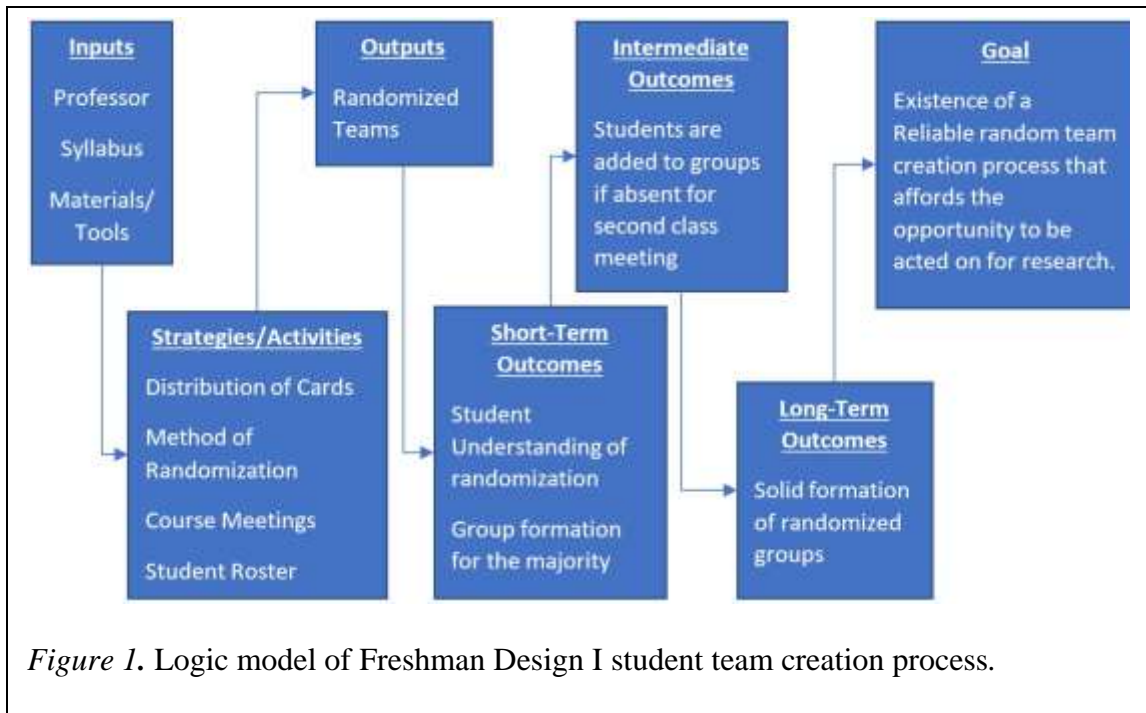
The CATME tool was the automated method by which student teams were developed for upperclassmen. This tool was utilized by professors to develop student teams based on data it collected as they progressed in their studies. The formation of teams using data collected for CATME supported upper-class efforts in team creation. Faculty were experts in their field; therefore, many did not have the skills required to manage, lead, evaluate, or equip student teams (Adams, 2003). The use of CATME greatly assisted with junior- and senior-level team formation.

A complaint found common among student team member participants was the laborious nature of arranging discussion times for team members (Fong, 2010). The arrangements for the teams being formed for this study, however, did not account for student availability to meet outside of class. These teams were not formed by the students themselves, but by a process controlled by the professor. Fong (2010) agreed that instructors should create the teams, not the students. This randomness again was limited to those who enrolled in Freshman Design I and were pursuing studies in Mechanical Engineering. Adams (2003) offered examples of random team selections, such as counting off by number or team assignments based on date of birth, color of attire, or more formal methods using well-established personality tests.

The problem that was addressed in the process of student randomized teams sought a solid foundation for research using these teams as the sample group. The desired sample consisted of teams that had been formed completely at random yet having an element that could in fact act upon the team should there have been a justifiable cause in doing so. For the validity of this research, the teams were controlled only to the status of randomization. This control, however, should have been in a position to implement

future research findings for the improvement of future team formation. By evaluating the team formation process for Freshman Design I, this research was able to gather feedback from these teams to understand how specific changes may have affected the group formation process either positively or negatively.

In the team formation method, the researcher identified the critical elements of randomness as depicted in the logic model (see Figure 1). The formal process by which teams were formed randomly in Freshman Design I historically was accomplished by passing out cards shuffled before the beginning of the second class meeting, as provided in the Logic Model shown in Figure 1. The deck of cards available in a quantity greater than the total number of students enrolled in the course had six different images printed on one side of them. In order to display the randomness of the process to students, additional steps of randomization were included in passing out the cards. All cards were to remain face down until they were distributed. The process began with one card handed to every row, allowing students to make the decisions as to what card to keep or pass down. Furthermore, instructions were given to pass the cards to the person sitting in front of each student and additionally to their right and/or left. After the card distribution activity was complete, students with cards having the same image found one another, and the resulting groups defined each team. If a student was absent the day of the activity, they were added to the team with the lesser number of students from the activity. This happened based on when the students arrived at the next class after the activity they had attended. This balance offered the structure of a random group that could be



acted upon by the professor but was not because the means for which teams were formed was automated at random. The formation of teams was accomplished through efforts by the faculty making random selections rather than students forming their own teams (Adams, 2003). It was not unusual for engineering faculty to require work in student teams; however, only a small number of engineering faculty were trained to direct, lead, or activate teams (Kearney, Damron, & Sohoni, 2015).

The existence of the professor in this application provided an individual who could take actions to effect team formation, should actions be proven necessary. These elements were key to the validity of this group for the research study. The study required that teams be formed randomly but within a program that contained an individual who could make decisions based on certain factors affecting the team creation process but currently not making team formation judgments based on additional factors beyond the

random automation method. In addition to providing an understanding to the students that all groups were created impartially, the randomness of team selection was in place.

The six WKU engineering design courses were broken down and assessed programmatically by a variety of components inside each course. For this research, the focus was directed to the first course for new students to Mechanical Engineering, Freshman Design I. The course syllabus is referenced in Appendix A. Freshman Design I was coupled with Freshman Design II for equipping students as they began their academic journey toward becoming mechanical engineers. Inside the Freshman Design I course were many aspects collected to generate the entire experience.

The students were challenged with fundamentals in engineering design, ethics, and prototyping concepts, along with an element of team structure. By working in teams, there were pitfalls to the collaboration within groups. When a high-level assignment was the objective, students perceived as less skilled were discounted by group members (Fong, 2010). As it pertained to this research, the elements of team formation were the focus for the research.

Supporting teams were a more complex exercise in the atmosphere necessary for students to succeed (Kearney et al., 2015). The need for team creation played a major role in the education process for students pursuing a degree in Mechanical Engineering. The field of Engineering relies heavily on abilities to work effectively within teams. For the students in Freshman Design I to complete project objectives to meet the requirements of the course, they had to perform their work in a team setting. As their engineering education continued, the keys to their success in the program weighed heavily on successful teamwork to complete projects required of them. Research by

Swigger et al. (2012) noted no significant differences in the GPA or experience of teams that were high or low performing. According to Borrego, Karlin, McNair, and Beddoes (2013), aligning team processes to outcomes safeguards team success, while clarifying alignment potentially offers a substantial effect on team results in place of rigid use of personality types or the like in assessment of team members.

In this research, teams formed by these freshman-level students were not dependent upon methods traditionally preferred for team creation. The randomness of the exercise helped to validate the process for the research conducted. The pursuit of feedback from these teams required randomization for the research validity to evaluate the team formation process in order to gather information from students. To effectively randomize the student team selection groupings, a mechanism for random selection was required. The focus on this process within the research required that in fact the student teams were not influenced by outside sources, and aside from concerns for student availability as participants in the course, the groups were random.

Use of feedback gathered from these teams helped to understand how specific changes affected the group formation process either positively or negatively. The research performed using these randomized groups targeted interpretation of potential team members' nonverbal communication and how this information could be used to influence the team creation process. This research used feedback from student groups on their interpretation of what could have been addressed differently if the random groups were acted on, from interpretations of how potential group members communicated nonverbally. A survey shown in Appendix B was used for gathering the students'

feedback for review. IRB approval was attained for gathering information with the survey shown in Appendix C.

