Teamwork Efficacy, Attitudes and Interest: Insights on Their Relationships

Kara Vance, Abdullah Konak, Sadan Kulturel-Konak
Penn State Berks

Gül Okudan Kremer
Penn State University Park

Ivan Esparragoza
Penn State Brandywine

Abstract

Students' professional skills, such as teamwork, global awareness, ethics, and creative problem solving, increase their likelihood for success throughout their education and career paths, especially in the Science, Technology, Engineering, and Mathematics (STEM) disciplines. In particular, effective teamwork can improve an engineering team's performance, communication, and collaboration. In this paper, we discuss students' attitudes toward teamwork, teamwork self-efficacy, and interest levels in developing teamwork skills and abilities. Although literature provides guidance on how to gauge teamwork self-efficacy, the level of interest toward teamwork and students' positive or negative teamwork attitudes, the relationships among interest, efficacy and attitudes toward teamwork are not clear. We argue that assessing students' interest levels should be an integral part of teamwork assessment because interest is a construct, which can predict students' long-term dedications to grow professionally in a domain. Therefore, interest is a key component of our foundational assessment framework, the Model of Domain Learning (MDL), to evaluate the students' teamwork knowledge, skills, and abilities (KSA). We developed a survey instrument to measure teamwork interest, attitudes and self-efficacy. The survey was used to collect data at multiple campuses of a university in the Northeast to investigate whether there were any relationships between students' attitudes toward teamwork, interest levels, teamwork self-efficacy, and background. Based on the collected data, we also investigated factors, such as gender, grade point average, background, and work experience, which may influence students' teamwork attitude, self-efficacy, and interest. The relationship among attitudes, self-efficacy, and interest was examined.

I. Introduction

Professional skills, such as teamwork, global awareness, creative problem solving, and ethics, allow students to enhance their educational journey and career paths. This paper focuses on teamwork. More specifically, we intend to provide insights on gauging engineering students' self-efficacy, attitudes, and interest toward teamwork with the objective of using interest as a construct in the assessment of students' development in teamwork knowledge, skills and abilities (KSA).

Today's engineering challenges require a large variety of knowledge and skills from multiple disciplines, including non-engineering ones. Therefore, having effective teamwork skills in engineering contexts is important. Multi-disciplinary teams bring together a pool of talents, experiences, and knowledge base, which cannot be embodied in an individual. However, the multi-disciplinary nature of a team does not guarantee successful team performance. The research shows that the success of a team depends on how effectively team members are able to share information, assign tasks based on the strengths of team members, coordinate tasks, and provide feedback to one another.[1] It is essential that engineering graduates have teamwork KSA to function effectively in teams. Engineering programs have responded to this need by incorporating teamwork into all levels of academic curricula.

Table 1 summarizes a set of the instruments for assessing teamwork KSA. Broadly, teamwork assessment instruments can be categorized into two groups: peer evaluations and tests. Peer evaluations mainly focus on student projects and aim to achieve a fair summative evaluation of the individual contribution of each team member to project outcomes. Teamwork tests focus on measuring teamwork knowledge and/or personal traits, such as leadership, that are known to be important for teamwork. Teamwork tests are widely adopted by the industry for the selection of team members.[1]

Existing instruments for assessing teamwork KSA do not include items to measure student interest for learning teamwork. Recently, we have proposed an assessment framework based on the Model of Domain Learning (MDL)[2] to assess students' professional skill development[3], and interest is one of the MDL components. Alexander et al.[2] theorized that interest shifts from situational to individual as a person develops from novice to expert in a domain. Individual interest is an indicator of life-long learning, which is important for continuous development of professional skills.

Table 1. A List of Prior Assessment Tools in the Literature.

