

TRUST-BUILDER: A FIRST-RUN STUDY ON ACTIVE TRUST-BUILDING

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ABSTRACT

Despite being a common theme in company mission statements and core values, the role of *trust* receives little to no active consideration on the construction jobsite. This research attempts to lay the foundation for additional research into trust-building in construction by determining whether or not trust can be actively and deliberately managed by a conscientious and regular analysis of current and upcoming relationships. Three key findings from the literature provide the groundwork for this research: (1) high levels of trust between project participants increase productivity and enhance team performance; (2) trust is built or broken as a cumulative result of our actions and behaviors; and (3) trust levels can be accurately measured.

Using student groups as a sample, we tested to see if specific trust-building interventions could be effectively introduced into group interactions. Results show some support for the theory that individuals who deliberately initiated trust-building interventions perceived a higher overall change in trust level towards their peers than other participants.

KEYWORDS

Trust, sustainable relationships, collaboration

INTRODUCTION

In a review of the mission and core value statements of 86 construction companies, a majority claimed to place a high value on trust in their overall company philosophies. This suggests that at least at the executive level, a high level of trust between internal and/or external customers is perceived to be an important part of many construction companies' goals and objectives. Additionally, a number of current industry trends are demanding higher levels of trust by way of increasing collaborative requirements (Autodesk 2008). Alternative collaborative project delivery models such as Design-Build (DB) and Construction Management (CM) and Integrated Project Delivery (IPD) have seen increased use while the traditional method of Design-Bid-Build (DBB) is on a downward trend (Jackson 2010). Proponents of IPD claim that projects completed under this system are more conducive to increased levels of trust between the project shareholders (Pressman 2007).

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Despite these developments, it seems that the issue of trust receives little to no active management on the construction jobsite. This may be the result of the arguable ambiguity and perceived subjectivity of the topic. Or perhaps it is because industry participants believe it is something that is intangible and difficult, if not impossible, to manage. Research attempting to describe possible reasons for this apparent neglect is forthcoming, however this project proceeds on the basis of the following three key findings from the literature as detailed by Smith and Rybkowski (2012):

1. High levels of trust between project participants can increase productivity and enhance team performance (Egan 1998, Kirshnan et al. 2006, Latham 1994, Swan 2002, and Zaheer et al. 1998).
2. Trust is built or broken as a cumulative result of the actions and behaviors of the individuals involved (Currall and Epstein 2003, Mayer et al. 1998, and Vangen and Huxham 2003).
3. Trust levels can be accurately measured (McEvily and Tortoriello 2011).

PURPOSE AND SIGNIFICANCE OF THIS PROJECT

This project attempts to extend the foundation supporting additional research into trust-building in construction by determining whether or not trust can be actively and deliberately managed by a conscientious and regular analysis of current and upcoming relationships. Support for this hypothesis would indicate that tools and methods could be developed that would assist industry players, both executives and field personnel, in managing and systematically increasing interpersonal trust levels. This would be valuable on both the micro social level (i.e., the involved individuals), and also on the macro social level (i.e., inter-organizational relationships, industry reputation, etc.) (Hepworth et al. 2012).

TRUST-BUILDING

Extant literature on building trust is predominantly theoretical and utilizes case studies as support (Chow et al. 2012, Covey 2009, Khalfan et al. 2007, Morgan and Hunt 1994, Solomon and Flores 2003, Vangen and Huxham 2003). Other literature describes games or simulations that illustrate the impact of both losing and/or gaining trust on long-term profitability (Smith and Rybkowski 2013). Wong et al. (2008) described various trust-building methods as falling under two key umbrella concepts: 1) *process-based* and 2) *characteristic-based* trust production. Parkhe (1999) defined similar categories calling them mechanisms through which trust is generated, but included a third mechanism – *institutional-based* trust production. This category of mechanisms creates a formal structure that provides built-in incentives for cooperative, trustworthy behaviors and was not included in this research based on the argument that *institutional-based* trust production or creation is actually a functional substitute for trust (Granovetter 1985, Huste 1989).