The program examined in this study was within the operations of educating undergraduate students in Mechanical Engineering at WKU. The undergraduate degree in Mechanical Engineering requires a series of specific course requirements, as most degrees of its type. Within the coursework for the degree are six major design courses spread across a student's academic career in Mechanical Engineering, along with several other required courses such as Chemistry, Physics, and Calculus.

The six major Design courses are highlighted in Figure 2 from the critical path to graduation for WKU Mechanical Engineering students. Not only were technical skills necessary, but skills also critical for success included interpersonal communication, conflict management, general people skills, and team leadership (Kearney et al., 2015). The six major engineering design courses were Freshman Design I (ME176) and II (ME180), Sophomore Design (ME200), Junior Design (ME300), and Senior Project (ME400 and ME412). Throughout these courses were activities in teamwork. Many aspects of student success were dependent upon this work and how they evaluated one another in peer groups. A major issue for instructors tasked with identifying individual student contributions within a team project was an effective assessment of student collaborations (Swigger et al., 2012). Systems of grading coursework contained peer evaluation and did not avoid the aspects of team performance (Fong, 2010).

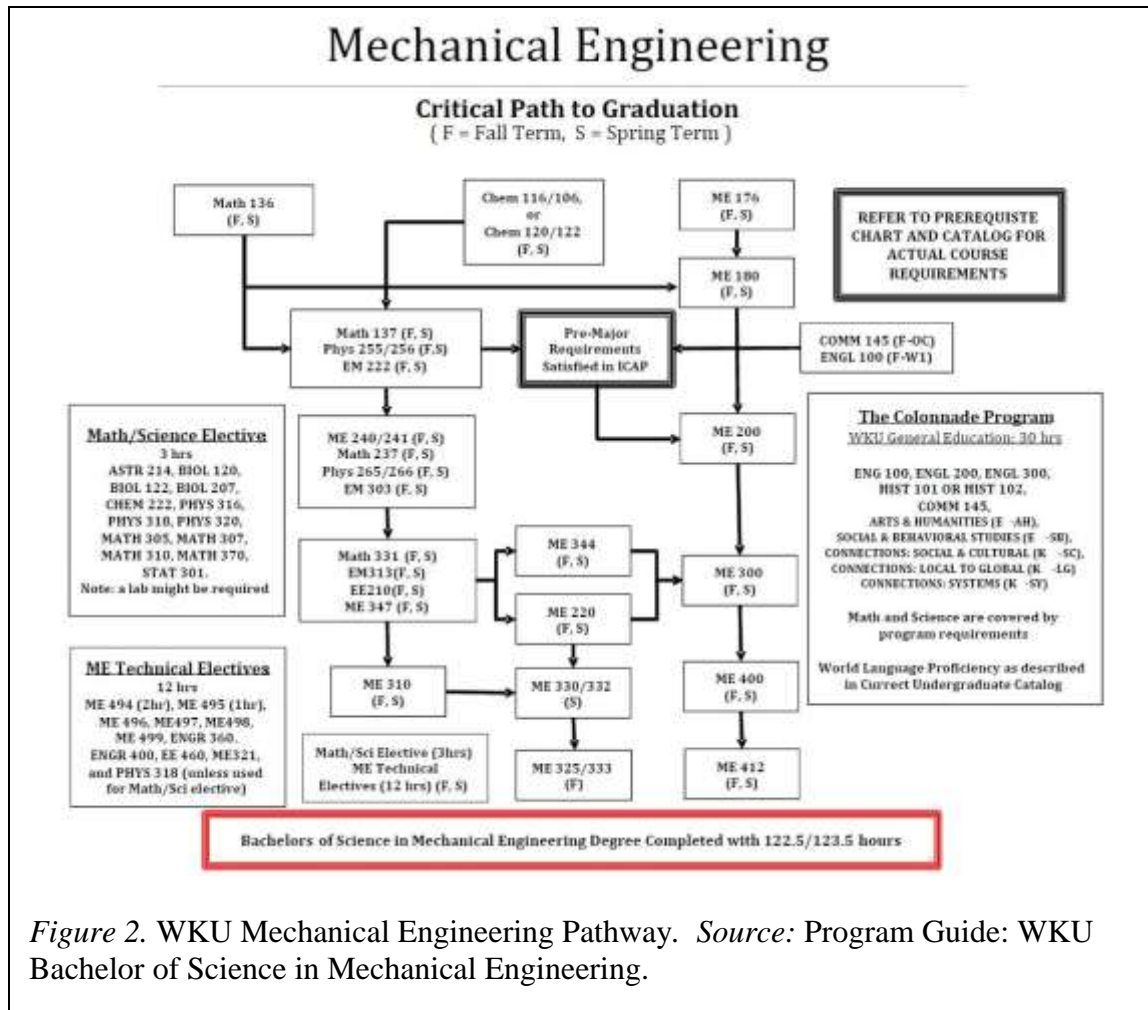


Figure 2. WKU Mechanical Engineering Pathway. Source: Program Guide: WKU Bachelor of Science in Mechanical Engineering.

Project courses based on the use of teams added value to the student's area of study by offering important skills not developed by traditional lecture style learning (Gider & Urbancic, 2010).

Effects of Proper Team Formation

Industries focus importance on training for teams and have the time to do so, but in engineering classrooms little formal training is a part of the curriculum and time is not available for such activities (Adams, 2003). Some students found that traditional lecture-based learning provided directly from instructor to student did not stimulate their thinking but discovered that learning in teams was a sufficient alternative (Fong, 2010).

Addressing the teamwork segment of the course programmatically offered an understanding of this segment's structure and processes. Development research on groups has dated back to 1950 (Kearney et al., 2015).

Research offering discussions with students on their attitudes toward teams listed deficiencies in collaboration, unity, unclear expectations, free riders, lack of experience in teams, along with unestablished deadlines within groups (Adams, 2003). Major student complaints with teams, such as the arrival of late members and absences, have been found to be reduced by peer evaluation (Fong, 2010). Certainly, if these effects along with social loafing were reduced, team effectiveness would increase. "Social loafing" is defined as the nature of team participants to exhibit reduced determination in group work in comparison to what their individual efforts would be on their own (Borrego et al., 2013). A tool for evaluating the effects of social loafing on group performance was developed at the Renmin University of China (Ying, Li, Jiang, Peng, & Lin, 2014). The targeted work for this research was not to uncover the effects of social loafing on the engineering teams. This tool was worth noting based on its potential future use in working with specific groups of teams.

Research Design

This research used a theory-based approach. The researcher collaborated with the course professors in the Mechanical Engineering Program to determine the most appropriate means for gathering feedback. The timing and use of the chosen survey instrument in collaboration with the Freshman Design I course defined the ability for the researcher to work directly with students affected by the process in a one-semester cohort. In the offerings of Freshman Design I, a bi-term course required specific timing

to collect feedback from the students. To use an effective means of surveying students, the professors involved with teaching Freshman Design I worked with the researcher on the steering committee. With the steering committee's collaborative efforts, timing for distributing the survey to collect student feedback was deemed appropriate and approved by the WKU Institutional Review Board (IRB).

This research was a mixed-methods case study using a concurrent embedded strategy (Creswell, 2009). Qualitative analysis of the students' first six open-ended responses to the survey in Appendix B offered a process of elimination for students that did not offer valid responses to the research. These students were removed based on each student's lack of nonverbal communication knowledge. The qualitative portion of the research presented and evaluated the student responses that were considered to be incompatible with the subject. Quantitative analysis of the resulting valid student inputs offered insight into the potential effects of assessing nonverbal communication. These results provided feedback into how teams that were randomly formed were affected by an assessment of nonverbal communication. The researcher looked for constructs, themes, or patterns within the responses by utilizing interpretational analysis. One limitation of this study was the small sample size, which limited the generalizability of the study. A delimitation of this study also was the choice of the small sample size, which bound the study to a strict focus on one type of team.

Participants

The student participants were identified in this research based on a chronological number assigned to their survey response form as submitted. There were no connections or methods of arrangement of these identifiers; they were simply consecutively assigned

for the use of differentiating between each respondent. This study was designed to eliminate student responses that showed evidence they lacked an understanding of nonverbal communication. For the research questions to be answered appropriately, the participants were required to have the ability to provide useful feedback for the research. The primary purpose in the concurrent embedded strategy used the student participants' qualitative responses to evaluate their competency of nonverbal communication. If the participant responses were obvious or somewhat questionable for their understanding of nonverbal communication, those participants were excluded from the list of reliable feedback responses used to answer the research questions. The elimination process unearthed the most valid responses from the group of student participants. Working with the steering committee, the choice was made to not interject or offer guidance to define nonverbal communication, as this discussion could have swayed the validity of the study. Those lacking confidence in observing nonverbal communication or an understanding of the topic were systematically removed by review of their responses to the open-ended survey questions.