Reference	**Assessment Tool/Rubric Name**	**Purpose**
Baker and Salas[4]	Multi-Trait/Multi-Method Matrix	Team Goal Setting Strategic Processing
Ellis et al.[5]	Distributed Dynamic Decision (DDD) Making Model	Decision-Making and Problem Solving Strategic Processing
Koski and Tubbs[6]	Predictive Index	Team Communication, Conflict Resolution Strategic Processing
Loughry et al.[7]	Comprehensive Assessment of Team Member Effectiveness (CATME)	All Learning Outcome Areas Strategic Processing
McClough and Rogelberg[8]	Individual Performance in Teams Scale (IPIT)	Team Goal Setting Strategic Processing
Pazos et al.[9]	Learning Group Classification Model	Decision-Making and Problem Solving Strategic Processing
Thomas et al.[10]	COMPASS	Team Communication Strategic Processing
Willey and Gardner[11]	$SPARK_{plus}$	All Learning Outcome Areas Strategic Processing

In our previous work[3], we demonstrated how interest could be used to measure students' development in professional skills as a part of a MDL-based assessment framework using an empirical study of team communication. Originally, the MDL was developed by Alexander et al.[2] to model the professional growth in a domain from novice to expert level experience through the interactions among three components of learning (i.e., interest, knowledge, and strategic processing) across three developmental stages, which are acclimation, competency, and proficiency. The MDL is the foundation for gauging students' interest toward teamwork in this paper. Further information on the MDL-based assessment framework is available in our earlier work.[3]

In this paper, our primary goal is to evaluate the feasibility and reliability of using interest as an additional construct to track student development in teamwork KSA. We introduce several questionnaire items to measure students' interest in teamwork. These questionnaire items can also be used in a broader instrument for assessing teamwork KSA. Another contribution of the paper is a preliminary analysis of the factors affecting interest. Specifically, we focus on teamwork self-efficacy and attitudes of engineering students, and their relationship with interest. Our research questions are as follows:

- Is there any relationship between teamwork self-efficacy, attitudes, and interest for the sample of engineering students studied?
- How confident are engineering students in their teamwork skills and abilities?
- Do engineering students have a more negative or positive attitude toward teamwork?
- How interested are engineering students in their teamwork skills and abilities?
- How does engineering students' background information, such as involvement and grade point average (GPA), correlate with their teamwork self-efficacy, attitudes, and/or interest?

II. Background

Bandura[12, 13] proposed the social learning theory, also known as the self-efficacy theory, which states that self-confidence determines how successful one will be. McClough and Rogelberg[8] defined teamwork self-efficacy as a team member's confidence in performing the group's task. Overall, research supports that self-efficacy has a positive impact on performance.[4] According to Huh et al.[14], the group's confidence determines how well the team performs the task, which is called collective efficacy or team efficacy. Collective efficacy assessment considers past successful group experiences, instructor's confidence in their feedback, anxiety and excitement toward comprehending efficacy, as well as the analysis of the superior's execution of the assignment.[14, 16] Lent et al.[15] surveyed two groups of engineering college students during a team project and asked them to evaluate the overall group's confidence in performing tasks based on a ten-point confidence scale. The results of their survey indicated that self-efficacy and team cohesion were strong predictors of collective efficacy.

Efficacy can be measured through beliefs. McClough and Rogelberg[8] and Riggs et al.[17] proposed the Personal Efficacy Beliefs Scale (PEBS). PEBS measures how confident one is in performing the team task. Huh et al.[14] mentioned the Collective Efficacy Beliefs Scale, which

assesses how confident the team is in performing the tasks together based on past teamwork experiences, using a seven-point Likert scale.

Hardin et al.[18] recommended four approaches to measuring collective efficacy. The first technique is to measure a team member's viewpoint of the group's efficacy without the aggregation of scores. The second method is to assess the teamwork self-efficacy for each team member with the aggregation of scores. The third approach is to measure the team efficacy for each group member with aggregated scores. Hardin et al.[18] and Huh et al.[14] suggested consensus through a discussion about collective and self-efficacy among the team.

Teamwork attitude is defined as how apt one is to work in a team with others.[19] Factors to determine a students' attitude toward teamwork include rewards[20,21], team size, workload, cooperation versus competiveness, peer evaluations[20], level of participation[20,22], myths about teamwork[23] and the level of instructor's involvement.[24] Students' negative attitude toward teamwork is a frequently discussed topic in the literature. Vance et al.[26] reported that online information technology students have a more negative teamwork attitude in comparison to students, who experience teamwork face-to-face. Payne and Monk-Turner[25] focused on teamwork attitudes based on age and gender. Males are more likely to have a positive teamwork attitude, since females disagree more often. Traditional students have a more negative attitude toward teamwork than nontraditional students, since adult learners usually have more experience in adapting to new situations and may value opportunities more.