Process-based (a.k.a cognition-based) trust production results from past interactions that create a positive or negative impression of reliability and consistency (Wong et al. 2008). An individual's reputation contributes to this mechanism. *Characteristic-based* (a.k.a. affect-based) trust production comes from having similar attributes to one's counterpart such as societal or cultural similarities resulting in

perceived value congruence (Lewis and Weigert 1985, McAllister 1995, Wong et al. 2008).

Various models of trust-building exist in the literature that attempt to describe this process (see Mayer et al. 1995, McKnight and Chervany 2001, and Vangen and Huxham 2003). The methodology of this project uses the Mayer et al. (2003) model as a framework due to its description of the typically repetitive nature of interactions in group settings such as a construction project. Key points taken from this model and built into this research design include these three items:

1. Individual baseline trust levels are set for each relationship by a combination of the factors affecting perceived trustworthiness of the individual being considered, and the Trustor's propensity to trust.
2. Engagement in an interaction involving some level of risk (i.e., "risk taking in relationship").
3. Outcome of each individual engagement impacts the trust basis for the following interactions.

METHODOLOGY

The authors conducted a quasi-experimental study using college seniors enrolled in construction science capstone classes. The goal was to determine whether or not trust could be effectively built in teams by asking participants to implement suggested trust-building methods. A trust measurement and analysis tool was iteratively administered to the student sample (N=139) in between implementation of trust-building interventions between group members. Figure 1 shows the implementation strategy created for this design.

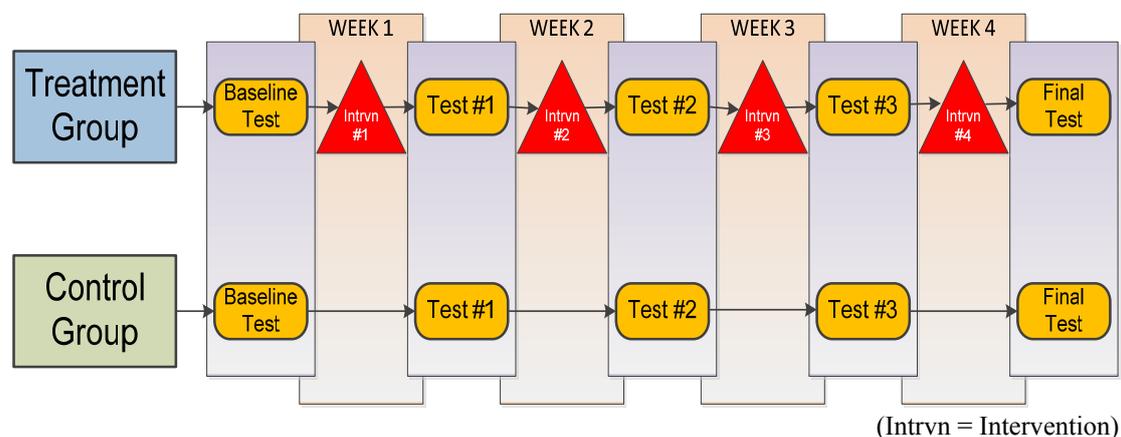


Figure 1: Research Design Implementation Strategy

Every student was asked to complete a benchmark survey at the beginning of Week 1, and then another survey each of the following Fridays until the final survey was distributed at the end of Week 4. For analysis, Tests #1, #2 and #3 acted as both pre- and post-tests to their respective adjacent tests. The results of this study were limited by the relatively short time available for the group interaction. This limitation may have prevented

Because of the first-run nature of this study, students were deemed acceptable as research subjects for the primary data collection. These students were selected because they were participating in group projects designed to simulate actual construction projects, necessitating extended interactions between the group members. Research participants were assigned to teams of between three and six members depending on the number of students enrolled in each class. Utilizing random number assignments, half of the sample became treatment groups and the other half control groups. One member from each of the treatment groups was randomly selected to implement a series of trust-building interventions within their group. This individual was called the Trustor in this research. The Trustor was asked to implement one intervention with each member of his or her team on an individual and weekly basis. The intervention for the week was given to the Trustors via email each Friday after taking the test, along with a follow-up to determine with which members of the group they were able to complete the intervention. A reminder email was also sent on Tuesday of each week.

