Survey Tools for Faculty to Quickly Assess Multidisciplinary Team Dynamics in Capstone Courses

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ABSTRACT

Many engineering faculty have limited skills and/or assessment tools to evaluate team dynamics in multidisciplinary team-based capstone courses. Rapidly deployable tools are needed here to provide proactive feedback to teams to facilitate deeper learning. Two surveys were developed based on industrial and organizational psychology theories around desired high performance industry characteristics. A case study experiment was conducted in an architectural engineering capstone. Here, these surveys were deployed in conjunction with traditional qualitative verbal feedback and technical assessments.

Results presented here suggest that capstone teams exhibit high-functioning attributes of effective teams based on the course formulation. Team dynamics evolved as the course progressed naturally and with the help of faculty based on the survey results. Discussions in this paper detail survey development, implementation, and sampled trends to represent how to use and interpret the survey output. Furthermore, best practices for implementing these ideas in other courses is touched on. Evidence is presented to support the surveys as a tool and to show correlations between the results and other technical assignments.

Key words: Team dynamics, cross-disciplinary Teams, multi-source Feedback

INTRODUCTION

Many engineering students do not know how to approach large complex systems due to their exposure to idealistic examples (ASCE 2004). Additionally they not capable of providing critical

multi-disciplinary integration of their designs due to the isolated nature of topics in the classroom (Andersen et al. 2007; ASCE 2008). For students to become more multidisciplinary in nature, students need to learn how real project teams interact and how they coordinate designs while maintaining technical execution. This combination of skills remains an area of study within engineering education that still is in need of further development and refinement for different majors (McNair et al. 2011). In looking at Tomek's (2011) work, it was paramount to distill in the students the understanding of roles, responsibilities, and the integration of the various disciplines. Yet, academically this remains increasingly difficult to develop within confined curricula. Furthermore, it has been shown that industry enhancement through the use of problem-based learning (PBL) fosters a modern environment that prepares students for the realities of their chosen careers in the Architecture, Engineering, and Construction (AEC) field (Solnosky et al. 2013).

Multi-disciplinary teams provide an excellent way to promote integration that allows for more complex projects to be undertaken (Adams 2003; Salas et al. 2008). Capstone courses further provide a comprehensive evaluation of students' prior knowledge that is applied to real projects through individual and/or team based structures (Davis 2002; Jenkins et al. 2002). These systems provide excellent mechanisms for developing new leaders amongst students once they graduate when structured properly (Rassati et al. 2010; Solnosky et al. 2014).

With regard to team situations in the classroom, most degree programs (teaching building engineering) are working to adopt more opportunities to develop team assignments, projects, and opportunities. These opportunities are often less than ideally constructed due to relatively few faculty members being trained, or they have no similar industry experience necessary to guide student teams. Such faculty often are unaware of the nuances that the teams must go through based on assignment structures (the major exception is faculty with significant industry experience) (Hannah and Venkatachary 2010). Consequently, only a surface level understanding of their value on the students are realized (Hansen 2006). Engineering collaboration within team settings must "move beyond the divide and conquer" approach (commonly observed) and instead operate in a dynamic and integrative mode that resembles actual industry (Richter and Paretti 2009).

In order to encourage positive team development and performance, many factors need to be evaluated from the students' perspective when formulating and structuring team related items (Mohammed and Mathieu 2002). An industrial and organizational psychology approach to designing teams, team projects, and team evaluations within documented engineering education literature has been limitedly established (Borrego et al. 2013). Implementing these theoretical constructs can take a group approach to an integrated team approach where the collective work results are stronger than individual results (Katzenbach and Smith 2005). By understanding how dynamics affects team interaction, team members then know how to resolve disputes if they do

occur. A side benefit is that faculty members can then effectively assist teams to resolve issues based on occurring traits.

A pilot study was conducted that looked into multi-disciplinary teams in an architectural engineering capstone course that closely mimicked how real multidisciplinary industry teams work. Besides developing the course around multiple systems and emerging technology, team performance and their dynamics were investigated.

The information presented here focuses on the development, implementation, and resulting interpretation of two surveys which provided insight into team inner workings. These surveys were constructed to provide a rapid mechanism that would allow the faculty to assess performance amongst the members. Results from the surveys can be used as a feedback tool to correct a team if negative interactions are occurring. This paper will inform the readers how to administer the surveys and interpret the results when combined with other evaluation methods. Material here is not intended to look at overall effectiveness of the course, as this was detailed in Parfitt et al. (2013) and Solnosky et al. (2014).

BACKGROUND ON THE AE CAPSTONE

The capstone course within the Pennsylvania State University's Department of Architectural Engineering (AE) has traditionally exhibited strong professionalism and technically sound projects. However, students always worked individually and were required to apply breadth material (outside of their discipline focus). Through industry sponsorship, the AE Department formulated and tested a new model for the course delivery involving multidisciplinary teams. This case study pilot employed Integrated Project Delivery (IPD) and Building Information Modeling (BIM) methodologies as the foundation for the multidisciplinary teams' interactions. The project's sponsors wished to produce teams that functioned at a higher level of integration and collaboration than traditional methods generated. In essence, the multidisciplinary team experience was to prepare graduates who entered the fields of design and construction with the skills needed to enhance and promote integrated philosophies through leadership.

Our case study was conducted over a four-year trial period consisting of a year-long, two course sequence pilot program. The program ran from Fall Semester of 2009 through Spring Semester of 2013. This program was open to 5th year AE students enrolled in either the Bachelor of Architectural Engineering (BAE) degree, the integrated Bachelor of Architectural Engineering/Master of Architectural Engineering (BAE/MAE) degree, or the integrated BAE/MS degree. From a discipline standpoint, each team consisted of: construction, lighting/electrical, mechanical, and structural

engineering students (each of the options are housed in the AE department). Each student involved with this pilot agreed to participate on a voluntary basis, as compared to the traditional format (individuals that work alone). These students devoted four academic credits to the program each semester, which represents approximately 25% of the student course work for the academic year.

When the course was created, the first item was to look at the requirements that had to be met from The Accreditation Board for Engineering and Technology's (ABET) standpoint. ABET criterion 3 outcomes a-k (ABET 2012) were maintained while additional objectives were added which tie in and integrate BIM, IPD, and team collaboration notions. These new objectives are listed.

1. Mimic, through examples, how system design choices affect the other disciplines
2. Develop that a team approach as a whole takes precedence over individual disciplines
3. Gain a better understanding of integrated design and construction processes
4. Gain a better understanding of how BIM technology is changing the industry
5. Obtain a more powerful skillsets revolving around modeling tools
6. Develop accurate and realistic work processes/paths
7. Expand the ability to research new technology and evaluate/implement this technology for a particular project.

With the course objectives and outcomes known, the core components that comprised the multidisciplinary pilot program were formulated. Critical to the success of the capstone included: different delivery methods were tested on how students presented material and completed designs (Solnosky et al. 2014), the selection considerations of projects with proper complexity for all disciplines (Holland et al. 2010), and industry interaction (Solnosky and Parfitt 2011; Solnosky et al. 2013). Key highlights from the pilot are listed here:

- Extensive faculty involvement as discipline consultants
- External guidance by practitioner and construction representatives from the actual subject projects:
  o Provided lectures on topics not previously presented to students
  o Provided tours on related projects
  o Judged and evaluated final designs members
- Rigorous project selection to ensure:
  o Adequate implementation of problem-based learning (PBL) theories
  o Areas for multi-option focus
  o Challenging designs within the disciplines
- Formulation of assignments to promote collaboration by means of:
  o Topic background and code provisions research
  o Alternative studies portion

○ Narrowing and refinement of designs

○ Communication designs to peers

○ Technical writing

Because the classroom organization and team formulation resulted in a small sample size, this article reports findings based primarily upon qualitative inquiry (although quantitative data was collected). As such, the study findings were based around a case study premise though more data is continuing to be collected later for detailed statistical analysis.

TEAM DYNAMICS

It is well known that student motivation in the face of academic work, both inside and outside the classroom, is one of the strongest determining factors in the learning process (Reyes and Galvez 2011). Additionally, the team dynamics serve to influence motivation, cohesiveness, and effectiveness (Ilgen et al. 2005), as well as professionalism and responsibility towards a mutual goal. Fong (2010) gathered students' positive and negative feelings in team based learning. The positives included: learning to cooperate and share responsibility, developing leadership skills, mutual support in the team. The negatives included: team members can form an "insider" group, unfair workload distribution, and dislike towards absentees or latecomers to the team (e.g. Brewer 1979).