Our review of the literature on assessing interest toward teamwork revealed a limited number of studies. Alexander et al.'s[2] MDL explain professional development in a domain based on three stages: acclimation, competency, and proficiency. Interest changes as one goes through from the acclimation stage to the proficiency stage. Interest in the acclimation stage is situational interest, meaning a student is only engaged due to the introduction of a new topic. In the competency stage, one develops their interest further through an increased commitment to their field of study. In the proficiency stage, individual interest is defined as the strong desire to invest more into the field of study in a long-term and personal manner.

Teamwork interest considers students' past experiences with working in a group.[27] Other studies feature measurement of interest through inventories of various constructs or in an observational manner. McDermott and Dell[28] discussed the Vocational Preference Inventory (VPI). The VPI measures interest through six ten-point frequency scales, such as realistic, investigative, artistic, social, enterprising, and conventional as well as considering personality traits. Kline[29] suggested the Team Player Inventory (TPI), which measures interest, based on a team member's past teamwork experiences, using a five-point Likert scale and ten items. McIntyre[30] presented three case studies in a first-year engineering course, involving group decision-making and problem solving. Students' interest in teamwork is measured based on how much cohesion, interaction, and discussion each team member had within the group. Beard et al.[31] stated that interest could be measured through a person's social cues, such as body language and eye contact.

As reviewed above, although various instruments exist for measuring interest toward teamwork, the potential relationships of interest with knowledge of teamwork processes and attitudes toward teamwork have not been studied; our study provides insights on these critical relationships.

III. Research Methodology

An online survey was designed to gauge students' teamwork self-efficacy, attitudes, and interest. The survey was emailed to engineering students at a university with multiple campuses in the northeast United States. It should be noted that the survey did not emphasize a specific engineering course or a class level, and it was available for any engineering student to take, regardless of their class standing or the course content. Therefore, the survey measured only the students' self-reported perceptions about their teamwork self-efficacy, attitudes, and interest. After data cleaning, 586 responses were used in this study. There were 202 first year, 129 second year, 146 third year, and 109 fourth year students.

Teamwork Interest

The survey had two groups of interest questions. The first group included questions about how frequently students engaged in learning activities related to teamwork, such as attending a workshop and reading a book. The second group of questions intended to measure their individual interest to improve their teamwork KSA. First, we conducted an exploratory factor analysis to determine whether the questions would conform to these two groups (latent factors) and to identify the questions with low factor loadings. In the factor analysis, the extraction method of Maximum Likelihood and the rotation method of Promax with Kaiser Normalization were used. The best model obtained featured three factors as shown in Table 2. Two questions with very low factor loadings were eliminated from further analysis.

Table 2. Factor Analysis for the Interest Questions and Extracted Variables.

Question	Factor		
	I_1	I_2	I_3
Attended a speaker event about teamwork	.859		
Watched a documentary or training video about teamwork	.697		
Watched a video clip outside of class work about teamwork	.658		
Attended a workshop about teamwork	.634		
Asked questions to an expert (professor, consultant etc.) about effective teamwork	.500		
Performed a web search to learn about effective teamwork	.482		
Read a book about teamwork	.434		
Rate your level of interest in attending a free workshop on teamwork.		.774	
Rate your level of interest in reading literature about effective teamwork?		.682	
While you are browsing a news website, you have spotted an article called "How to be Effective in Teamwork." Rate your likelihood of reading this article?		.671	
Rate your level of willingness to take an elective course in order to improve your teamwork skills?		.633	
In your institution, a renowned teamwork guru will give a workshop on teamwork skills. If you have to pay $10 for this workshop, rate your level of interest in attending this workshop.		.625	
Read an online article about teamwork			.759
Read a newspaper/magazine article about teamwork			.651