Information Collection

Based on collaboration with the steering committee, the feedback consisted of surveys completed by students who participated in the team formation process. These surveys were distributed manually in a class session for Freshman Design I facilitated by a visit to the course by the researcher. These classes typically have an enrollment of 50 to 60 students. Participation in the survey was anticipated to be near 100%. The expected sample size was 50 to 60 students. Demographic information was not collected because age, gender, race, etc., were not factors in this study. This methodology was

selected based on the availability of a sizable number of student participants and was dependent upon how the student feedback was acquired with a high rate of responses. After data collection and survey statements were collected, statistical techniques were used to validate the data. Evidence of the instrument's internal validity was established, and student quantitative feedback was measured to address the key research questions.

Limitations of this research were primarily based in its origins within one specific program. The small sample size for this evaluation was assessed and further used within its own program. The quality of the data was suspect because of the small sample size. If pursued over several years and evaluated collectively, the data may offer stronger validity, as it would be spread across several additional cohorts. This evaluation has potential for expansion if findings could be proposed to software programmers of the CATME tool for team formation. The CATME tool is used with early randomization of teams but was not used in such a capacity with the sample group in this research. This evaluation was focused directly on one course, the team formation for Freshman Design I, and was not considered to be a representative sample for the entire population of corporate, workplace, or educational team formation. The availability of a randomly formed group of teams was more difficult to identify in other environments.

CHAPTER IV: FINDINGS

The purpose of this study was to determine the perceptions of the student participants of incorporating the use of nonverbal communication into the creation process used in forming their teams. The participants of this research voluntarily participated in a survey distributed to them after the conclusion of their work in teams formed randomly under the direction of their professor. Proper approval of this research was acquired through a process with the WKU Institutional Review Board. See Appendix C for documentation approving the work, as well as the information provided to each survey participant. Of the 54 students available for participation in the survey, two of them were under the age of 18 and could not participate. The remaining 52 students consented to participate and provided survey responses. Of the 52 student participants, several lacked a substantial understanding of nonverbal communication, justifying their removal from the efforts to answer the research questions. The initial stage of this concurrent embedded approach was to evaluate the participants' qualitative responses to remove those whose answers were not considered valid for the quantitative portion. The resulting quantitative results provided feedback for the questions posed in this research.

Evaluating Student Responses for Exclusion

The following information provides the qualitative deductions as processed for eliminating participants who lacked a strong understanding of nonverbal communication. Several responses were closely related and grouped, offering example student responses that justified the decision. The following provides an explanation for participant removal offering no substantial feedback to support the work. The qualitative statements provided

supporting evidence for exclusion of the participants lacking the ability to support the research. See Appendix B for the full survey provided to participants. The survey questions referenced as Q1-Q6 in this section are from the following questions of the distributed survey.

- Q1. What is your understanding of nonverbal forms of communication?
- Q2. In your opinion are you capable of gathering information based on another person's nonverbal forms of communication? Please explain your logic.
- Q3. What forms of nonverbal communication are the most obvious to you?
- Q4. Based on observations of your project team members can you effectively identify forms of nonverbal communication they have used? Please describe.
- Q5. Could face-to-face evaluations by your professors prior to forming teams utilize early observations of body language and facial expressions to assist in effective team creation? Please elaborate.
- Q6. What demonstrated nonverbal displays of communication by your team members could be correlated to a specific team member's function? (For example: Has a particular nonverbal form of communication supported a team member's ability to be: a leader, data driven, procedural, conceptual, or supportive, etc?)

The first participant response justifying removal from the study, Participant 37, failed to provide feedback to the quantitative questions in the second half of the survey. Additionally, Participant 37 responded to Q1 and Q2 as follows. Participant 37's response to Q1:

Nonverbal communication is communication without sound, gesturing, facial expressions etc. I'm bad at it.

Participant 37 responded to Q2 with:

Nope. I have autism

The researcher does not claim expertise in the study of autism but has colleagues in the field of psychology, as well as personal and professional volunteer experiences working with students diagnosed with autism. This participant's answers to Q1 and Q2 correlated with an understanding that an individual diagnosed with autism would have difficulty identifying the use of nonverbal communication. In addition, the lack of responses by participant 37 to the quantitative questions offered no support for the research.

Participants 4 and 18 justified removal based on their belief that nonverbal communication can be understood only by interpretations of a person they know personally, rather than having competency in assessing the nonverbal communication of strangers. The ability to assess anyone was a critical understanding for this work, as the nonverbal communication for assessment took place in a very short initial interaction with the individual forming the team and the potential team members. Participant 4 provided their understanding in an answer to Q2:

Yes, you can generally tell if someone is mad, they agree, disagree, etc. But, it's only is when you know the person and how they react.

Participant 18 similarly responded with a struggle in capability of gathering information from nonverbal communication of those with whom they were not familiar. Therefore, Participant 18's answer to Q2 signaled a need for their exclusion:

It is easy to see when someone is bothered by something if you commonly hang out with them but someone I don't know would be harder to tell

The very nature of the self-managed teams the students were working in was made up of unfamiliar individuals formed randomly into a team. A lack in ability to assess the nonverbal communication from someone they did not know limited their ability to provide valuable feedback for this work.

Participant 5 was excluded from the final group assessed in this study based on the following response to Q1:

Hand gestures, facial expressions, body language, etc. all play a part in nonverbal communication and are just as important as verbal comm.

Nonverbal communication accounts for nearly 90% of communication that takes place (Gupta, 2013). An equalizing of nonverbal communication to verbal communication was an inaccurate understanding of the weight that was placed on the collection of nonverbal feedback. This response, along with other misunderstandings of the context, promoted the removal of Participant 5 from the group.

Participants 6, 7, 10, 27, 34, 35, and 50 were primarily excluded based on their self-identification for lacking capabilities of gathering information based on others' nonverbal communication. The following comments as identified per participant justified the removal of these participants from the later quantitative feedback portion of the study. The exclusion of Participant 6 was based on their lack of confidence established from their answer to Q2:

Yes and no. If someone's body language is really obvious and direct I can gather information but if it is very subdued it is hard.

A self-identification of not being proficient in nonverbal communication eliminated Participant 7 from the work based on their answer to Q1:

I understand the more obvious nonverbal cues and even some of the less obvious, however, I am in no way proficient in this form of communication.

Participant 10 shared their lack of understanding that everyone used nonverbal communication by explaining some individuals were difficult to read from their answer to Q1:

Sometimes some people are easy to read others are a book in quantum physics.

Participant 27 self-identified difficulty understanding any nonverbal forms of communication beyond yes and no body language in response to Q2:

It is easy to understand yes and no body language but beyond that have no idea.

Lacking a confident ability to gather feedback from nonverbal communication, Participants 34, 35, and 50 were all removed from the study based on their similar answers to Q2. Each used forms of “to an extent,” “semi capable,” and “it’s situational” to describe their lack of ability to gather information from nonverbal communication.

Participant 50 responded to Q2 with:

I would say that it is situational for me. In certain situations I can gather information and in some I can't.

Participants 17, 21, and 51 provided responses to Q1, Q2, Q4, and Q6, by demonstrating an incorrect correlation of nonverbal communication to only simple hand signals used when verbal communication was not an option. These participants had a limited understanding to only directional instructions using motions rather than a full understanding of nonverbal communication used in conjunction with verbal forms of

communication. Because the research focus was not on instructional motion but on nonverbal communication, these participants were removed from the final group offering valid feedback. Each participant in this grouping used examples of environments that limited the use of verbal communication, completely relying solely on hand signals.

Participant 21's response, for example, to Q2 was:

Yes, I played football and all of our plays were called from the sideline by hand signals. We never huddled up and never said what the play was we just looked and understood.

Participant 51's response to Q1 showed limited understanding with the response:

Writing, hand communication.