Furthermore, motivated students apply themselves to work sooner, concentrate more on what they are doing, and are more persistent and generally devote more time and effort to the task than unmotivated students (Deci and Ryan 2000; Reyes and Galvez 2011). Students here often indicate that collaboration with their peers gave them additional incentives to learn because they would get encouragement and support from team members (Siller et al. 2009). Through speaking, debating, and resolving issues, students develop a comprehensive set of skills that enhance team interactions (Sankar et al. 2008). Tomek (2011) more importantly believed that team members are able to minimize and often prevent issues from developing during the project. This in turn, helps further the development of a high-performance team, because the team is centered on the task given to them. To be able to satisfy the needs of professional practice in this study, particularly on effective teams, it was critical to promote the development of effective team dynamics.

SURVEY DEVELOPMENT

To facilitate immediate student benefit for assessing team's dynamics, a series of surveys were the ideal mechanism as they provided a rapid turnaround time for the faculty. Surveys further provided

a means for faculty to support team behavior or correct it to more closely coincide with the overall course objectives. Surveys were developed by the authors and in conjunction with the University's Industrial-Organizational Psychology Program. These surveys were broken into two distinct evaluation categories: team performance and peer evaluation.

The team performance survey consisted of twenty-three questions designed to measure five important factors found in high performing teams. These factors were: 1) Team Vision, 2) Participative Safety, 3) Support for Innovation, 4) Task Orientation, and 5) Team Cohesion. The first four factors were adapted from Anderson and West's (1998) *Team Climate Inventory*. From this inventory, *Team Vision* is a sense that team members share a single, high-level creative goal, which motivates them on their overall project. *Task Orientation* is a measure of team members' motivation to perform well on the tasks that make up their assignment. *Participative Safety* is a sense that team members' value one another's opinions in the decision-making process, and that each members' input is accepted and encouraged. Finally, *Support for Innovation* addresses the emphasis the team places on developing new ideas or novel approaches for their task. *Team Cohesion* was assessed using a scale adapted from Carless and De Paola's (2000) *Group Environment Questionnaire.* Each of the 23 questions can be found in Appendix A.

As part of question adoption, validity of the adaption and implementation remained critical. Anderson and West's (1998) Team Climate Inventory was based solidly on the work by Tjosvold et al. (1986), Siegel and Kaemmerer (1978), and Burningham and West (1995) through which rigorous testing was conducted over more than 120 teams. Adaptation to this project involved only minor changes through word selection to more closely align with the project. In adapting Team Cohesion from Carless and De Paola's (2000) Group Environment Questionnaire, similar procedures were followed. Carless and De Paola's (2000) original survey items were rooted in research from Wech et al., (1998), Campion et al. (1993), Anastasi and Urbina, (1997), and Cohen and Bailey (1997). This allowed the statements to reflect an organizational multi-disciplinary team environment statement that they agree upon rather than a question. Examples of adaptation can be seen in Table 1. The rationale for doing such a modification was to ease students in completing the survey, but more importantly to associate the terminology original questions to our study.

Table 1. Examples of Literature Adaption and Modification of Survey Questions.

Before (Original)	After (This study)
How clear are you about what your team's objective are?	I am clear about my team's Objective
To what extent do you think they are useful and appropriate objectives?	My team's objectives are appropriate and useful
How far are you in agreement with these objectives?	I am in agreement with my team's objectives

The peer evaluation survey consisted of thirteen questions which were selected to measure the degree to which team members felt they and their peers were contributing to the team's goals. These questions can be found in Appendix B. Holland et al. (2010) implemented the same peer evaluation survey questions in a cross-disciplinary cross-department program AEC design studio (less technical but a similar construct to this pilot). Such questions were selected, in that it had demonstrated efficacy in collecting team performance characteristics (Dominick et al. 1997; Geister et al. 2006) when deployed in other multi-disciplinary settings (Jones et al. 1993).

Questions included perceptions of the extent that each team member is respectful of one another, fulfilling his or her responsibilities, and communicating effectively. It also included a general sense that team members would like to work with each member again. Overall, these surveys provided a platform both to gauge the effectiveness of the pilot program, and also for students to learn more about their team's interactions and performance. By receiving feedback on team dynamics and effectiveness throughout the team's project, members are able to direct their effort and attention to making improvements in order to improve their ultimate performance (e.g., DeShon et al. 2004).

The scale used for both team performance and peer evaluation followed a 5-point Likert Scale where 1 was strongly disagree, 3 was neutral and 5 was strongly agree. To relate the results from the surveys to the students, rating ranges were adopted directly from Holland et al. (2010). There were three ranges. Any "below average" range (score of a 3.0 or lower) was not deemed a successful outcome of team performance. A value between 3.0 and 4.0 was considered positive, but not highly impactful on positive overall team performance. Finally, any score with a value of a 4.0 or higher was a success resulting in teams functioning at a top (high) performance level.

Similar survey development has been utilized in engineering education in the past (McGourty et al. 1998), yet not in the same context of technology supported multidisciplinary teams with four distinct technical options. As such, specific and detailed feedback could then enable students to see their accumulated results, thus allowing them to learn from their past performance to motivate the team to improve through any necessary corrections (Dederichs et al. 2011; Kluger and DeNisi 1996; Geister et al. 2006).

The strength in the surveys' ability to provide rapid assessment comes from their creation based heavily on the existing instruments developed by other researchers (e.g. Anderson and West 1998; Carless and De Paola 2000; DeShon et al. 2004). These prior researchers conducted rigorous reliability and validity studies on their original instruments, through their large sample sizes. Only minor modifications to technical specific wording was done match the metrics that this study was most concerned in studying (discussed in the next section).

COURSE ASSESSMENT STRATEGY

The assessment approach is multi-faceted that encompassed: reports, presentations, consultations with faculty, and the surveys (Parfitt et al. 2013). Evaluation procedures were formulated that allowed for the measurement of technical and soft skills in students. Team dynamics were incorporated into the overall structure (Figure 1). Here, quantitative surveys were distributed to measure the important factors found in high performing teams and perceived performance of a member against other members' notions.

Different metrics were established for the following four student content categories: 1) technical content; 2) soft skills; 3) course/project management and 4) team dynamics. Technical content and management categories focused on student deliverables whereas, team dynamics were the internal relationships within the team. Soft skills in this case study were a hybrid between student deliverables

Figure 1. Team Dynamic Feedback Process.
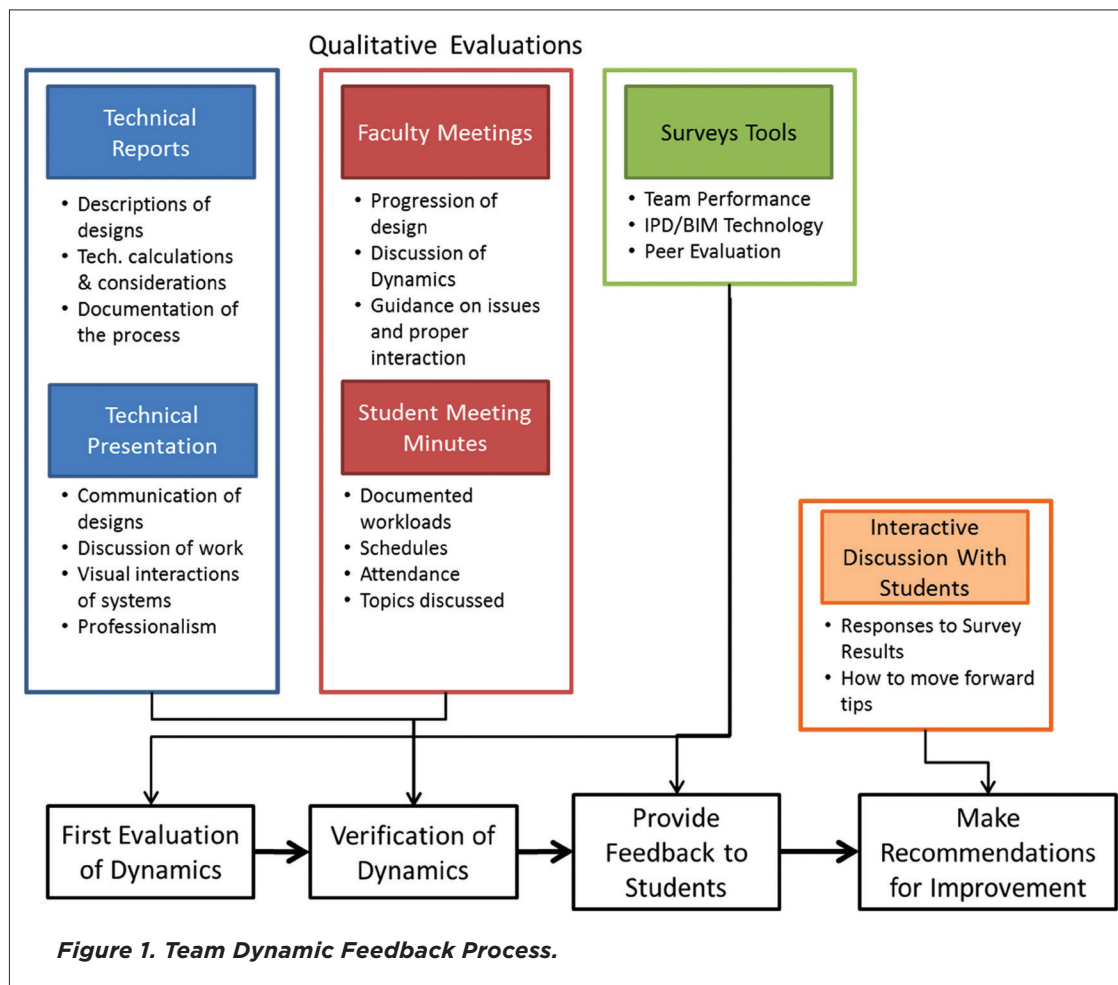
and internal relationships. For brevity purposes, the detailed technical content and management details have not included in this paper but can be found in Solnosky et al. (2013) and Solnosky et al. (2014). The seven team dynamics and performance metrics were based on how teams function in a high performing manner. Research suggests that these dynamics are each related to effective team performance (Anderson and West, 1998; Ilgen et al., 2005). These team dynamics are of equal importance in real-world industry project teams. The seven dynamic metrics are:

1) Have a high-level creative and commonly agreed upon goal

2) Motivation to perform well in the team setting

3) Members value one another's opinions

4) Teams are developing new ideas or novel approaches

5) Each team member is respectful of one another

6) Members are fulfilling his or her responsibilities

7) Members are communicating effectively

The seven team dynamic metrics correlate back to several of the seven new objectives. Research on interdisciplinary teams suggests that new Objective 2 and 3 would be the most critical to team dynamics, team integration, and cohesion (Gully et al. 1995; Ilgen et al. 2005). Objective 2 related to metrics 1, 4 and 7 while Objective 3 relates to metric 4 and 6. Additionally, Objective 6 requires strong interactions with team members in order to generate proper workflows which correlate to metrics 2, 3, 5, and 6.

FACULTY EVALUATIONS AND FEEDBACK REVIEW PROCESS WITH SURVEYS

Student knowledge evaluations by faculty embody the primary assessment of understanding technical knowledge. Team dynamic evaluation from different viewpoints were more scattered across the procedures. Table 2 shows the relationship between the tools and the four knowledge categories

Table 2. Evaluation Tools related to Knowledge Categories.

	Technical Content	Soft Skills	Course/Project Management	Team Dynamics*
Peer Evaluation Survey	No	Limitedly yes	No	Yes: 1–7
Team Performance Survey	No	Limitedly yes	No	Yes: 1–7
Presentations	Yes	Yes	Yes	Yes: 1, 4, 6, 7
Reports	Yes	No	Limitedly yes	No
Faculty Meetings	Yes	Yes	Yes	Yes: 1, 2, 4, 6,7

*1-7 relates back to the dynamic metrics listed in the course assessment strategy section

mentioned previously. Survey data was the first indicator for how teams functioned. Supplemental interactions and evaluations of other content supported or disproved survey data.

As the capstone was multi-disciplinary, there were 6 faculty involved in the project, one for each of the four disciplines and two integration faculty. The two integration faculty were the individuals who looked at the team dynamics, of which the author was one of these members. Integration faculty collected and analyzed the data. Data collection techniques are discussed later. Once organized and formatted into a logical structure, the data results were presented to the other faculty. The general timeline for when different techniques were deployed and shown to students along the year are shown in Figure 2.

Data that faculty received were similar to what the teams got but further showed all responses (not just averages). This was done in the event it was necessary to troubleshoot issues arising. For the students, team performance results were tabulated by discipline as well as an overall average for the team. This permitted to students to see how each discipline thought of themselves as compared to the team. For the peer evaluation results, each student was only given their results that compared their scores against the average score of the remaining members about them.

Approximately two days before integrated faculty met with students, the data were given to the other faculty. Rarely did discipline faculty comment on items unless it was apparent in other

Figure 2. Schematic Timeline of Evaluations and Interactions.
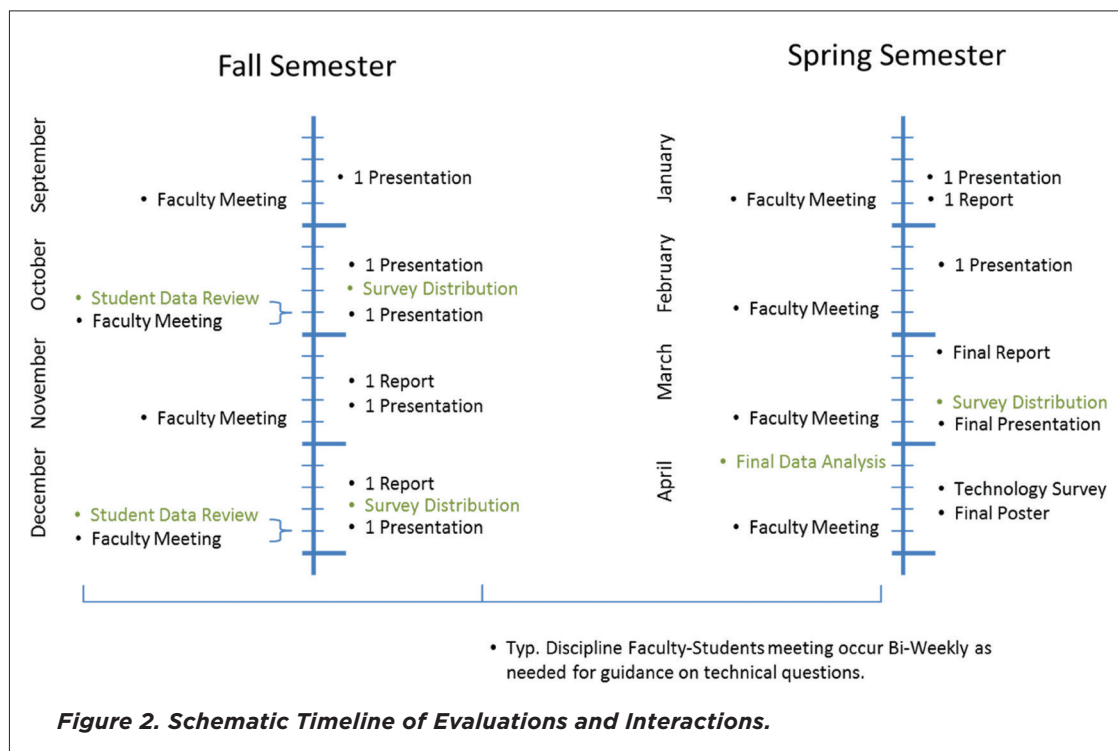
documents that students did poorly. Survey data helped the integration faculty prioritize team dynamics issues by addressing issues that would impact the team results/deliverables. When these were found in the survey data, integrated faculty asked discipline faculty if similar traits where observed in their interactions with students or in report and presentation deliverables. The most common trends across the disciplines and integration notions that matched survey data was deemed most important to address. In several cases, the surveys picked up trends that the faculty did not observe due to students not conveying such issues to the faculty. As the data looked at specific traits, the issues were able to be traced to students or underlying issues in the team's dynamic.

All faculty met once a month as a group to: project out course work; discuss trends and issues everyone saw (not just dynamics); and completed grades as needed.

Interpreted data from the surveys were given back approximately a week after the surveys were completed (a week duration to compile results and interpret). This trend followed for two of the three collections (the first two surveys). The third survey feedback was not provided back to the students as the project was completed unless team members asked for those results.

As an instructive tool, students were presented the results while in a group meeting with the integrated faculty. Here, the faculty described general trends observed in the groups based on the surveys. During this, students reviewed the results real-time with the faculty where any potential issues or conflicts identified by the survey were presented. Along with the negatives, the positives were presented. Discussions with faculty (who previously looked at the data) occurred to indicate what was positive and negative to "bring to light" issues that might be present to help start solving them. Based on survey data and ad-hoc faculty meetings, suggestions on how individual members and the team could improve (technically and working collaboratively) were provided. Essentially, this reinforced positive team behaviors while helping to reduce negative behaviors through multiple feedback sessions. Comparative survey results from one feedback session to another were expressed to emphasize in successive meetings on if their team adjustments were making noticeable effects. This provided quick supportive evidence if their efforts were being taken seriously or not.