As shown in Figure 1, there were four different interventions used in this study. The four interventions were developed based on the framework for trust in construction developed by Wong et al. (2008). Two interventions were based on the process-based list and two on the characteristic-based list. The authors selected these interventions because of their relatively high “goodness-of-fit” rankings as determined by the structural equation modeling conducted by Wong et al. (2008), and their relative ease of implementation by the student Trustors. Additional details regarding the interventions and other similar interventions are described by Wong et al. (2008). The selected interventions for this study were:

1. Create an opportunity to have additional interaction with the other party, either work or personal to facilitate better understanding between the parties (*process-based*).
2. Make a specific effort to contact and communicate with the other party when it is **not** expected or required (*process-based*).
3. During a decision-making process, specifically discuss the other party’s needs and how or if they are being met (*characteristic-based*).
4. Dedicate time to discuss and understand the other party’s personal details and background (family, hometown, high school, hobbies, etc.) in order to understand them better (*characteristic-based*).

The week in which each intervention was implemented was also randomly selected. Each Trustor was asked to attempt all four interventions with each of his or her team members over the course of this portion of the project. All Trustors were conducting the same intervention during the same week. The effect of making this suggestion in the treatment groups was analyzed using the tests to collect data. This was designed to allow us to understand whether or not coached and deliberate interventions into the various group relationships could impact the levels of interpersonal trust existing between team members.

The survey was the same each time we administered it and was based on a trust measurement tool created by McAllister (1995). McAllister’s tool was designed to measure interpersonal trust and, according to McEvily and Tortoriello (2011), has

been replicated 12 times by other researchers since its inception. This is more outside replication than any of the other reviewed tools. Figure 2 shows an example of the survey based on the McAllister's work.

| | | | | | | | | |
|--|---|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Please complete the following survey for each person on your team. Remember to be honest in your responses to ensure that the collected data will be able to assist us in creating more effective construction teams. Your responses will not be shared with team members or professors. | | Team Member Name | | | | | | |
| | | Strongly disagree \longrightarrow Strongly agree | | | | | | |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1 | This person approaches his/her job with professionalism and dedication. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 2 | Given this person's track record, I see no reason to doubt his/her competence and preparation for the job. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 3 | I can rely on this person not to make my job more difficult by careless work. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 4 | Most people, even those who aren't close friends of this individual, trust and respect him/her at work. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 5 | Other work associates of mine who must interact with this individual consider him/her to be trustworthy. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 6 | If people knew more about this individual and his/her background, they would be more concerned and monitor his/her performance more | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 7 | We have a sharing relationship. We can both freely share our ideas, feelings, and hopes. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 8 | I can talk freely to this individual about difficulties I am having at work and know that (s)he will want to listen. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 9 | We would both feel a sense of loss if one of us was transferred and we could no longer work together. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 10 | If I shared my problems with this person, I know (s)he would respond constructively and caringly. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 11 | I would have to say that we have both made considerable emotional investments in our working relationship. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 12 | Please list 1-3 specific recent experiences that informed or influenced your responses above. | 1 | | | | | | |

Figure 2: Trust Measurement Tool (partial)

Prior to the benchmark test, the various course instructors described the project to the students as a study on teamwork using a common script. Specific mention of trust as the focal point was carefully avoided throughout the study in an effort to minimize the Hawthorne Effect (Dickson and Roethlisberger 1939). Additional scripts were created for each week the test was administered to ensure continuity between the various professors administering the tool. Each professor was instructed to read the prescribed script, hand out the surveys, collect them upon completion and seal them in the survey envelope.

By utilizing students for this study we were able to minimize potential confounding variables and improve the validity of results. A bias exists with student-based research data but due to the innovative nature of this project, the selected

students are an appropriate sample for this first-run study. This kind of approach is common in the fields of psychology and social science where students are used regularly as an indicator of the wider applicability of a process or a tool. Literature exists that supports both sides of the debate on the generalizability of student data to a non-student population (Calder et al. 1981, Lynch 1982, Peterson 2001). One of the objectives of this research is to contribute to the theory on trust-building in construction. We agree with Calder et al. (1981) that a student population, despite possible overall generalizability issues, is a good place to start building the case for theory generalization. In this case, we endeavour to develop a theory regarding whether or not trusting behaviors can be artificially introduced into a group setting and have a positive impact on trust levels. While we recognize that the student data is not perfectly generalizable to the construction industry, these results still hold theoretical value and contribute to the relatively small body of knowledge on the subject.