The means of the extracted latent variables were compared across the class standing of the participants (first, second, third, and fourth year) using one-way ANOVA. The results of the ANOVA are given in Table 3. Figure 1 illustrates the 95% Confidence Intervals for the mean of extracted interest variables I_1, I_2, and I_3 over the class standing. The means are virtually identical

for the first three years, but a statistically significant increase is observed for all variables in the last year. In fact, the increase observed in the last year is the reason for the statistically significant results in the ANOVA analysis. To explain the cause of the significant increase observed in the interest variables, students' various teamwork experiences are plotted against the class standing. It is clear that the third and fourth year students rated their engagement in teamwork experiences much higher than the first and second year students did. In the following sections, we explain the possible causes of this observation in more detail.

Table 3. The Results of the ANOVA.

	Factor	Sum of Squares	Degree of Freedom	Mean Square	F	*p*-value
I_1	Between Groups	6.112	3	2.037	5.682	.001
	Within Groups	206.533	576	.359		
	Total	212.646	579			
I_2	Between Groups	2.939	3	.980	2.468	.061
	Within Groups	228.685	576	.397		
	Total	231.625	579			
I_3	Between Groups	11.425	3	3.808	5.211	.001
	Within Groups	420.962	576	.731		
	Total	432.388	579			

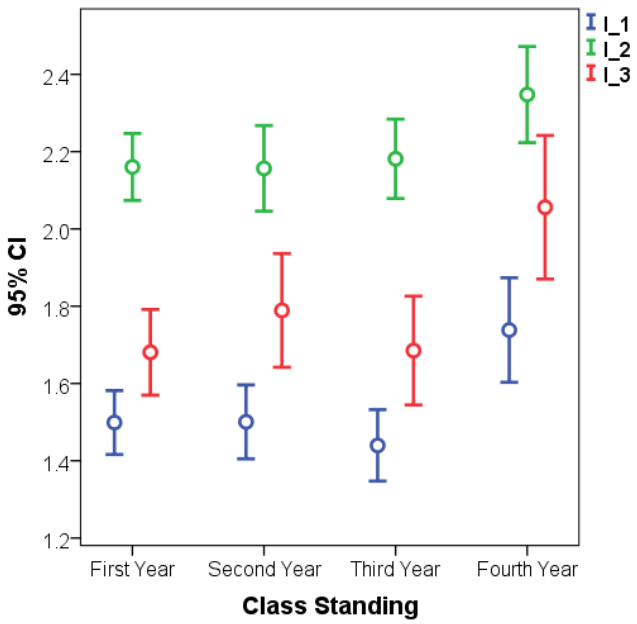
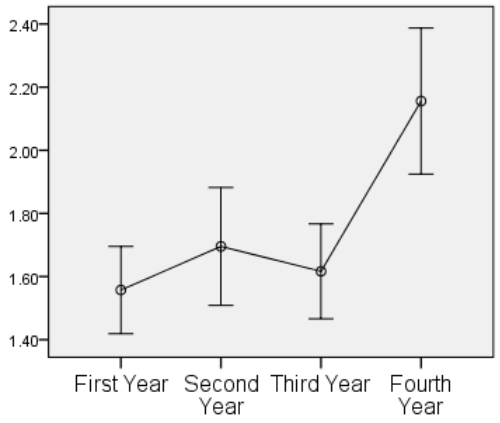
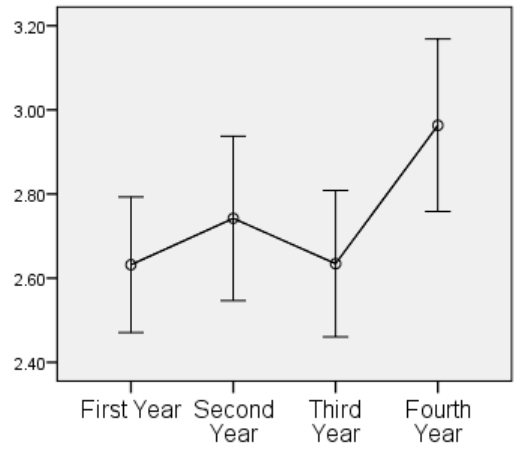