Surveys remained effective as a teaching tool for the classroom as faculty were able to show their alignment with other assessment tool results.

DATA COLLECTION METHODOLOGY

Given the course's pilot nature (defined previously), a combination of quantitative and qualitative testing was conducted to evaluate the entire course. At the time of the original study, these

surveys were not considered part of the pilot assessment from a research success viewpoint. The results collected and presented here are exploratory and descriptive in nature. Overall, observed team dynamic trends, impacts on teams design products, and lastly student perceptions on the surveys as a feedback tool were collected.

All students were required to participate in the team performance and the peer evaluation surveys as part of the course. Surveys were made available to students using an online platform (*surveymonkey.com*). Both the peer evaluation survey and the team performance survey were distributed at the same time, but through different internet links. This permitted students to complete the surveys when they wanted, as long as completion occurred within a week from the time the link was sent.

In support with the literature (Carless and DePaola 2000), faculty witnessed that having a minimum of three evaluations with the surveys are necessary to provide the best guidance on dynamics. Holland et al. (2010) supported that two of these three should be placed closer to the start of when the students worked as a team to capture early behavior of the individuals while the dynamic relationship was young.

Subjectivity, Bias, and Limitations in Responses and Evaluations

Care was taken when administrating the surveys to limit bias when possible (Sankar et al. 2008) through clearly explaining why they were part of the course. Scores from the survey were not directly taken into account as part of their grade (however, student grades would be deducted if they failed to complete it). Surveys were sent to the students three times: twice in the fall semester (week 7 and 14) and once in the spring (week 9).

Due to sampling sizes, only qualitative trends (as presented here) from the surveys were looked during this phase of the project. While not rigorous from a research standpoint, the intent as a first indicator into team dynamics remained. Although it is difficult to eliminate bias, the multi-stage assessment process provided the necessary opportunities to balance the course outcomes. Due to students self-reporting on their perceived notions and efforts of other team members, bias in their recording of accurate values can be present in the data. We believe that through explaining why the surveys were done, not linking specific answers to grades, and the coupling with real time faculty interactions after the survey, limited bias.

A major limitation was that it is not possible for the study to compare the traditional capstone with the pilot capstone because the traditional version was based on individual performance (i.e. team of 1). The surveys are still being utilized to date, in an effort to collect sufficient data that statistical testing can be implemented to gauge the level of impact the adopted format has on student teams.
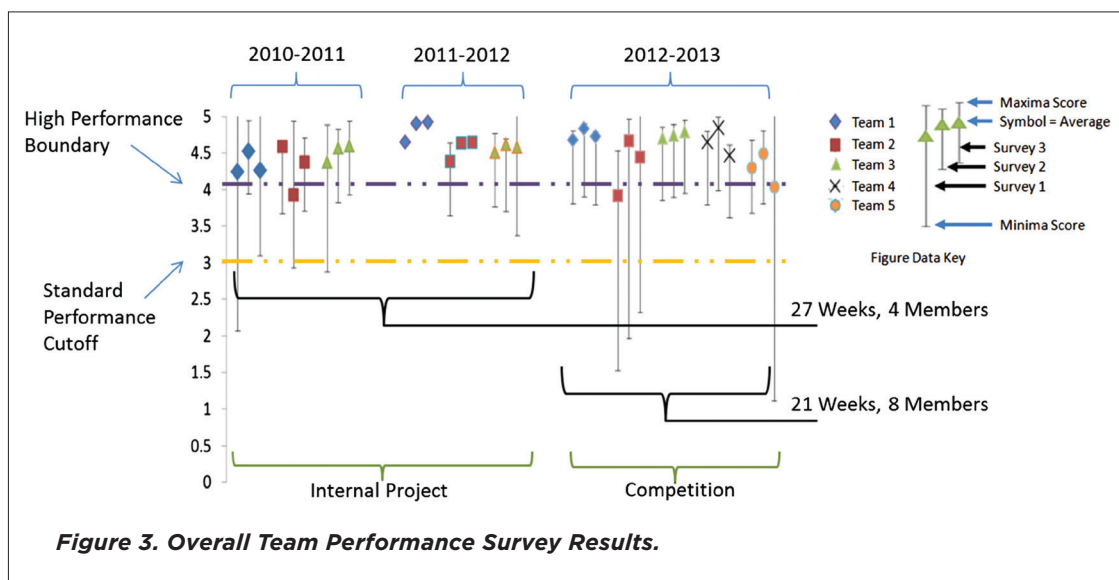
TEAM DYNAMIC TRENDS AND RESULTS

The following section discusses the observed student dynamic trends captured primarily by surveys. Other evidence will based on faculty observations and material found in student work will be touched upon. Here, emphasis is placed on patterns and trends that emerged.
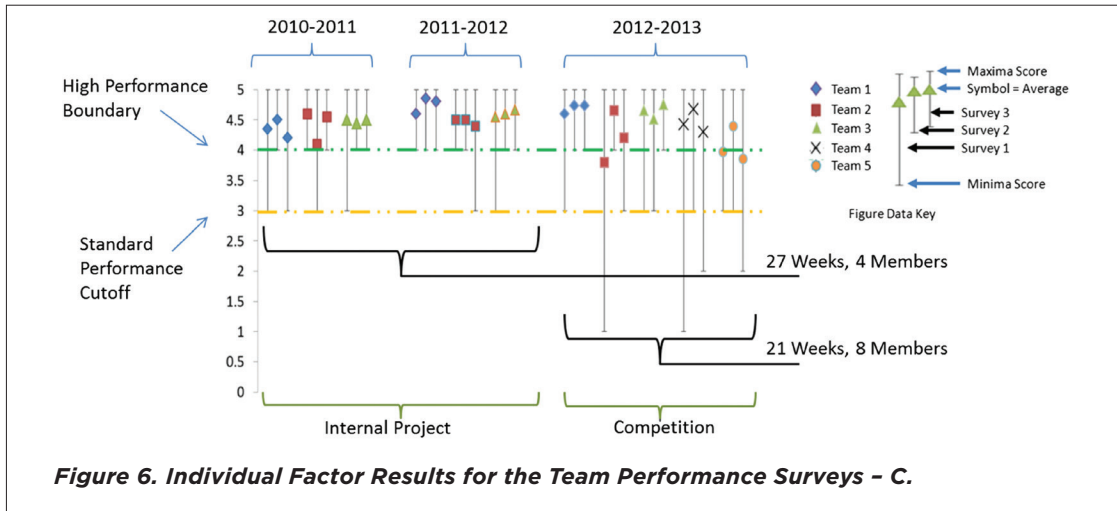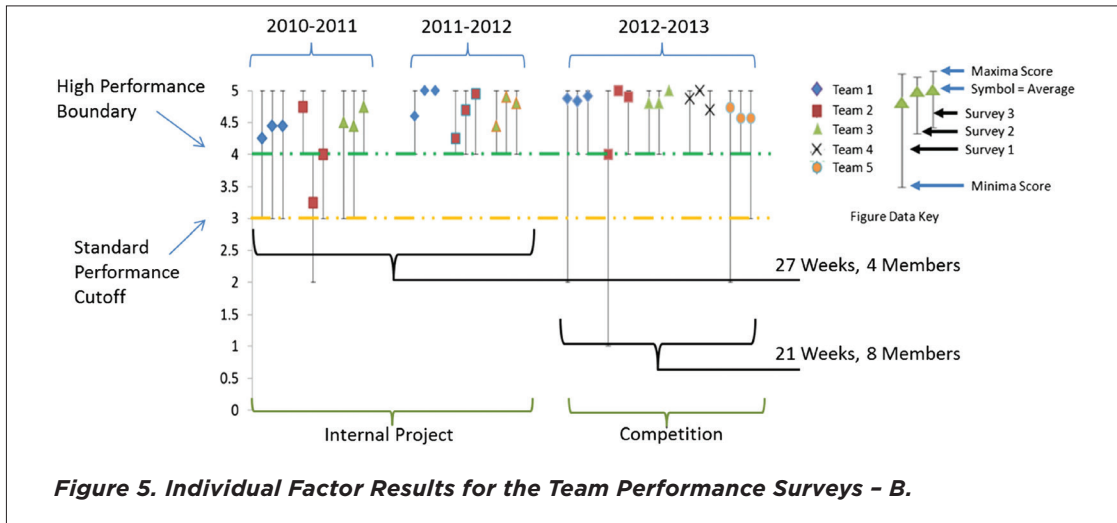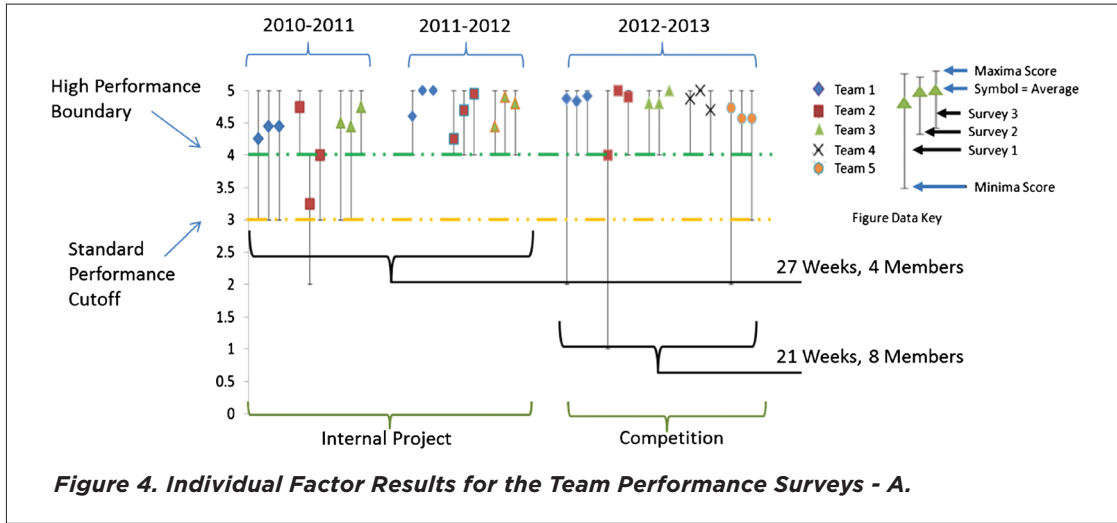
Team Performance Surveys