To further exemplify the need for elimination of participants 17, 21, and 51, their responses explained that their teams did not use nonverbal communication but only verbal communication. As explained in earlier chapters, this most certainly was not the case. Participant 17 answered Q6 stating:

We haven't been using nonverbal communication everything has been verbal.

Participant 21 provided this answer to Q4:

No in my team we communicated almost always verbally.

Additionally, Participant 51 responded to Q4 saying:

No we talked the whole time

Participants 33, 36, and 38 supplied their misconceptions of nonverbal communication, as they identified means of professional presentation and documents as their definition. The responses provided by Participant 33 demonstrated how 33, 36, and

38 responded in similar methods. Participant 33 included pictures and slide shows in their answer of understanding to Q1:

Nonverbal forms of communication to my understanding is communicating maybe through body motions, pictures/slideshows, or just simply acting something out.

Participant 33 went on to respond to Q2, including drawings in their explanation:

I feel like I am fairly capable of gathering information based on a person's nonverbal communication just because really pay attention to people. I pay attention to the way they act and all the hand motions and pretty much anything besides verbal. I can look at a drawing and see what's going on easily.

This incorrect understanding shared with Participants 36 and 38 continued with

Participant 33's answer to Q3:

Hand motions, emoticons such as smiles, and pictures and drawings.

Again, representative of Participants 36 and 38, Participant 33 responded to Q4 with:

Based on my observations most of the nonverbal communication we do are through drawing our design out and using hand motions to show how it works or simply just doing it after it's built if they still don't understand.

There was a mix of true nonverbal communication concepts in the responses from Participants 33, 36, and 38; however, their inclusion of completely unrelated forms of tangible written or drawn communication painted these participants with an unreliable understanding of nonverbal communication. A final example from Participant 33's response to Q6 echoed the same pattern:

One of my team members is really good at making drawing and this really helps him to be a very creative and demonstrative nonverbal communicator.

Participants 33, 36, and 38 appeared to be confusing other forms of professional presentations and acting with their concept of nonverbal communication. Although these participants responded similarly by self-identifying as “fairly capable of gathering information,” unfortunately they appeared to lack understanding of what nonverbal communication truly was. Participant 36 responded to Q2 with:

Yes. Drawing and writings can be useful in understanding another's logic.

In addition, Participant 38 answered Q3 stating the most obvious forms of nonverbal communication as:

Expressions and Pictures

Therefore, Participants 33, 36, and 38 were removed from the list of respondents offering competent feedback on the subject of nonverbal communication studied in this research.

Participants 15 and 20 had a similar misunderstanding of nonverbal communication as the three participants reviewed in the section prior. Respondents 15 and 20 provided responses sharing their team’s use of current communication mediums rather than referencing an understanding of nonverbal forms of communication.

Participant 15 provided this answer to Q3:

text, email, GroupMe, body language, eye contact.

Additionally, Participant 15 responded to Q4 by saying:

We have a GroupMe, as well as a google drive.

Similarly, Participant 20 answered Q4 with:

No because we usually communicate over text. Eliminating my non-verbal communication.

These responses by Participants 15 and 20 provided reason to remove them from the final analysis of feedback on nonverbal communication in this study.

Participants 3, 9, 14, and 16 were eliminated from the final group, as they provided responses to survey questions that were completely irrelevant to the questions about nonverbal forms of communication. Lack of attention by Participants 3, 9, 14, and 16 to the topic and questions posed provided reason to remove them from the group of valid responses used in the second quantitative portion of this work. Participant 3 had a primary agenda to simply point blame at others on their team rather than focus on the questions posed in the survey. For example, Participant 3 responded to Q4 by stating:

Yes, for example it's obvious one team member isn't that interested because they rarely show up to help (actions).

An example irrelevant response from Participant 9 included their answer to Q4:

We get excited when things go right. Some get sad when things go south.

Participant 9 also answered Q6 with this response:

“A Team Member” having long arms shows that he could operate the machine much better.

Participant 14 wavered from the actual focus on nonverbal communication in their answer to Q4 stating:

Yes, when the project falls apart. Every one of us are going to look upset.

Participant 16 lacked the ability to properly identify forms of nonverbal communication their team members used. For example, Participant 16 responded to Q4 answering:

Yes, some obviously pay attention while some wander off.

Additionally, confusing team member actions with nonverbal communication, Participant 16 answered Q6 with:

Naturally taking over or putting stuff together.

The mixed responses were examples from Participants 3, 9, 14, and 16, justifying removal from the competent remaining group that was sought for valid feedback on the research questions posed.

Evaluating Student Responses for Inclusion

The remaining 27 survey participants provided evidence of their understanding of nonverbal communication. The remaining students provided for a strong grouping of nonverbal communication competent individuals with the capability to provide feedback on how the team formation process they experienced was affected. This remaining group of 27 provided feedback concerning whether the team creator, their professor in this case, positively or negatively affected the process by incorporating attention to nonverbal communication. A few qualitative examples follow to provide evidence of the final group of participants' competences. Again, each individual participant was simply identified as assigned by a numerically ordered identifier.

Participants 1, 2, 11, 30, 42, and 52 provided response levels with evidence of either self-study and self-interest or comments that accurately described what was currently known about nonverbal communication. Some of the student comments aligned with research presented in earlier chapters of this work. The strongest sense of competency was evident in responses from Participants 2, 11, 30, and 52, confirming an

understanding that nonverbal forms of communication outweighed other forms of communication. Participant 2 made this clear in the following answer to Q1:

That a conversation is 70% nonverbal.

Participants 11, 30, and 52 echoed Participant 2 by responding with varying terms such as “majority,” “overwhelming,” and “most” in responses similar to Participant 52’s answer to Q2:

Yes, most communication is through nonverbal forms rather than verbal forms.

In addition to the awareness of how much information was conveyed by nonverbal communication, Participants 11, 30, and 52 provided answers to other survey questions similar to the final group that was assessed for their feedback on how teams could be affected. Responses from Participants 1 and 42 included comments revealing a heightened understanding of nonverbal communication and personal study on the subject. Participant 1 responded to Q1 making this claim of self-study:

I have a fairly basic understanding of nonverbal communication. I have done some personal research on the subject out of curiosity but have never taken a formal class on the matter and by no means have any certifications in the field.

Acknowledging an understanding that nonverbal communication was more difficult if not impossible to control, Participant 42 provided for Q1 an explanation that reactions could be involuntary:

Nonverbal communication involves body positioning and facial expressions, whether voluntary or involuntary. They can also involve noises (not words).

As was the case with Participants 11, 30, and 52, Participants 1 and 42 provided additional evidence of their nonverbal communication understanding in unison with the group included in the final quantitative analysis.

Participants 19, 22, 23, 25, 28, and 46 self-identified with a competent understanding of nonverbal communication along with expressing a talent for using and reading this form of communication. This set of participants additionally provided similar descriptions of nonverbal communication as the other students included in the final quantitative grouping. Participant 19 explained an attentiveness to gathering information from nonverbal communication in response to Q2:

I can do this pretty well by after hearing the issue and watching their facial expression/body language

Participant 46 responded to Q2 adding an element of lie detection in their self-assessment of logic in nonverbal communication:

Yes, I am okay at reading faces and very good at discerning lies

Participants 22, 23, 25, and 28 self-identified their competence in response to Q2 using phrases such as “I am good at,” “I can understand,” “Yes, I tend to be able to read,” and “I can gather” in responses similar to this example from Participant 23:

Yes, by reading another person's nonverbal communication I can understand some information without being told specifically.

Along with self-identifying as competent, Participants 22, 23, 25, and 28 provided responses that nonverbal communication conveyed to them an understanding of one’s emotions or moods. Participant 22 exemplified this in their answer to Q1:

These are ways to express your thinking and feelings to other people without actually talking. This can include facial expressions and body language.

Participant 23 provided a specific example of identifying nonverbal communication and their perspective from work within their team in response to Q4:

If an idea was confusing I could see that on a team member's face and I knew it needed to be explained further.

Participants 8, 13, 24, 26, 39, 43, 44, and 45 also self-identified with competence and abilities to gather information based on nonverbal communication. This group's answers did not include any specific explanation of talents in reading nonverbal communication. Participants 8, 13, 24, 26, 39, 43, and 45 provided a strong understanding of the forms of nonverbal communication and concepts of understanding emotions and moods. Competence was affirmed in this group by the use of statements such as "Yes," "yes, body language can tell a lot about," "Yes, because not all communication is through voice," "I am capable," and "I am fairly good at reading" in responses similar to Participant 8's answer to Q2:

Yes, based off of facial expressions and body positions or posture, one can interpret another's mood and comfort as well as other emotions.