Figure 1. 95% Condidence Intervals of the Extracted Intrest Variables over Class Standing

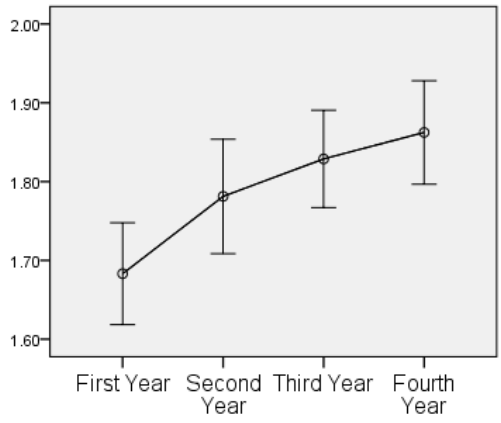
(a) Have you ever taken a course or training on teamwork? (1: Never to 5: Many times)



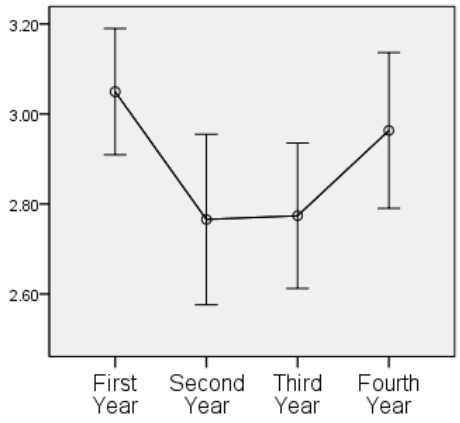
(b) How often have you been provided with feedback on your individual teamwork performance? (1:Never to 5:All the time)



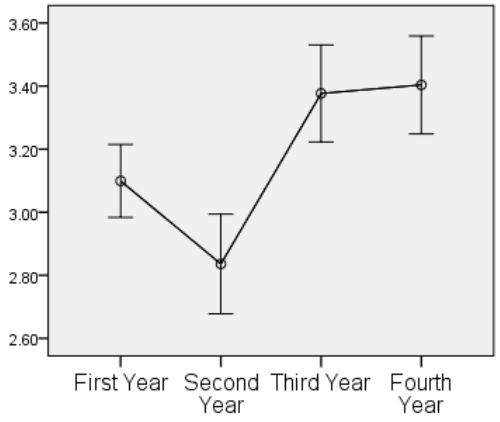
(c) Have you ever had a job that requires significant teamwork? (1: No, 2: Yes)



(d) In classes that require a team project, how often have you been provided with the knowledge about how to be effective in teamwork? (1:Never to 5:All the time)



(e) During a semester, how often do you work in team projects in your classes? (1:Never to 5:More than five projects)



(f) For your intended professional career, rate the importance of teamwork? (1: Not At All to 4: Extremely)

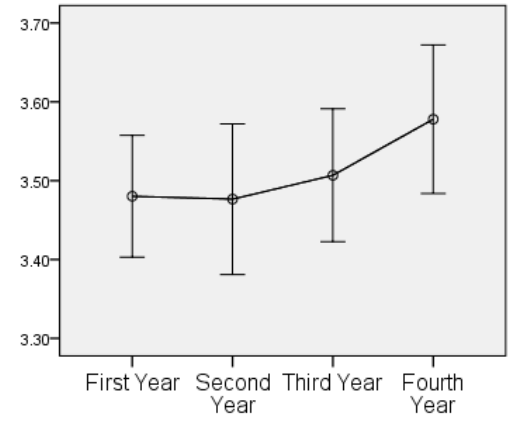


Fig 2. 95% Confidence Intervals with regard to the Interest Variables, the Frequency of Activities about Teamwork, and the Importance of Teamwork Compared to the Class Standing (*x*-axes in the charts).