Team performance survey results, in conjunction with other methods, indicated that the teams as a whole were acting (on average) at a level consistent with professionals (top-level performance range 4.00-5.00). Three teams had outliers at different times during this study. Figure 3 shows the overall scores (minima, maxima and averages) across all factors. With the exception of one team in the fourth year offering (team 5), all teams at the end of the year were at this high performance level. Individual factors within the team performance survey are shown in Figures 4a-e (individual factors). Evidence to support such high scores include: primarily only the top performing students opted into the pilot course, students self-formed teams, and over 50% of the students had a prior multi-disciplinary experience in an architecture design studio. Further discussion and evidence related to the peer evaluation are touched on later. While only one team average, at the end, was below high performance, certain individuals did score below this level as indicated in Figures 3–8 by the vertical lines (they indicate absolute minima and maxima recorded by any student within the team).
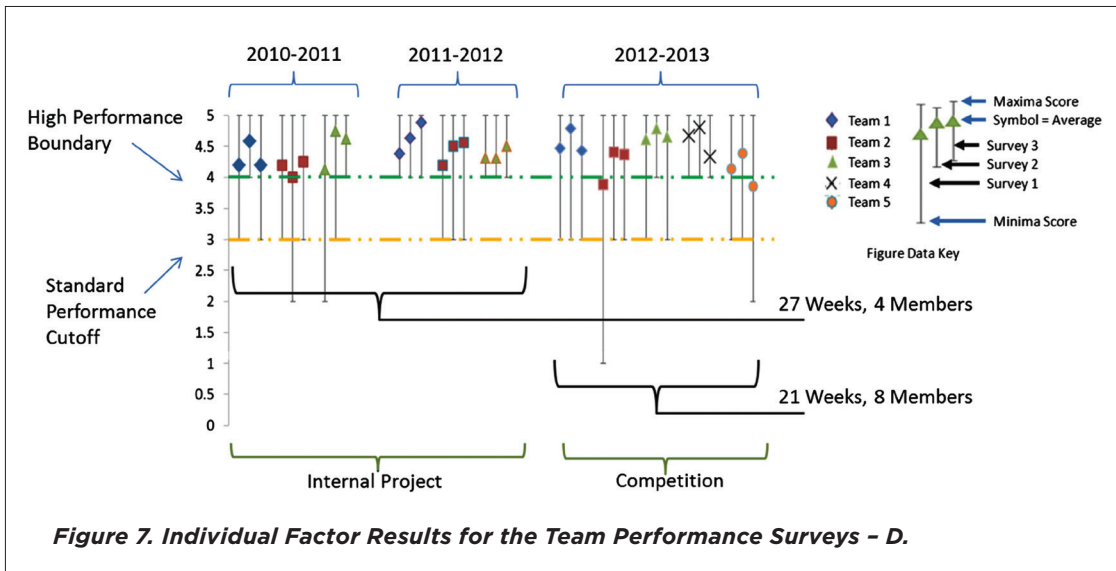
Having looked at overall trends with each individual factor within the team performance surveys, several traits were observed. For team vision (Figure 4), only 1 out of the 11 teams had an end of

Figure 3. Overall Team Performance Survey Results.

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Figure 4. Individual Factor Results for the Team Performance Surveys - A.

Figure 5. Individual Factor Results for the Team Performance Surveys – B.

Figure 6. Individual Factor Results for the Team Performance Surveys – C.

Figure 7. Individual Factor Results for the Team Performance Surveys – D.

year vision below the high performance boundary. Additionally, 8 out of 11 teams had higher vision scores than when they started. These indicate that there were clear and strong visions facilitate innovation. The outlier did show that the vision became somewhat abstract such that their achievable vision was not realistically completed. With Participative Safety (Figure 5), 5 out of 11 teams peaked at survey two then the score dropped. Only one team started with a lower value than high performance while a different team (only 1) fell below high performance at the end. Drops indicated that more people tended to rush in the team decision-making due to the time crunch at the end of
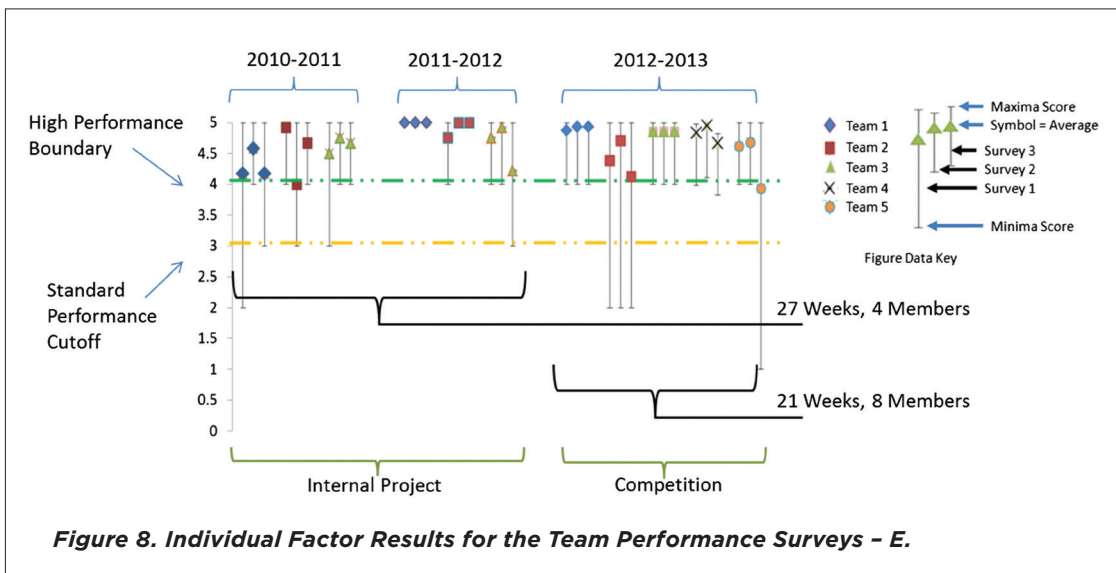
Figure 8. Individual Factor Results for the Team Performance Surveys – E.

the semester. As such, teams were less focused on improved ways of working and more so about completing the work (Rogers 1983).

Having examined support for innovation results (Figure 6), 8 of 11 teams ended up higher at the end then the beginning. Of those, only 2 steadily increased while 5 had highest scores in survey two, and lastly 1 team dropped significantly for survey two but rose back up in the end. These show that the practical support in executing designs in the team increased as a whole across the capstone. Fluctuations which resulted in drops were related back to expectations and team approval of doing various tasks as design deadlines became closer and more important. In looking at task orientation (Figure 7), 7 out of 11 teams rose in score from survey 1 to 2 but dropped from survey 2 to 3. Only three teams had a constant rise in scores. Here, teams steadily built an intra team commitment to excellence that seeks improvements but the mental model shifted to productivity over excellence as the semester ended indicating the drop.