Statements revealed Participants 8, 13, 24, 26, 39, 43, and 45 considered nonverbal communication as a method of understanding emotions and mood, which included responses such as participant 24's answer to Q1:

Any type of communication that uses no voice. For example, body language can let you know how that person feels.

Participants 29, 31, 32, 40, 41, 47, and 48 did not directly self-identify with a competence in nonverbal communication but provided ample information in their survey responses to provide evidence of their knowledge. Participants in this grouping were valid for the final quantitative analysis, as they noted descriptions of nonverbal communication that included “Hand motions,” “body language,” “movement of hands, movement of lips,” “eye contact, smiling,” “communicate without words,” “facial and hand,” and “gestures” in addition to their other confirming responses. Participant 32 exemplified a sample representative statement in response to Q1 by stating:

Body language is a big form of nonverbal communication that can provide important context clues as to how a person feels.

Respondents considered to have capacity for providing valid support for the research conducted had responses to Q3 and Q4 that supported the participants’ understanding of nonverbal communication. Most responses to Q3 and Q4 are not included, as they were consistent with listings of body language, facial expressions, and any form of communication provided that were not verbal. In the survey, Q5 and Q6 were designed for gathering qualitative feedback that joined with the participants’ quantitative responses. Some responses to Q6 as addressed previously conveyed a lack of understanding in the subject of nonverbal communication and were not ignored when evaluating respondents for competency.

Addressing the Research Questions

The final grouping of survey responses was comprised of the students determined as competent respondents, totaling 27 participants remaining for quantitative analysis after the qualitative analysis of the original 52. The responses of these 27 students

provided valuable insight into answering the research questions posed in this work in this specific environment of engineering student teams formed at random by their professor. A scale must be reliable to be used for analysis (Mehmetoglu & Jakobsen, 2017). The internal reliability of the research instrument was determined by calculating Cronbach's alpha for the survey. Cronbach's alpha was used to measure the reliability of scores and ranges from 0 to 1 (Mehmetoglu & Jakobsen, 2017). To be valid, the Cronbach's alpha required a coefficient of 0.7 or higher (Mehmetoglu & Jakobsen, 2017). Cronbach's alpha for the included student responses was 0.718, which suggests the research instrument used in this study was reliable.

Research Question 1

Final participant responses to the first research question were assessed by Q8 and Q12 of the quantitative portion of the survey. RQ1 asked: Is it important to factor in aspects of nonverbal communication when creating teams? As shown in Table 3, the participants' responses were divided. The responses leaned slightly toward agreement in support of nonverbal communication strengthening team creation by their answers to Q8 inquiring a response to: If nonverbal communication was factored into who was placed on teams by diversifying the reactions observed, this would have had a positive impact on creating stronger teams. Survey results revealed 15 out of 27 students (55.56%) either agreed or strongly agreed that nonverbal forms of communication should be factored into the placement of individuals on teams. Of the remaining 44.44%, only one participant strongly disagreed and five disagreed. Unfortunately, 22.22% of the participants' responses landed in the neutral category. This percentage of neutral responses revealed an uncertainty that nonverbal communication may or may not have positively impacted

their teams. Slightly higher responses of agreement and few responses of disagreement simply suggest that factoring in aspects of nonverbal communication was an important aspect in creating teams but was not confirmed in this measure by a large percentage of respondents.

Table 3

Responses to Question 8

Type of Response	Percentage of Participants	Responses
Strongly Disagree	3.70	1
Disagree	18.52	5
Neutral	22.22	6
Agree	25.93	7
Strongly Agree	29.63	8

Note. Feedback from participant survey.

Additionally, in efforts to resolve RQ1, survey Q12 sought participant responses on: It is important to evaluate what can be gathered from nonverbal communication when creating project teams. Table 4 displays the participant results from Q12. Responses from participants to survey Q12 provided more clarity than responses to Q8 in a direction that factoring nonverbal communication into creating teams could have a positive impact. Of the 27 responses, 20 students (74.07%) agreed or strongly agreed it was important to evaluate nonverbal communication when creating teams. In response to survey Q12, only 5 of the 27 students (18.52%) chose to remain neutral, and a small number of respondents (7.40%) responded in disagreement or strong disagreement. From responses to Q8 and Q12, it was not explicitly clear but strongly supported that it was important to factor in aspects of nonverbal communication when creating teams, according to this group of participants.

Table 4

Responses to Question 12

Type of Response	Percentage of Participants	Responses
Strongly Disagree	3.70	1
Disagree	3.70	1
Neutral	18.52	5
Agree	40.74	11
Strongly Agree	33.33	9

Note. Feedback from participant survey.

Research Question 2

Responses to survey Q9 and Q10 provided feedback from the assessed student group to gather feedback for RQ2: Do members of randomly formed teams see potential for improvement in the formation processes using nonverbal communication? Shown in Table 5, responses to survey Q9 resulted in 21 of the 27 students (77.78%) agreeing or strongly agreeing that a predictor of productive team members could be observed in nonverbal communication. Only three students (11.11%) had neutral responses, and the remaining three disagreed or strongly disagreed. With more clarity than provided for RQ1, strong support was built for RQ2 resulting from responses to survey Q9 that revealed 77.78% of respondents supported observations of nonverbal communication for forecasting productive team members.

Table 5

Responses to Question 9

Type of Response	Percentage of Participants	Responses
Strongly Disagree	3.70	1
Disagree	7.41	2
Neutral	11.11	3
Agree	37.04	10
Strongly Agree	40.74	11

Note. Feedback from participant survey.

Responses to Q10 shown in Table 6 revealed that 21 of the 27 student (77.78%) responses answering as agree or strongly agree supported that body language specifically could provide an early understanding of a team member's commitment level. Less students, in comparison to previous questions, responded with neutral (7.41%), and 4 of the 27 students (14.81%) disagreed or strongly disagreed. Again, 77.78% of the participants agreed that nonverbal communication observations predicted a team member's productivity, and body language was an early indicator of team member commitment. These results support a strong case that members of randomly formed teams saw potential for improvements using nonverbal communication in the team formation process.

Table 6

Responses to Question 10

Type of Response	Percentage of Participants	Responses
Strongly Disagree	3.70	1
Disagree	11.11	3
Neutral	7.41	2
Agree	37.04	10
Strongly Agree	40.74	11

Note. Feedback from participant survey.

Research Question 3

Survey questions Q7 and Q11 sought to answer RQ3 asking: Can leaders, who are not experts in nonverbal communication, successfully assign individuals to a team based on a first-time meeting? As seen in Table 7, a total of eight students (29.63%) provided neutral feedback to Q7. Findings from Q7 disclosed 16 of the 27 students (59.26%) agreed or strongly agreed that forms of team member nonverbal communication could be observed in first-time meetings by their professors. Zero respondents strongly disagreed, and three of the 27 students (11.11%) simply disagree. Similar to RQ1, a great deal of clarity was not revealed by 59.26% of students, believing that nonverbal communication exhibited by a team member could be observed by their professor in a first-time meeting.

Table 7

Responses to Question 7

Type of Response	Percentage of Participants	Responses
Strongly Disagree	0.00	0
Disagree	11.11	3
Neutral	29.63	8
Agree	40.74	11
Strongly Agree	18.52	5

Note. Feedback from participant survey.

Answers to survey Q11, as shown in Table 8, provided that 17 of the 27 students (62.97%) agreed or strongly agreed their professor did not need to be an expert in nonverbal communication for success in its use for creating teams. Analogous with Q7, zero respondents chose strongly disagree, and the remaining 10 students were split evenly between disagreeing (18.52%) and neutral (18.52%). The majority (69.97%) of students agreed their professor would not have to be an expert to successfully interpret nonverbal communication. A 69.97% response in agreement to question 11 and a 59.26% response to Q7 positively reflected that leaders lacking the specific expertise could assess nonverbal communication for assigning individuals into teams in a first-time meeting.

Table 8

Responses to Question 11

Type of Response	Percentage of Participants	Responses
Strongly Disagree	0.00	0
Disagree	18.52	5
Neutral	18.52	5
Agree	37.04	10
Strongly Agree	25.93	7

Note. Feedback from participant survey.