FINDINGS

The key indicator in testing this hypothesis was the overall change in trust index experienced by the participants. We determined this number by subtracting the trust index of the latest available test, in most cases the final test, from the earliest available test, in most cases the benchmark test (see Figure 1). Using the change in trust index as the primary dependent variable for these comparisons mitigates the potentially confounding variable of each individual's propensity or disposition to trust, which is likely to be different for each participant. Also, the randomized control group approach provides additional internal validity to the results.

TREATMENT VS. CONTROL

The first analysis attempted to determine whether or not there was any statistical significance in the difference between the two groups' initial trust index, as measured by the baseline survey. According to an independent-samples t-test, there was no significant ($p < .05$) difference between the treatment group (mean = 5.48, SD = 0.87) and the control group (mean = 5.36, SD = 0.90) where $t(266) = -1.070$, $p = 0.285$ (two-tailed). This confirmed the expectation that the random group assignment successfully controlled significant differences between the control and treatment group benchmark trust indices.

Figure 4 shows the average trust indices experienced by members of the treatment groups in comparison to those of the control groups across all five tests. The initial analysis of the control and treatment group data did not support the hypothesis that a deliberate trust-building intervention by the Trustor in the treatment group would positively impact the levels of interpersonal trust existing within a group. Figure 3 suggests that the treatment groups seemed to be building trust at a slower pace than the control groups. The two linear regression lines indicate the best possible line for predicting future scores based on the data. It is interesting to note that the slope of the treatment linear regression line is 0.05, less than half of the control group's linear regression slope of 0.11. The R^2 values, also known as the "Coefficient of Determination" for the linear regression lines included in Figure 3 indicate that the line for the control groups is more accurately describing and predicting the data points than the line for the treatment groups (R^2 value closer to 1), although both R^2

values are relatively strong. The results might also suggest that the Hawthorne Effect was in operation on this data. However, various techniques were used in the design of this test in an attempt to minimize any potential impact.