Lastly in team cohesion (Figure 8), 6 of 11 teams increased from beginning to end scores. 5 teams maintained scores of at least a 4.5 or higher for the entire yearlong project. Compared to other factors, team cohesion had higher scores on average. In remembering what team cohesion is, scores of these sizes were expected as group integration is fostering. Higher numbers indicated that there was a higher degree of closeness, similarity, and unity within the group related to tasks and work atmosphere.

Any continual rise indicated stronger interactions were continuously being built. This was verified by faculty, in that the teams "took to heart" the survey feedback that aided them to improve their designs. Continual rises were preferred over plateaus but plateau were still preferred over drops. Teams that plateaued in categories were often less willing to "go outside the box" or "go the extra mile" from a technical knowledge standpoint, thus designs or practices were correct but often less innovative and integrated. From an interaction standpoint, plateaus meant the teams felt they no longer needed to strive for higher interactions or were unable to better themselves.

For academic years 2010-11 and 2011-12, it is worth noting that for the majority of teams, each of the five performance factors (Figure 4-6) either remained the same or improved from the baseline first survey to the final survey. Increased performance was expected due to the team design becoming more cohesive and integrated as time progressed (Hannah and Venkatachary 2010). Supportive traits and technical results for this statement were present in their designs, presentations, as well as observed by faculty.

When drops in performance occurred (within the defined high performance range), the faculty members then further investigated (by interviews and by examining technical reports) for possible reasons. Teams that dropped between surveys two and three did so for several reasons. Based on the follow-ups, the reason for most drops were identified as arisen conflicts in the team at the time in which the surveys were administrated. Identified conflicts included: diverging ideas on system(s) integration, a lack of collaboration among one or more disciplines due to personalities, confusion

on the direction to proceed that will produce the best results, and a lack willingness to understand how multiple systems interrelate from a design and sequence perspective. Such intrateam conflict can result in lower ratings of satisfaction with the team and impaired team performance (DeDreu and Weingart 2003). Accordingly, conflicts directly impacting technical work were quickly identified by the faculty in the submitted material as the student work (at the assessment stages) was not as comprehensive. This technical indication supports drops in team survey scores.

Academic year 2012-13 had greater response variability as compared to prior offerings as indicated in Figures 3 overall across metrics but also in individual categories (Figure 4-6). Averages were comparatively lower to the previous years along with more minimas on the border of what is considered a successful but non-high performing team (limit of a 3.00). In seeing such scores (Figure 4-8), follow up interviews with students indicated that the results were accurate with the most likely causation being extra required coordination time and effort between two of the same option who then had to collaborate with the team (e.g. "double" collaboration). Further supportive evidence in submitted reports and student presentations were often lacking a single "voice" in their composition. These issues led to a sparser team vision and poorer project execution.

The most obvious explanation was attributed to the size of the team in that larger teams require more of their members to arrive at the same level of expectations as those of the smaller teams. It was further found in student generated work (designs and presentations) that, double the size of the team and disciplines does not mean double the quality or quantity. In fact, the trend was equal to or slightly lower than teams of 4 students (this also can be dependent on the project for the year). This evidence, and others, suggested that teams of smaller multidisciplinary teams in a yearlong capstone were better for integrated activities; particularly agreement with one another when technology can support creativity and collaboration.

Based on the courses that implemented the survey to date, averages that fall within the defined limits provided a good early measure of how teams as a whole were performing. Presented here are several noteworthy findings the survey results hinted at which were confirmed by other manners. The first finding is that Team 1 and Team 3 (2010-2011 academic offering) made it to the final practitioner presentation and they both had the highest and lowest average recorded for end semester spring collection (4.26 and 4.60 in Figure 3). The highest average was expected, but the reason behind the lowest was that Team 1 had a much stronger technical competency as compared to Team 2. This suggested that simply having a high functioning collaborative team alone is not sufficient to produce successful technical performance. This is in line with research by Gully et al. (1995) and Beal et al (2003), where team cohesion was not self-sufficient for successful execution.

For the 2011-2012 academic offering, Team 1 and Team 2 had the highest averages (4.92 and 4.65 in survey 3 (Figure 3)). As such, both made it the final presentation. The leading indicator as to why

team three was scored lowest was due to the one discipline member (lighting/electric) leaving the team due to unforeseen personal reasons. Such a disruption in team membership has the potential to impair the dynamics among the remaining team members (Choi and Thompson 2005), particularly when the member's expertise is unable to be carried by other members, then the comprehensiveness of the integrated design suffers.

During the 2012-2013 academic offering, the teams that won the top awards in the AEI Competition were: Team 1 within the categories of team integration and mechanical systems; Team 3 in structural systems; and Team 5 in construction management. Team 1 and Team 3 were of no surprise as their soft skills and technical skills appropriately matched with the survey data conveyed (Team 1 highest overall and Team 3 second). Team 5 did not go with the trend however. If looking at this solely from a discipline standpoint, then it was of no surprise due to a construction student's poor dedication (observed casually and through weak design solutions). Additionally, Team 1 experienced a loss of a team member due to a death. Instead of a decrease in performance that often occurs (Choi and Thompson 2005), the score instead rose. In talking to the group, the faculty believed that there was a strong motivation to honor the student by attempting to come together and win.

The team performance survey accurately isolated disciplines that were often the driving force behind a large amount of their respective teams' decisions. Interestingly, at the outset of the offerings, some disciplines that scored higher earlier would at times end with lower values. In support of this, the lighting/electric (L/E) discipline consistently scored at the bottom (for the most part) on team performance which correlated closely to their limited integrated designs relative to the necessary integrated systems. In particular, lighting/electrical students decreased while the construction management students steadily increased over time as construction became more integrated as design progressed. The improvement suggested that as these disciplines continued to develop a stronger climate. Declines indicated students became less attached due to the pressure of completing the design or loss of interest.

Peer Evaluation Surveys

The primary measure used in the peer evaluation survey (as a teaching tool) was the self-other comparison (difference) values. Here, self-other agreement is defined as the difference between what score the team member gave themselves and the average score the rest of the team gave that member. Smaller values indicated members are in higher relative agreement of a particular person's performance. Results presented here highlight team trends through illustrative examples in what the peer evaluation survey captured when used as a feedback tool. Consider the following example to indicate that smaller values mean better performance. Say "Tim" has a self-score for question 1 of a 5.0 but the average of his teammates is a 3, then the difference is a 2.0. Now if "Sarah" has a self-score of say 4.0 but her teammates give her a 4.16 average, her difference is a then the difference

is a 0.16. This lower score of Sarah's tells the survey reader that it is better than Tim's score. For consistency in reporting data, and for how it was implemented in the classroom, the scores in this section will reflect that the lower score indicates better performance.

When using score comparisons as a feedback tool, if self (S) and other (O) scores are very similar, then the individual and team had similar perceptions of one another. If the self is less than the other score (S<O), then it means that the team holds that member in higher regards for that particular trait then the student does in their own mind. When self is greater than the other score(S>O), it implies that the individual had a higher opinion of their worth (with regard to that trait) then the team does towards the individual. Correction is needed when self is higher than other (S>O); this is a good indicator of poorer performing teams by looking quickly at these values.

The ability of an individual to evaluate themselves and others in how well they are performing positively or negatively evolves from the domains of metacognition (Everson and Tobias 1998) and self-monitoring (Chi et al. 1982) in the cognitive psychology domain. Kruger and Dunning (1999) tested that deficiencies in this ability leads non-experts to have a tendency to over inflate self-appraisals due to their lack of expertise. Most error results from overconfidence in their understanding of the subject matter that related to their performance until they become experts or are shown that they are not actually performing well (Griffin et al. 1990; Vallone et al. 1990). According to Bless et al. (1996), the mood and demeanor can inhibit or promote performance on tasks. This, according to Fogas (1998), can lead to bias in responses. When applied to this project, students may not have had expertise and could introduce bias. To limit bias, self-other comparison (differences) helped to eliminate this while it also helped to correct students who inadvertently inflated their scores.

Across the offering years, self-other differences were small, comparatively speaking, (represented in Table 3) that holistically support the performances of the teams (at a team level). While the team performance survey indicated certain issues in teams, here further highlights to indicate the outliers in the Peer Evaluation Survey that relate back to the first survey are discussed upon.

Table 3. Self-other Comparison Averages.