CHAPTER V: DISCUSSION, RECOMMENDATIONS, AND CONCLUSION

All communication is crucial to the development of ideas within a team (Houssain et al., 2017). The research conducted with undergraduate students in this work may open doors for looking at what may be a very underestimated task left unaddressed in many small businesses, corporations, nonprofits, and educational processes. Students praise programs that allow them to work in teams because it provides the chance to work in a professional environment (Fong, 2010). Many other nonacademic areas could be studied for efficient means of forming teams. Continuing to move into our industrial and technological future may depend on the speed and accuracy at which strong teams can be formed. More learning occurs within a team if there is a team member who is willing to point out when other team members are incorrect (Fong, 2010). Creating self-managed teams consisting of members who are supportive and corrective in their efforts increases team growth and competence. Substantial insights can be gained by understanding team formation (Houssain et al., 2017). With an everchanging society and employment landscape, teams may need to be created and replaced quickly in our developing and mobile workforce. Groups that are diverse are higher performing than groups with similar team members (Fong, 2010). The days of an employee staying with one organization for several decades are ending and require more agility. Proper team creation practices could be a key to navigating this new frontier.

Recommendations to Expand this Study

In consideration for future research on the formation of teams, the use of collected information in this research is suggested for the development of a study to evaluate the actual effects of team creation using the factors presented. Findings in the current

research addressing RQ1 are not explicitly clear but strongly support that it is important to factor in aspects of nonverbal communication when creating teams. It would be interesting to discover whether the results based on the feedback found from this population would follow through in an environment where teams are formulated according to interpretation of body language and other nonverbal forms of communication. One would predict a positive outcome by modifications developed from these findings. According to Hossain et al. (2017), agreement through communication and consistency has a direct effect on team performance with cohesion following proper communication.

Those who choose to live unattached socially have shown to have shortened life spans in comparison to their counterparts who function in more social-based environments (Karlgaard & Malone, 2015). This simply gives additional purpose for working in teams and finding beneficial strategies in team formation. Earlier research has found that heightened existence of agreement is accomplished by communicating face to face (Hossain et al., 2017). The simple facts of success with face-to-face communication present evidence of the influences from nonverbal forms of communication. RQ2 resulted in findings that support a strong case for members of randomly formed teams acknowledging the potential for improvements using nonverbal communication in the team formation process. Gupta (2013) supported this with the belief that nonverbal communication should not be disregarded because a significant amount of communication is nonverbal. There are a multitude of variables that could and should be measured in the process of proper team formation. Any additional aspect

studied increases the likeliness of success. Understanding proper team creation could offer valuable information in developing productive teams (Hossain et al., 2017).

The desired approach to using the information presented in this research on effective use of nonverbal communication could involve a step-by-step approach. In instances in which nonverbal communication should be a concern, a heightened awareness should be present, but not to the extent that causes more negative effects in the communication transaction. Additional future applications for this information may include efforts to pass it along to others who will profit from it the most. The research process could be applied on projects that coach and educate others who are in leadership roles. The valuable insights could be provided on an instructional basis to further benefit others who could improve their own communication skills by at least being aware of their personal nonverbal communication tendencies. First impressions often are seen as true (Gupta, 2013). Findings for RQ3 positively reflected that leaders lacking expertise in nonverbal communication could assess nonverbal communication for assigning individuals into teams in a first-time meeting. Awareness of a potential team member's true reactions and interests as defined by their nonverbal communication may help to dissect what appears to be deep-rooted conflicts. People do not always realize nonverbal communication includes gestures, body position, and facial expressions (Gupta, 2013). Being able to identify what is truly communicated by connecting with individuals and developing an understanding of their nonverbal communication habits could possibly unearth and prevent the causes of unspoken conflicts.

This research study is valuable for anyone who seeks to create a successful team. Teams are created by professors, business owners, and managers. Team learning occurs

in diversified and imaginative teams (Fong, 2010). The findings in this study could be useful to team creators who are interested in understanding how leading team formation may positively impact the success of a team. This research also could be of interest to people who are creating teams to determine those individuals who will be the best fit for their environment. Numerous people do not understand nonverbal communication (Gupta, 2013). The results of this study on the use of nonverbal communication can be implemented by anyone in management or leadership seeking a better understanding of how to increase success in forming self-managed teams.

Future Recommended Studies

Development of future research projects could include studying historical methods used in other countries or in other organizational teams. A future study could support successful growth of small business and entrepreneurship by evaluating use of nonverbal communication in these environments. Additional work may generate awareness for leadership innovations in small business hiring by gathering existing data on nonverbal communication in the interview process. A study could be completed to evaluate the use of nonverbal communication in the process of hiring a new member for a small business that functions as a self-managed team.

A future research project could involve interviews and onsite observations of nonverbal communication in small business owners and corporate managers. Teamwork is important to companies that employ engineers (Hossain et al, 2017), such as the student participants in this study, but should be expanded to additional groups. The design could include surveys, similar to those included in the current research, with employees in small businesses to obtain feedback on how nonverbal communication

impacts their teams. Evidence may be limited from companies that have followed this path; therefore, the focus of such interviews and observations may include more “what if” scenarios using this feedback to support the potential innovation. Impacts on employees from job stress and coping with such issues may require reviewing personnel skills as contributing factors of their feedback. If opposing results are revealed, the use of other supporting factors should be entertained to justify the innovation. The ability to work in a team is crucial for engineers, and more and more universities and employers expect engineering students to be capable of working with groups (Hossain et al., 2017). The goal for a future study could be to present information from success stories in which similar tactics have been used on a broader scale. The research also could utilize case studies that have been successful or failures for the implementation of a team-based organizational structure. What has worked well and what has not should be discussed. The future research could potentially involve companies that may have started with this approach but wavered from it and the effects thereof. Diverse personality types have been shown to have different skills, abilities, and knowledge that led to higher levels of success in team projects (Houssain et al., 2017). Continuing research may reveal phenomena that become evident from feedback collected from the employees and leaders studied. These phenomena can demonstrate the effects of leadership on the hiring success of a self-managed team. Data could be collected from observations of employees in their functioning work environments at least once per month over the duration of the study, as well as through interactions in the field. The researcher should work to build an understanding of the emic perspective by interacting with and observing employees.

Based on the researcher's outside view, the etic perspective should be maintained when findings are reported.

It may be difficult to attain proper cooperation for such research. Reda and Dyer (2010) reported the difficulty in getting small businesses to participate in a research study that involves collecting data from both employees and owners. This possible research should utilize observations and interviews to collect data from the employees and managers of the selected companies. If the research uncovers other tools that are valid during the process of completing the work, other instruments also may be utilized. The researcher should observe the employee and manager morale throughout the course of the study with data collected on diversity. Teams composed of diverse personality types have been shown to work better together (Houssain et al., 2017). Plans could be made to interview employees and managers to obtain information that cannot be obtained from observation. This research should take place over a period of six months to one year, based on the availability of the companies that participate. Once the data have been collected, the researcher may determine other data analysis that may be necessary.

A future study could provide information to business owners who are interested in understanding how leadership styles impact employee and company morale. This also may be of interest to people who are starting new businesses and wish to determine the type of leadership that best fits their environment as they begin the hiring process. The results of this study can be implemented by anyone in management or leadership seeking a better understanding of how to increase morale in self-managed teams.

Sociometers

There are additional hardware tools to investigate for potential availability in future studies. MIT's Director of the Human Dynamics Laboratory, Alex Pentland, along with his team, have used what is known as sociometers to produce data on the productivity of teams (Karlgaard & Malone, 2015). Sociometers are devices worn by research participants that collect patterns of communication such as face-to-face interaction, duration, proximity of participants, and levels of physical activity (Karlgaard & Malone, 2015). Sociometers collect the nature of human interaction not content, such as tone of voice, orientation to others in a group, and how much listening and talking occurs (Karlgaard & Malone, 2015). Additional work should be invested in potential use of these sociometers in self-managed team building applications.