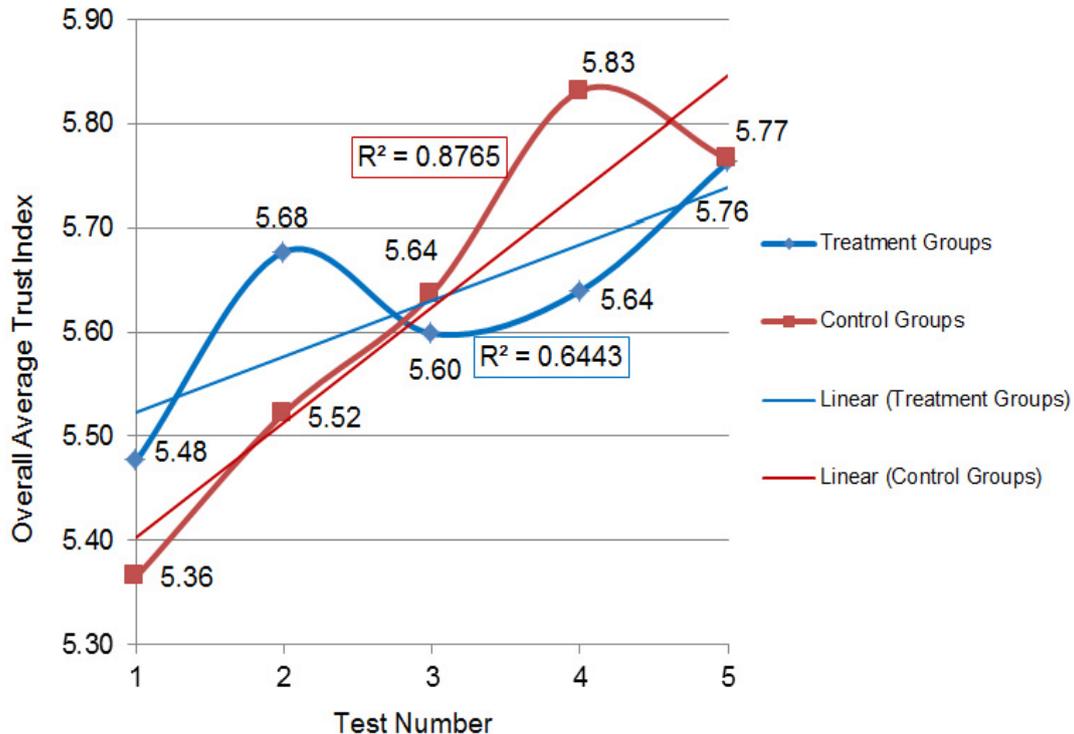


Figure 3: Average Overall Trust Index by Test – Treatment vs. Control

To get a better feel for trending with each group, the change in trust index between each of the five tests was averaged across the respondents. Analyzing the change in trust in this manner shows a different trend than that seen when only looking at the average score. Figure 4 shows the average change or delta between each of the tests for both groups. Interval 1 represents the change between the baseline test and test #1. Interval 2 represents the change between test #1 and test #2, and so on. It should be noted that the average change between tests described in Figure 4 is not equal to the difference between the average trust index scores shown in Figure 3, as evidenced by negative average changes in some instances. This is a result of some participants randomly missing tests, so their changes were transferred to the next interval in the data calculation.

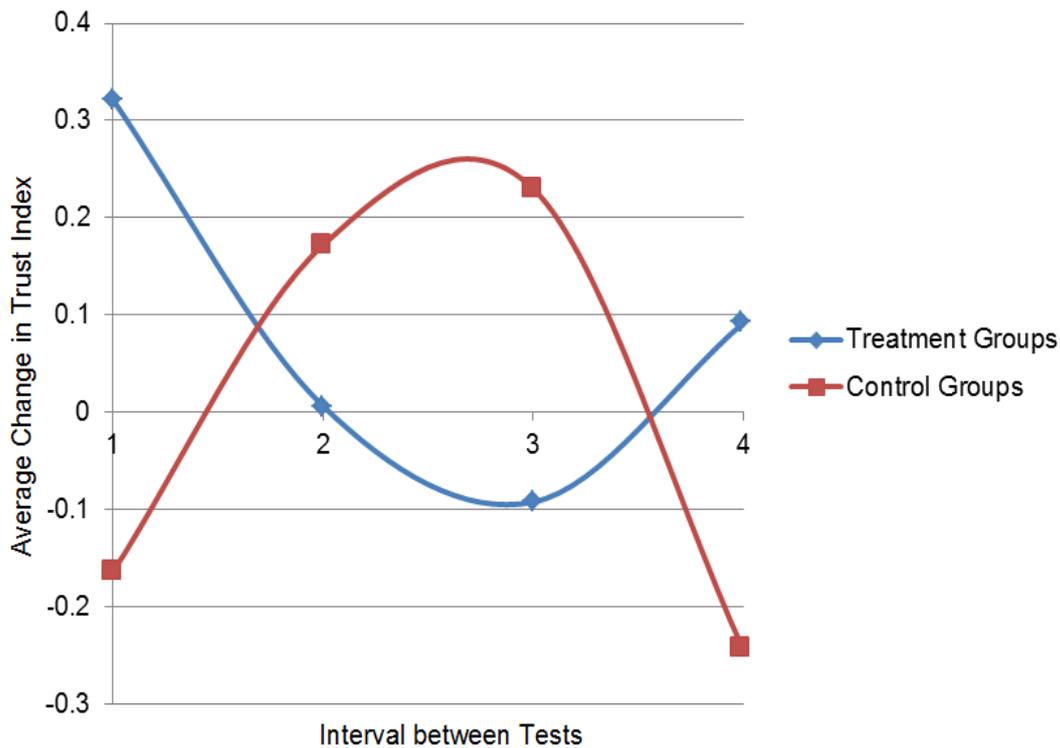


Figure 4: Average Change in Trust Index Between Tests

The trending here is interesting, although not conclusive. Figure 4 shows that the change for the control groups, while initially increasing, started to trend downward in interval 4, the time between test #3 and the final test. In contrast, the change experienced on average for the treatment groups began to trend upward in the final interval.