Team	2010-2011			2011-2012			2012-2013		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
1	0.157	0.526	0.462	0.372	0.180	0.096	0.337	0.192	0.170
2	0.166	0.474	0.161	0.333	0.397	0.467	0.397	0.405	0.845
3	0.149	0.206	0.270	0.436	0.465	0.256	0.516	0.280	0.167
4	–	–	–	–	–	–	0.530	0.385	0.564
5	–	–	–	–	–	–	0.498	0.465	0.639
Overall	0.157	0.402	0.325	0.380	0.347	0.273	0.455	0.345	0.477

In the 2010-2011 academic offering, average self-other agreement was highest on the first evaluation (0.157), lowest at the second (0.402), and marginally increased again at the final evaluation (0.325). In general, this suggests that team members were initially in agreement with one another regarding their evaluations. This changed as they navigated their tasks throughout the semester. The reasons for this change are best examined through Team 1 and 2.

Team 1 initially had very high levels of self-other rating agreement (0.157). However, this decreased dramatically by the second survey (0.526), and remained relatively far apart at the conclusion of the year (0.462). In observing the results from the survey, follow up faculty, individual, and group meetings confirmed intra-team leadership tensions were the most probable cause that resulted in these more inconsistent perceptions as compared to inflated values (Kruger and Dunning 1999). Specifically, it was documented that although one member (Tom), was the group's assigned construction manager (traditional leader role), another team member (Steve) tended to be recognized as the team's "unofficial leader." French and Raven (2001) suggests that although Tom had *legitimate* (role-assigned) *power* over the team, Steve exerted *referent power*—where team members followed and listened as they related to him more. This can be noted quite clearly in the self-other rating for Tom on peer evaluation surveys rounds two and three. Tom consistently rated himself far higher than his peers, resulting in ratings differences of 1.282 on survey two and 1.155 on survey three.

While these inconsistent perceptions were present, the issue of legitimate power roles in the team leader position did not affect the overall team performance. Here, success was attributed to the fact that the team still had a leader figure which, as a whole, the team was accepting of that. This permitted them to complete the objectives. While technical construction topics by Tom were weaker, (based on meeting minutes and presentations), overall construction was just as strong as other team members integrated more construction into their own discipline work to compensate the effect.

For Team 2, members exhibited very high levels of self-other agreement on survey one (0.166) and survey three (0.161), but much lower levels of agreement on survey two (0.474). Follow up group meetings, along with presentations, revealed that Team 2 initially developed a project idea (shortly after Survey 1) that demanded more technical skills than the team was able to handle successfully. Group intervention by faculty confirmed that this technical requirement was inhibiting technical execution, thus stressing the team in being able to complete the interconnected tasks. Tsui and Barry (1986) support the finding in that, as members become overburdened with increased project demands, agreement and cohesiveness diminishes. Once faculty intervened, a more manageable deliverable was structured (through scaling back). This resulted in stress being alleviated and ratings became more consistent once again.

Moving to the 2011-2012 academic offering, a different pattern emerged. Average agreement was observed to gradually improve across all three survey administrations. This was a successful

trend by the established course standards. On the initial evaluation, average self-other ratings across teams was 0.380. On the second survey, it was a 0.347, and on the final survey, it was a 0.273. This suggested that teams in the 2011-2012 year gradually formed more similar impressions of themselves and one another as the year progressed. Team 1 had the most interesting pattern for further discussion.

In Team 1, a large increase in agreement amongst the team was observed relative to the others. Survey one had not especially high self-other agreement (0.372) but by survey two (0.180) and survey three (0.096) the differences drastically narrowed. In fact, survey three had by far the highest level of intrateam agreement recorded. Taken together with the team performance survey, the numbers suggested that team members were very much "on the same page." Supplemental faculty technical evaluations (reports and calculations) and meetings (individual discussions and presentations) further supported a difficulty of isolating individual roles in their deliverables (writing, presentations, and in question and answer sessions). Support for this conjecture was drawn from team mental model literature (Mathieu et al. 2000; Mohammed and Dumville 2001), which state that teams who have a strong mental representation of one another's roles, skills, and abilities exhibit higher levels of team performance as they start to become fluent (both technically and otherwise) in other disciplines.

Lastly in the 2012-2013 academic offering, the average agreement (across teams) was generally worse than in the preceding years. This was evident at the low agreement average (0.455) at the first evaluation. By the second evaluation, self-other agreement was 0.345, but this value dropped for the third evaluation (0.477). This suggested that team members were initially quite different in their evaluations of themselves and others, but came closer into agreement as they worked together, before differing again as the tasks neared its completion. In the beginning, student deliverables were also more isolated in the way in which they were conducted and presented.

Although this year demonstrated lower average scores of self-other agreement than previous years, Team 1 demonstrated increasingly high average levels of self-other agreement across the three surveys. At the time of survey 1, agreement was moderate (0.337), but improved substantially by survey 2 (0.192), and was marginally better at survey 3 (0.170). This observation trend suggests that members of this team worked relatively close together to quickly develop a strong shared mental model. Additional support for this claim was found in the technical material students generated. Similar to the pattern observed in Team 1 during 2011-2012, this team exhibited excellent performance, earning top ratings for systems Integration and mechanical design, as well as second place for structural and electrical design. A contributing factor was that this team had the most team members who were in a similar design studio course the prior year. Faculty believed that this gave the team a higher advantage to perform at a stronger and more cohesive level due to their prior exposure to such atmospheres.

Team 3, which earned first place for structural design, likewise demonstrated a gradually improving pattern of self-other agreement among its members, beginning at a relatively low average value of 0.516 on survey 1, but improved to 0.167 by survey 3. Given the patterns of these high performing teams, it is likely that high levels of intrateam agreement was indicative of strong coordination among team members (Mathieu et al. 2000), which supports team performance efforts.

DISCUSSION OF TEAM TRENDS FOR MEETING COURSE OBJECTIVES

As one of the primary intents of the course was to generate a highly capable individual who can effectively work on multi-disciplinary teams, it was observed through the data from the surveys and other tools, that this was in fact a success. Based on these trends, several conclusions about multi-disciplinary teams' dynamics on an AE related yearlong capstone were made that may be of benefit for other programs with similar disciplines or course makeup.

Performance of the Team:

- Teams that operated together closely developed stronger shared mental models towards their team's tasks as a whole team. This enhanced their performance and efficiency across both platforms (discipline and integration) (Mohammed and Dumville 2001).
- With teams, problems would arise initially due to a lack of full collaboration. Yet, as the project progressed the teams become more collaborative and problems decreased more quickly (Dederichs et al. 2011). However, when goals diverged, so did the scores.
- Disciplines did have an effect on the team performance. Structural and construction disciplines (in all situations) led the teams as these options were the most critical in the engineering decision making process for the projects chosen (high-rise, laboratory, arena, and elementary school).
- Teams that had members who were in a similar design studio course the prior year significantly performed higher in their ability to achieve strong cohesiveness based on early planning in pilot.
- Inconsistent perceptions of legitimate power roles of the team leader were present but did not affect the overall team performance, as long as, the member's leadership was able to be compensated by other members (Choi and Thompson 2005).
- Smaller teams of four resulted in higher performances and stronger focus on the project topic than those in larger self-selected teams. This was due to the necessary second level of coordination amongst a discipline before cross discipline coordination could be conducted.
- Teams functioned at the proposed high level status to match industry expectations set by the sponsors.

TEAM DYNAMIC IMPACT ON DESIGN PRODUCTS

- Teams that plateaued their scores early were often less willing to "go outside the box" from a technical knowledge standpoint, thus designs were correct but less innovative.
- The more cohesive and "on the same page" attitude resulted in a more realistic, integrated, and probable result (Mullen and Copper 1994).
- Teams with strong cohesive relationships led to member roles that supported strong student integration on the topic. Isolation of a single person in deliverables was difficult to see.
- System designs that minimally impacted integrated decisions and the critical project path consistently scored at the bottom on team performance. This can be attributed to these disciplines allowed for more isolation within the team.
- Excessive technical demands (for a potential system design process), beyond the comfort level and experience of the team inhibited the technical and social execution of interconnected comprehensive tasks.

STUDENTS' PERCEPTION ON SURVEY IMPLEMENTATION

- When a team "took to heart" the survey feedback, their designs more often than not improved holistically based on self-reflection of their interactions (Kruger and Dunning 1999).
- Team agreement did change over time, but it can be corrected if addressed in an interactive manner through the surveys with faculty guidance (Bless et al. 1996; Holland et al. 2010).
- Students commented to the faculty that a team often would discuss the results with their fellow members in greater detail later only if they performed poorly.