Summary and Conclusion

In conclusion, the team formation process for self-managed teams should not be a casual endeavor. Team formation is vital for effective teamwork (Houssain et al., 2017). In many organizations and systems requiring teams, there are minimum requirements to be met for capital purchases, mergers, and other major expenses. An employee, student, or team member's contribution should merit enormous amounts of upfront effort before bringing that member into a self-managed team. In environments that plan for successful self-managed teams, the preparation required to have the right people on the right teams most likely will never be enough. Choosing the right team members is the first part of creating a successful team (Houssain et al., 2017). By using readily available tools to arrange the best possible team, strong consideration should be placed on the return on investment in proper team creation practices.

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APPENDIX A: Freshman Design I Syllabus

ME Freshman Experience I
Department of Engineering Spring 2019
Western Kentucky University
COURSE OUTLINE

Courses: ME 176 Mechanical Engineering Freshman Design..... 1 Credit
Co-requisites: MATH117 or higher

Instructors: Kevin Schmaltz **Office:** EBS 2112

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Office Hours: posted on office door

Gordon Smith **Office:** EBS 1119

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Textbook: *Exploring Engineering: An Introduction to Engineering and Design*, by Kosky, Balmer, Keat and Wise, (3rd or 4th Editions acceptable)

Course Content: This course provides an introduction to the engineering design process as well as engineering professional skills and computer tools that are important for success as a mechanical engineering student. Some of these professional topics will include ethics, design fundamentals, and design prototype realization.

Course Goal: An overall course goal is to provide incoming ME students with an improved understanding of engineering in general and the Mechanical Engineering discipline. The course will show students the opportunities available for engineering students at WKU, and provide some basic technical skills. Specific objectives are listed below.

Course Objectives: At the completion of this course, students will be able to:

1. Work alone and in a team setting to devise and create functioning engineering designs.
2. Create conceptual designs and physical prototypes for simple projects.
3. Be able to generate documents, perform calculations and communicate professionally.
4. Evaluate professional ethical responsibilities and dilemmas.
5. Demonstrate the ability to safely perform basic shop functions: drilling, turning, milling, sawing, tapping, reaming, countersinking.

Grading Basis:

Engng. Profession Assignments 20%

Ethics Assignments 15 %

Team Design Activities 25 %

Final Design Project 40 %

TOTAL: 100%

Grading:

90-100 A

80-89 B

70-79 C

60-69 D

below 60 F

Ground Rules:

1. As an engineering student of Western Kentucky University, you will be expected to refrain from any form of academic dishonesty or deception such as cheating, stealing, plagiarism or lying on individual homework assignments, and you are expected to contribute on all team documentation assignments. Furthermore, you should understand and accept the potential consequences of punishable behavior.

2. All students are expected **to attend every class** and be prepared and attentive. Electronic devices are to be turned off and put away during class time. Students are expected to arrive to class on time. Any absences/late arrivals should be pre-arranged with the instructor before the class. If you miss a class, you are expected to review materials posted to Blackboard for the missed class and immediately contact me to understand what has been missed. Much of the class involves team-based activities, you are responsible for being a contributing team member both during class time and when your team works outside of class.

3. Each of you will complete online peer evaluations (from CATME.org) at mid-semester and finals week, where you will have the opportunity to evaluate both your own and your teammate's participation during the bi-term. This is used to adjust individual grades on team activities – both up/down for good/poor ratings.

4. Your class grade during the bi-term is approximately 1/3 individual assignments and 2/3 from team assignments. You are expected to participate in all team assignments, and not wait for your teammates to do your work for you. Students who do not contribute **may not receive credit** for given team assignments. Students/Teams submitting any assignment late must have prior instructor approval and late work may or may not be accepted; if accepted it will be at reduced value.

5. Acting professionally (responsible and ethical) is at the heart of this class. As future engineers you will be expected to consider risks to the public and customer with whatever you design and build. Since you are our *customers* in ME176, WKU will teach you to use the prototyping equipment safely and efficiently. The freshman prototype facility (FPF) offers the greatest potential risk in the class, so the most important aspect of in the FPF there is to follow safety procedures. When in the FPF, you must always wear proper safety equipment and never work alone after hours; someone must always be present to call on the phone in case of an accident. Only use equipment provided by WKU. If you are performing a process and something “feels wrong”, it probably is wrong and you should get help from

the instructor or a student worker. Failure to follow the rules or clean up the FPF can and will result in suspension of facility privileges for a period to be determined.

6. In compliance with University policy, students with disabilities who require academic and/or auxiliary accommodations for this course must contact the Student Accessibility Resource Center located in Downing Student Union, 1074. SARC can be reached by phone number at 270-745-5004 [270-745-3030 TTY] or via email at sarc.connect@wku.edu. Please do not request accommodations directly from the professor or instructor without a Faculty Notification Letter (FNL) from The Student Accessibility Resource Center.

7. The WKU Center for Literacy is located in Gary A. Ransdell Hall 2066. At the Center for Literacy, students can receive assistance in developing strategies to help reading/studying to learn and writing for evidence and argument. The Center for Literacy offers both individual and small group sessions throughout the semester. More information about the WKU Center for Literacy can be found on the website: <http://www.wku.edu/literacycenter/>

Title IX Misconduct/Assault Statement

Western Kentucky University (WKU) is committed to supporting faculty, staff and students by upholding WKU's Title IX Sexual Misconduct/Assault Policy (#0.2070) at <https://wku.edu/eoo/documents/titleix/wkutitleixpolicyandgrievanceprocedure.pdf> and

Discrimination and Harassment Policy (#0.2040) at https://wku.edu/policies/hr_policies/2040_discrimination_harassment_policy.pdf.

Under these policies, discrimination, harassment and/or sexual misconduct based on sex/gender are prohibited. If you experience an incident of sex/gender-based discrimination, harassment and/or sexual misconduct, you are encouraged to report it to the Title IX Coordinator, Andrea Anderson, 270-745-5398 or Title IX Investigators, Michael Crowe, 270-745-5429 or Joshua Hayes, 270-745-5121.

Please note that while you may report an incident of sex/gender based discrimination, harassment and/or sexual misconduct to a faculty member, WKU faculty are "Responsible Employees" of the University and **MUST** report what you share to WKU's Title IX Coordinator or Title IX Investigator. If you would like to speak with someone who may be able to afford you confidentiality, you may contact WKU's Counseling and Testing Center at 270-745-3159.

Ogden Student Course Attendance Statement

The faculty and staff of Ogden College of Science and Engineering are committed to providing you with learning experiences and opportunities. You must assume ownership of your education and be an active participant in the classroom and laboratory to take advantage of these opportunities. **Active participation requires you to attend.** Scientific studies have shown that attendance during scheduled classroom and laboratory meetings is directly correlated to your performance on assignments and exams and the potential to earn higher grades. Additionally, if you do not regularly attend class, you are missing important information about course topics, due dates, and assignment details that are crucial to your success in the course. Therefore, as a student enrolled in an Ogden course, you are expected to attend every class meeting and to inform your instructor regarding the reasons for any absences as soon as practical. **Your instructor may incorporate class attendance/participation as part of the grading criteria.**

APPENDIX B: Survey Instrument

For the following open-ended questions please provide the most detailed answers you can.

(Extra space is provided for each question on the attached page.)

1. What is your understanding of nonverbal forms of communication?

2. In your opinion are you capable of gathering information based on another person's nonverbal forms of communication? Please explain your logic.

3. What forms of nonverbal communication are the most obvious to you?

4. Based on observations of your project team members can you effectively identify forms of nonverbal communication they have used? Please describe.

5. Could face to face evaluations by your professors prior to forming teams utilize early observations of body language and facial expressions to assist in effective team creation? Please elaborate.

6. What demonstrated nonverbal displays of communication by your team members could be correlated to a specific team member's function? (for example: has a particular nonverbal form of communication supported a team members ability to be: a leader, data driven, procedural, conceptual, or supportive, etc?)

Rank the following questions on a scale from 1-5 with 1 being strongly disagree to 5 being strongly agree:

7. The forms of nonverbal communication exhibited by your team members could be observed in first time meetings by your professors with the team members.
1 2 3 4 5
8. If nonverbal communication was factored into who was placed on teams by diversifying the reactions observed this would have a positive impact on creating stronger teams.
1 2 3 4 5
9. Observations of nonverbal communication can be used as a predictor of a productive team member.
1 2 3 4 5
10. Body language could be used early on to understand the commitment level of team members.
1 2 3 4 5
11. The individual tasked with creating the teams (i.e. your professor) does not have to be an expert in nonverbal communication interpretation to be successful at using it in team formation.
1 2 3 4 5
12. It is important to evaluate what can be gathered from nonverbal communication when creating project teams
1 2 3 4 5

APPENDIX C: IRB Approval



INFORMED CONSENT DOCUMENT

Project Title: Team Creation Methods in Practice: Understanding the Potential Effects of Nonverbal Communication In Leadership of Team Formation

Principal Investigator: Troy Robertson, Educational Leadership Doctoral Program,
troy.robertson@topper.wku.edu

You are being asked to participate in a project conducted through Western Kentucky University. The University requires that you give your agreement to participate in this project.