Teamwork Self-Efficacy

We developed teamwork self-efficacy questions based on the teamwork learning outcome areas summarized by Vance et al.[32] Based on the Teamwork KSA areas[33], twenty-five questions were grouped as follows (the number of questions in each KSA area is provided in parenthesis): Goal Setting (2), Performance Evaluation (3), Team Forming (5), Team Coordination (1), Communication (7), Conflict Resolution (4), and Problem Solving (3). These questions were operationalized with a four-point Likert scale, ranging from (1)-"Very Unconfident" to (4)-"Very Confident". The questions are available upon request.

First, we conducted a multivariate ANOVA to investigate whether teamwork self-efficacy depends on factors, such as class standing, GPA, work experience, and teamwork training experience. In terms of GPA, 3.5 was used as the cut point to divide the participants into two groups as high (GPA $\geq$ 3.5 encoded as 1) and average (GPA < 3.5 encoded as 0). The multivariate ANOVA suggested that job experience, followed by teamwork training, were the most significant factors for the teamwork self-efficacy. However, the underlying regression models had very low levels of *R*-square values due to the fact that participants rated their self-efficacy very high, regardless of their class standing and GPA. Instead of the ANOVA statistics and parameters, we provide the correlation coefficients among the factors and the self-efficacy variables in Table 4 because the correlation coefficients provide more meaningful information in this case.

The correlations among the self-efficacy variables and the previous job experience are significant, but very low. The negative correlations (albeit not statistically significant) among the self-efficacy variables and the GPA group are unexpected. Figure 3 presents the 95% confidence interval for the mean of the self-efficacy variables. Overall, the participants from all class levels rated their teamwork self-efficacy very high, between confident and very confident. In this regard, these results are similar to those observed from Information Technology students in our previous research.[26] It is also widely reported in the literature that students tend to over-rate their skills and abilities.

In many research studies[34], positive relationships have been identified between self-efficacy and academic performance. However, a high self-efficacy, without the proper skills and knowledge to support it, can be detrimental in team settings. Several researchers[35, 36, 37] have also pointed out the negative impact of over confidence in student performance and learning. In a teamwork setting, overconfident students may attribute the team failure to external factors or other students rather than analyzing their own behaviors and attempting to acquire proper skills, in order to deal with the pitfalls of teamwork. Clearly, this point requires further research and is not within the focus of this paper. Nonetheless, we postulate that self-efficacy may not be a reliable construct to assess students' development in teamwork KSA based on the results given in Table 4. On the other hand, interest provided a much distinct measure to gauge the impact of the factors that are expected to increase teamwork KSA.

Table 4. The Correlation Coefficients of Teamwork Self-Efficacy, Interest, and Attitudes with Grade-Point Average, Class Standing, and Previous Teamwork Experience (**: Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed)).

Variable (Cronbach's α Reliability)	GPA Group	Class Standing	Have you ever had a job that requires significant teamwork?	Have you ever taken a course or training on teamwork?
Goal Setting (.712)	-.019	.016	.154**	.090*
Performance Evaluation (.637)	-.010	.048	.105*	.079
Team Forming (.827)	-.074	-.038	.100*	.082*
Team Coordination	-.006	-.026	.130**	.054
Communication (.807)	-.127**	.032	.120**	.126**
Conflict Resolution (.816)	-.091*	-.048	.111**	.067
Problem Solving (.810)	-.044	.011	.147**	.089*
I_1 (.850)	-.014	.097*	.135**	.456**
I_2 (.803)	.011	.090*	.037	.159*
I_3 (.794)	-.006	.118*	.170**	.290**
Attitude (.730)	-.245**	.104*	.153*	.076
Benefit (.817)	-.191**	.071	.119*	.055