By emphasizing the equality of discipline expertise alongside collaborative approaches, faculty was able to lead the development of creative, collaborative, and integrated thinking within students. These results are similar to what Pihlak et al. (2011) found for multidisciplinary teams based in an architectural studio setting at an earlier stage of learning. In the pilot years, smaller team formulations demonstrated that smaller sizes do perform better in this particular group format. Successful outcomes are believed to be a combination of three areas: 1) the project type and complexity, 2) student interest on the topic/project, and 3) group size, with larger groups taking longer to gain the trust and cohesiveness amongst the members as compared to smaller groups within this type of setting. While the team performance was high, it can be safe to assume (based on prior team literature) that when more unwilling students take part in such programs the performance would be expected to drop unless additional guidance is given.

After the four-year study, it was determined (by the department) that the pilot was successful enough and was formally adopted by the department a permanent option to the students could select for their capstone design course (Solnosky et al. 2014).

FACULTY TIPS AND RESOURCES FOR ADOPTING AND IMPLEMENTING SURVEYS

The trends presented here indicate that the two developed surveys are applicable to quickly allow faculty to assess the dynamics and performance before detailed investigations need to be conducted. These tools permit the faculty to gain an insight quickly for the ability to guide, support, or correct team behavior through showing the results with students. Research suggests that frequent, specific feedback is a valuable tool for enhancing performance (e.g., Kluger and DeNisi 1996).

For other faculty to benefit from these surveys in similar such scenarios in capstone courses, or even other large scale class projects, several best practices can be recommended. To properly facilitate a successful review of the data to support teams (via guiding, approving, or correcting team behavior), traits that are not common in all academic faculty are needed on the advising side. The best faculty for the integrated faculty member conducting the survey portion of the course should, if at all possible, have moderate to significant experience in working on similar teams and a knowledge of how multi-disciplinary teams work through issues. For this case study, the one faculty had 20+ years experience before academia and regularly consulted on practitioner projects during academia. It is not recommended that a straight from Ph.D. assistance professor conduct this alone or any purely academic (lacking industry experience) individual unless they have proper training (e.g. industrial/organizational psychology). In such situations, additional help from a psychology dept. or other faculty is highly recommended for greater success until that faculty member is comfortable interpreting results. Specific skills that will be of benefit to the faculty member are listed in Table 4.

The survey questions generated in this study were taken from the original sources with minor modification to their working for greater relevance and ease of response in our pilot. We suggest that other faculty modify the baseline questions found readily available in the literature: Anderson and West (1998) and Carless and De Paola (2000). Modifications though, should be minimized and consultation with an organizational psychology department is recommended for ensuring intent of the questions is maintained.

Regarding survey implementation, review, time, and scheduling logistics are important to establish. The first time the surveys were distributed they need explained and their importance stated. This will take about 15 minutes. Surveys were given to students where they have a week to complete them (longer than this, then material is not as concise). From there it takes 2 days for a faculty member to generate a spreadsheet that collects and summarizes the data in the format for students

Table 4. Skills Needed for Successful Team Dynamic Evaluation and Guidance.

Skill	Purpose for Skill	When skill is used
Basic knowledge of disciplines and why they focus on what they tend to do.	Aids in the understanding of why things are done. Supports faculty to formulate teams if they are not self-select.	During student data review During raw data review During any student interaction During technical assignment creation
Detailed knowledge of the a focused discipline students are tackling and acceptable work loads	Provide solutions and corrections to when teams "bit off" more than they can handle.	During any student interaction During student data review During technical assignment creation
Knowledge of the 5 different aspects of team dynamics: 1) Team Vision 2) Participative Safety 3) Support for Innovation 4) Task Orientation 5) Team Cohesion	Aids in the understanding of why things are done and where things often go wrong. Aids in the understanding what drives the outcomes of students in different areas.	During student data review During raw data review
Understanding of how team members' interactions and mental models evolve and what drives them.	To evaluate the functions of the team. Can support the instructor to help provide suggestions for improvement.	During raw data review During any student interaction
Understanding of how team members' roles and responsibilities evolve and what drives them.	Can support the instructor to help provide suggestions for improvement. Supports faculty to formulate teams if they are not self-select.	During raw data review During any student interaction
Understanding group presentations. Speaking, presenting, posture, and graphics.	Provide suggestions for improvement.	During technical assignment review

and faculty. With data generated, it takes about another 2 days to cross examine/ask other faculty about trends. These time frames kept the student review of 1 week after surveys are done within a reasonable scope. For each team, approximately 1 hr of time is needed to review the results. Survey review should be attempted to be done during class time but was not always possible (note that our class meets 6 hours a week).

For the implementation of the surveys into other similar course structures, advanced statistics are not needed to influence students be perform better. Based on the material presented here, readers can take away several points for using the survey tools beyond the dynamics listed previously. Several tool benefits are:

- Allowed for broadly tracking the performance of multidisciplinary teams.
- Allowed for the identification and isolation of strong and weak team dynamics for both discipline and individual situations.
- Allowed for the identification and isolation of strong and weak perceived individual performance.
- Provided means of effectively realigning the team towards integrated notions.
- Indicated alignment agreement between faculty evaluations by other tools that support the team physical and shared mental models.

CONCLUSIONS

With teams, multidisciplinary interactions and student skills (soft and technical) can alter team dynamics. Part of the goal of the study was to develop and deploy quick assessment tools for evaluating different forms of team dynamics that permitted faculty to aid in assessing and guiding the teams quickly. The two developed surveys permitted faculty insight on how teams are functioning (in conjunction with other methods). Additionally, they provided a medium to aid students in adjusting their performance to remain aligned with the course vision of high performance. The results have demonstrated that taking an organizational behavior approach to align or shift team performances did lead to better student-centered programs. In this case study, surveys were equally valuable as other tools for providing insight. They were well received by the students as they were able to formally compare their perceived behavior against others' observations. As a result, students worked with faculty on any identified dynamic area(s) needing improvement so to better contribute to the team as a whole. Results and discussions here highlighted that implementation tools, averages, and self-other scores provide reliable feedback to students when explained by faculty in conjunction with other faculty observations. We have provided a rapidly implementable assessment tool for high performance dynamics.

With future iterations, when two of the same discipline are present in a team, the survey should be modified to provide additional indicators of how teams function at the intra-discipline dynamic level amongst those individuals. Furthermore, an additional survey is being given out now to gather data regarding the personalities of the members to see how they evolve during the year. Once a sufficient sample size is obtained, statistical testing will be part next phase of the study to see the level of impact team dynamics had on technical performance through grade correlation. Ordering effects should also be considered at this time as it could play a role in how reviews affect the dynamics and project outcomes.

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APPENDIX A: TEAM PERFORMANCE SURVEY QUESTIONS

Team Vision

1. I am clear about my team's Objective

2. My team's objectives are appropriate and useful

3. I am in agreement with my team's objectives

4. My teammates and I are in agreement about this team's objective

5. My teammates clearly understand the team's objective

Participative Safety

1. Team members generally share information rather than keep it to themselves

2. Members of this team have a "we are in it together" attitude

3. Team members all influence each other with regard to tasks

4. Team members keep each other informed about work-related issues in the team

5. Members of this team feel understood and accepted by each other

Support for Innovation

1. This team is always moving toward the development of new answers

2. Assistance in developing new ideas is readily available within this team

3. This team is open and responsive to change

4. Members of this team are always searching for new ways of looking at problems

5. In this team we take the time needed to develop new ideas

Task Orientation

1. My teammates provide useful ideas and practical help to enable me to do my tasks to the best of my ability

2. My teammates and I monitor each other in order to maintain a high standard of work

3. Teammates are prepared to question the basis of what the team is doing

4. Team members critically appraise potential weakness in team tasks, in order to achieve the best possible outcome

Task Cohesion

1. Our team is united in trying to reach its goals for performance

2. I'm unhappy with my team's level of commitment to the task (reverse)

3. Our team members have conflicting aspirations for the team's performance (reverse)

4. This team does not give me enough opportunities to improve my personal performance (reverse).

APPENDIX B: 360-PEER EVALUATION/FEEDBACK SURVEY QUESTIONS

1. Is responsive to team requests

2. Provides timely and appropriate feedback/work product

3. Is committed to achieving team goals/objectives

4. Is available and regularly attends team meetings/work sessions

5. Communicates effectively with the team

6. Provides constructive criticism in an effective manner

7. Is open minded and not defensive about his/her ideas

8. Is respectful of others

9. Works in a collaborative manner (breaks down silos and barriers)

10. Is technically competent in their area of study/expertise

11. Often asks "what else can be done"

12. Is accountable for their actions/work product

13. I would enjoy having this person on my team again.