The overall average change in trust index was then analyzed between the two groups, again using an independent-samples t-test. The results of the test showed no significant difference between the overall change in trust index between the treatment group (mean = 0.17, SD = 0.82) and the control group (mean = 0.31, SD = 0.88) where $t(310) = 1.395$, $p = 0.164$ (two-tailed).

TREATMENT VS. CONTROL VS. TRUSTORS

Due to the significant role the Trustors played in the project, their data was removed from the treatment group for additional analysis. This allowed for testing of the hypothesis that additional focus on the other individuals in their group in the form of intervention implementation would increase the interpersonal trust levels of the Trustors at a rate greater than the other two groups. Literature suggests that one way to begin building trust is to extend it to one's counterpart (Covey and Merrill 2006).

Once again, a comparison of the initial trust index as determined by the baseline survey was necessary to see if there was any statistical significance in the difference between the three groups' initial trust index. The results of a one-way ANOVA on data indicated no significant difference between the treatment group without the Trustors (mean = 5.41, SD = 0.89) the control group (mean = 5.37, SD = 0.9) and the Trustor group (mean = 5.69, SD = 0.89) where $F(2, 265) = 1.885$, $p = 0.154$. This,

again, confirmed a level starting point from which to begin comparisons between groups.

In order to better understand the distribution of this data set, a histogram (Figure 5) indicating the relative frequency of responses from each group was also created. The plotted curves are polynomial regression lines that represent the distribution of each dataset as accurately as possible. Figure 5 describes a slight skew in all three sets of data to the left, signifying that it is not a perfectly normal distribution. This skew shows the general trend evident in all groups of trust levels increasing over time and interaction, also described in Figure 3.