You must be 18 years old or older to participate in this research study.

The investigator will explain to you in detail the purpose of the project, the procedures to be used, and the potential benefits and possible risks of participation. You may ask any questions you have to help you understand the project. A basic explanation of the project is written below. Please read this explanation and discuss with the researcher any questions you may have. You should keep a copy of this form for your records.

1. **Nature and Purpose of the Project:** The purpose of this research focuses on a leader's role in team formation and how that leader could use observations of body language in the early stages of forming working teams. Participants will offer their feedback on how the team, they participated in could have been affected if observations of non-verbal communication would have been a factor in how the teams were formed.

2. **Explanation of Procedures:** A survey is conducted, approximately 15-20 minutes to complete, during which questions will be asked about the participants observations of their team members non-verbal communication.

3. **Discomfort and Risks:** This study places you at little to no risk. The probability of harm anticipated is no greater than would be encountered in everyday life.

4. **Benefits:** Participants will have this opportunity to share information about an experience in a course required for their program of study. Their participation may help generate knowledge about positive methods for creating working teams.

5. **Confidentiality:** Confidentiality of the information will be protected as the survey will only be tied to a particular student group enrolled in a course. The surveys will be completed anonymously. Records will be viewed, stored, and maintained in private, secure files only accessible by the P.I. for three years following the study, after which time they will be destroyed.

6. **Refusal/Withdrawal:** Refusal to participate in this study will have no effect on any future services you may be entitled to from the University. Anyone who agrees to participate in this study is free to withdraw from the study at any time with no penalty.

You understand also that it is not possible to identify all potential risks in an experimental procedure, and you believe that reasonable safeguards have been taken to minimize both the known and potential but unknown risks.

Your continued cooperation with the following research implies your consent.

THE DATED APPROVAL ON THIS CONSENT FORM INDICATES THAT
THIS PROJECT HAS BEEN REVIEWED AND APPROVED BY
THE WESTERN KENTUCKY UNIVERSITY INSTITUTIONAL REVIEW BOARD
Robin Pyles, Human Protections Administrator
TELEPHONE: (270) 745-3360

WKU IRB# 20-073
Approved: 10/08/2019
End Date: 10/08/2020
EXPEDITED
Original: 10/08/2019

CURRICULUM VITA

TROY A. ROBERTSON

EDUCATOR | LEADERSHIP COACH |
ENTREPRENEUR

Phone: 270-590-4572
Home: Smiths Grove, KY
Email: troy.robertson@topper.wku.edu
LinkedIn: www.linkedin.com/in/drtroyrobertson

PROFILE

An accomplished educator, coach, and entrepreneur with a history of leading businesses and student learning. A dedicated teacher who is known for mentoring students, designing collaborative learning experiences, leveraging technology to enhance comprehension, and delivering dynamic instruction. A practical leader who creates high-performing teams, develops collaborative cultures, and motivates team members to perform beyond their limits. Relationship builder who establishes quick rapport with students, partners with faculty, and advises professional/academic associations. Organizational Leadership Ed.D. candidate with a blend of business management and academic experience.

STRENGTHS

- | | | |
|---------------------|-----------------------------|------------------------|
| ▪ Teaching/Training | ▪ Team Leadership | ▪ Business Coaching |
| ▪ Mentorship | ▪ Entrepreneurship | ▪ Culture Building |
| ▪ Applied Research | ▪ Organizational Leadership | ▪ Outreach/Recruitment |

EDUCATION

Ed.D., Organizational Leadership – Western Kentucky University

- *Dissertation Topic: "Team Creation Methods in Practice: Understanding the Potential Effects of Nonverbal Communication in the Leadership of Team Formation". Chair: Dr. Randall Capps*
- *Study abroad program – IAE Lyon School of Management – Lyon, France*

M.S., Engineering Technology Management – Western Kentucky University

B.S., Technology Management – Western Kentucky University

A.S., Industrial Maintenance Technology – Kentucky Community Technical College System

A.S., Machine Tool Technology – Kentucky Community Technical College System

TEACHING EXPERIENCE

Instructor | Manager, Biodiesel & Engineering Prototype Facilities | Engineering Technician

Western Kentucky University / Bowling Green, KY / 2013 - 2018

Taught engineering courses, training labs, and supplementary sessions to help students complete capstone projects. Developed curriculum creating course outlines, content, activities, presentations, quizzes, and tests. Engaged students in collaborative learning, blending lecture and experiential exercises. Leveraged technology to design, deliver, and manage engagement and courses online. Mentored students and guided faculty, with a practitioner's view. Advised students. Strengthened a growing department by providing program development support.

- Restructured design course, which is consistently referenced by students as an impactful favorite.
- Selected for high school engineering advisory boards promoting STEM education and WKU.
- Scholarly research and studies, personally and with other professors to aid university efforts.
- Served the university as an outreach liaison to the local community.
- Taught on High-Performance Teams, Trends in Teams, The Impacts of Nonverbals in Teams, Nonprofit vs. For-Profit, Innovation, and Leading When You're Not in Charge as an Ed.D student.

PROFESSIONAL EXPERIENCE

Director of Applied Projects

Leadership Strategies Group / Bowling Green, KY / 2018 - Present

Working with for profit and nonprofit organizations to build their top-level leadership as well as strengthening all layers of leadership throughout their organizations. Coaching organizational leaders to improve their strengths and successfully delegate their weaknesses by surrounding themselves with strong teams. Specializing in personnel and creating high performance teams.

Owner

Journeyman Tool and Design, LLC / Smiths Grove, KY / 2011 - Present

Founded, led, and grew an organization that improved customer productivity and product quality through engineering special tooling/solutions and providing fabrication services. Hired talented professionals, trained team members on current trends/technologies, and created a productive culture. Provided university students with practical experience/career guidance. Collaborated with community and education leaders to develop talent and support economic growth of the area.

Project Engineer

Spalding-Fruit of the Loom / Bowling Green, KY / 2009 - 2013

Product development for portable basketball systems. Mentored engineers and technical illustrators in software/technical applications and provided technical education to all levels of the organization.

Systems Design Engineer

SpanTech LLC / Glasgow, KY / 2007 - 2009

Collaborated with sales engineers to design systems that met unique customer needs. Partnered with installation teams and vendors for on-site assembly, designed complex engineered systems, and created 3D solid models and detail drawings for manufacturing.

CERTIFICATIONS

- Lean Six Sigma Certificate (Masters Level - Western Kentucky University)
- Certified Making Makerspaces - Higher Education Makerspace Initiative (Berkeley / Carnegie Mellon / Case Western / Georgia Tech / MIT / Olin College / Stanford / Yale)

PUBLICATIONS

- Young, S. N., VanWye, W. R., Schafer, M. A., **Robertson, T. A.**, Poore, A. V. (2019). Factors affecting PhD student success, International Journal of Exercise Science 12(1): 34-45.
- **Robertson, Troy A.**, "A Case Study of Multiple-Use Finish Electrodes for Die-Sinking EDM" (2015). Masters Thesis & Specialist Projects. Paper 1462. <https://digitalcommons.wku.edu/theses/1462>.

GRANTS

- NSF EPSCoR Powering the KY Bioeconomy for a Sustainable Future; SI Fiscal Year 2018 (\$4,800)
- Highland Glen Industrial Park, Land Grant to QMS, Inc. Glasgow, KY 2017 (\$150,000)

PROFESSIONAL ORGANIZATIONS

- Barren County High School Industrial Advising, Barren Area Technical Center / 2015-Present
- Glasgow High School Advisory Board for the Academy of Engineering / 2014-Present
- Member, Southern Kentucky SolidWorks User Group / 2011-Present
- Member, Society of Manufacturing Engineers / 2006-Present
- President, Gamma Beta Phi Honors Society / 2006-2008