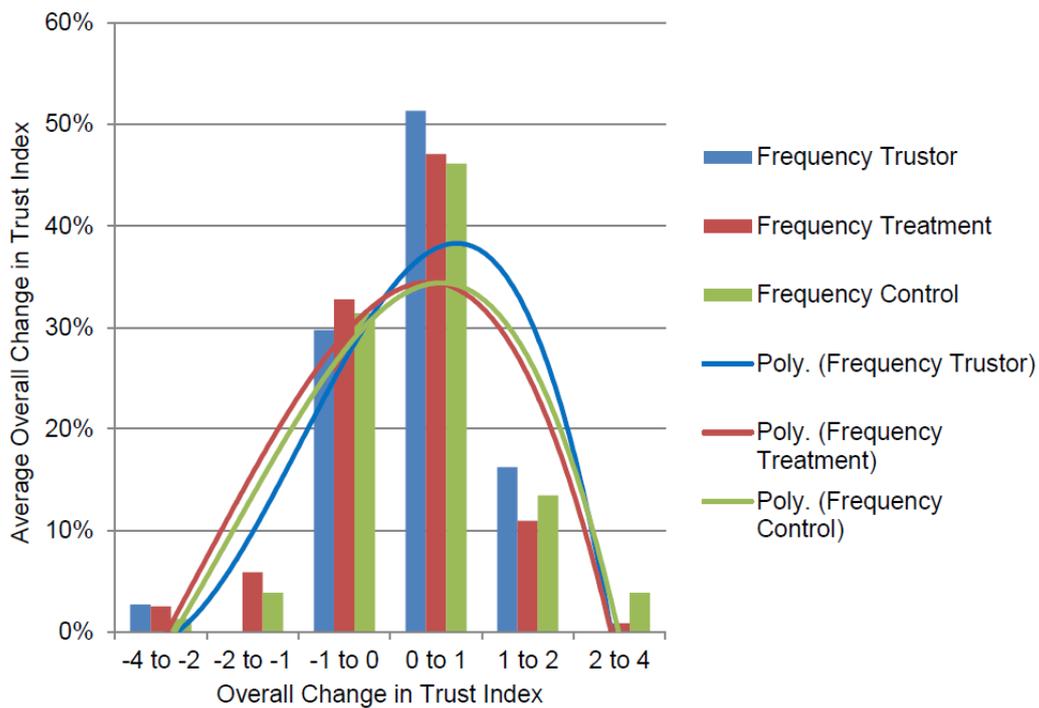


Figure 5: Relative Frequency of Average Overall Change in Trust Index by Group

The control and treatment group curves are very similar with the control curve beginning and ending slightly ahead of the treatment group. The data demonstrates that the Trustor group contains a higher concentration of participants experiencing a change in trust index in the “0 to 1” and “1 to 2” categories. Also, the Trustor group curve shows a somewhat less normal curve pattern, skewing slightly more to the left.

As a way to further analyze the data, we then removed the outliers from the set to see how the results changed. Table 1 details the descriptive statistics for the analysis of the overall change in trust index between Treatment, Control, and Trustor groups with the outliers removed.

Table 1: Descriptive Statistics for Average Overall Change in Trust Index by Group with Outliers Removed

| Group | N | Mean | SD | Standard Error (SE) |
|-----------|-----|------|------|---------------------|
| Control | 146 | 0.29 | 0.65 | 0.05 |
| Treatment | 107 | 0.12 | 0.56 | 0.54 |
| Trustor | 36 | 0.49 | 0.64 | 0.11 |

We conducted a one-way between-groups analysis of variance (ANOVA) to determine the significance of the apparent differences between the groups. This analysis showed some statistical significance in the differences between the groups, although not in the way that was originally expected. Table 2 contains the ANOVA output for the comparison across the three groups.

Table 2: ANOVA Output for Average Overall Change in Trust Index by Group with Outliers Removed

| | Sum of Squares | df | Mean Square | F | Significance |
|----------------|----------------|-----|-------------|------|--------------|
| Between Groups | 3.79 | 2 | 1.90 | 4.99 | 0.007* |
| Within Groups | 108.55 | 286 | 0.38 | | |
| Total | 112.34 | 288 | | | |

* Indicates significance at the 0.01 level

The significant differences suggested by this analysis were accompanied by an eta-squared (η^2) effect size value of 0.034, which is considered a moderate to small effect size (Cohen 1988).

To determine where the significant difference was between the three groups, we conducted a Tukey HSD post-hoc test. This test indicated that the significant difference evident from the one-way ANOVA calculation of the three groups existed between the Treatment group and the Trustor group.

Not surprisingly, we found the Trustor average to be higher than the other two groups. However, we did not expect that the only significant difference in means was between the Trustors and the treatment group. The increase in Trustor levels of trust was expected as a result of those individuals attempting to build relationships with their team members at an increased pace through implementation of the interventions. The cause for the comparative and significant lack of increase in trust experienced by the treatment group is unclear. Possible explanations for this difference include the idea that the artificial or contrived nature of the interventions actually had the opposite effect on the Trustees, resulting in the relatively minimal increase in trust levels evident in the data. Alternatively, perhaps because the Trustors were randomly selected regardless of their leadership potential or abilities, their attempts to support and in some instances lead their groups may have negatively affected their group perceptions and ratings.

CONCLUSIONS AND RECOMMENDATIONS

The data shows some minimal support for the hypothesis that trust can be actively and deliberately managed by a conscientious and regular analysis of current and upcoming relationships. The proactive and deliberate effort to focus on relationships through simple interventions had a statistically significant positive effect on the interpersonal trust levels perceived by the one taking action, in this case the Trustor. These efforts seem to result in an improved understanding of other team members and generally speaking, lead to increasing trust levels.

Additional research is needed to determine whether the increased trust indices experienced by the Trustors would be reciprocated by the other members of the Treatment group over a longer time period. This hypothesis would be difficult to test with a student population as the duration of most class-based group projects is limited, however industry participation would provide valuable and more specific data to this study. Preliminary data from industry testing shows support for the hypothesis, but additional testing is needed and forthcoming.

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