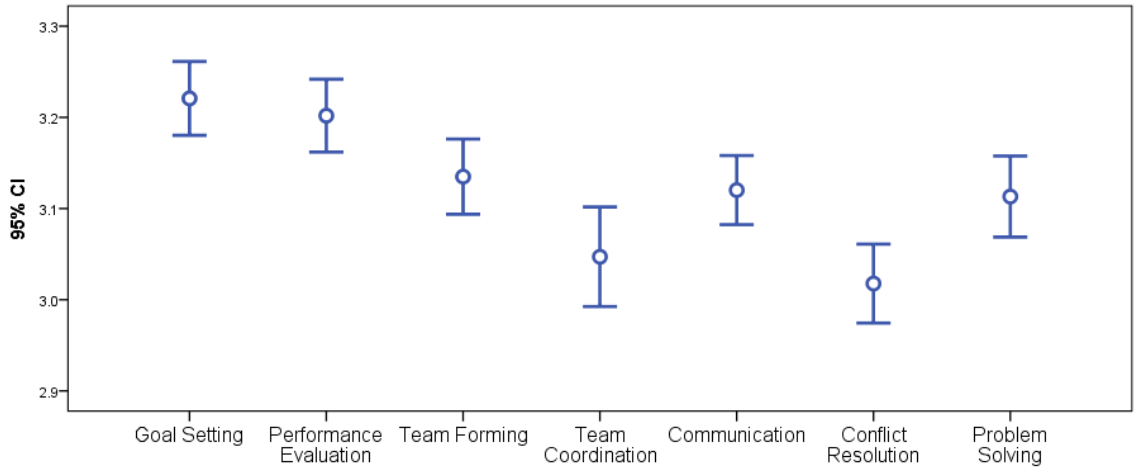


Figure 3. 95% Confidence Intervals for the Mean of the Self-Efficacy Variables (1-Very Unconfident to 4-Very Confident)

Teamwork Attitudes

In this section, we compare the overall attitude toward teamwork and the perceived value of teamwork across the grade standing. The attitude and perceived value questions were operationalized with a four-point Likert scale, ranging from (1)-"Strongly Disagree" to (4)-"Strongly Agree". To measure the overall attitude toward teamwork, the following four questions were used (Cronbach's α=0.730):

- I usually have a negative experience with teamwork (reverse coded)
- I would rather work on team projects than on my own
- I like to participate in teamwork
- I am usually motivated to participate in teamwork

To measure the perceived benefits of teamwork, the following five questions were used (Cronbach's α=0.817):

- Teamwork improves the quality of final project outcomes
- Teamwork keeps me more engaged and interested in project tasks
- Teamwork helps me learn new concepts from others
- Teamwork makes it possible to complete class projects on a timely manner
- Teamwork helps me to improve my communication skills

As shown in Figure 4, a strong relationship was observed between the class standing and the teamwork attitude and benefits. The third and fourth year students had a slightly more positive attitude toward teamwork and marginally higher perceived benefits from teamwork than the first and second year students. A one-way ANOVA was used to compare the means over the grade standing. The ANOVA showed that the class standing was a statistically significant factor for teamwork attitudes with *p*-value=0.002 and for perceived benefits with *p*-value=0.006 in Figure 4. The increase in teamwork attitudes and perceived benefits is a promising indicator for engineering students. A main cause of this increase may be explained by the rigor and scope of the team projects that students are involved within the last two years of engineering programs. At this particular university setting, the first year engineering curriculum features engineering design learning facilitated through a series of team-based projects supplemented by brief guidance on teamwork. During their second year, students focus on engineering science courses, where projects requiring teamwork are limited. Upon declaring the major at the end of the second year, as part of their studies in the third and fourth year of their curricula, students are frequently put in teamwork situations in an effort to prepare them for the actual work settings. Specifically, capstone design experience in their last year is meant to simulate the complexity of the work setting in the rigor level of the project as well as the timeline and professionalism expected in terms of results and conduct. Frequently, students work towards a working prototype or research result sponsored by an industrial company and in doing so they hold regular meetings with company liaisons.

As seen in Figure 4 and Table 4, work experience has higher positive correlations with the attitudes and benefits than the teamwork training has. In other words, this observation implies when students are engaged in a project with a large scope, that draws skills and knowledge from multiple disciplines, they start appreciating the value of teamwork. The first and second year students rated their self-efficacy as high as the third and fourth year students, but they had relatively low teamwork attitude and perceived benefits. This contradiction also casts a doubt on the validity of using self-reported efficacy as a construct to measure teamwork KSA.

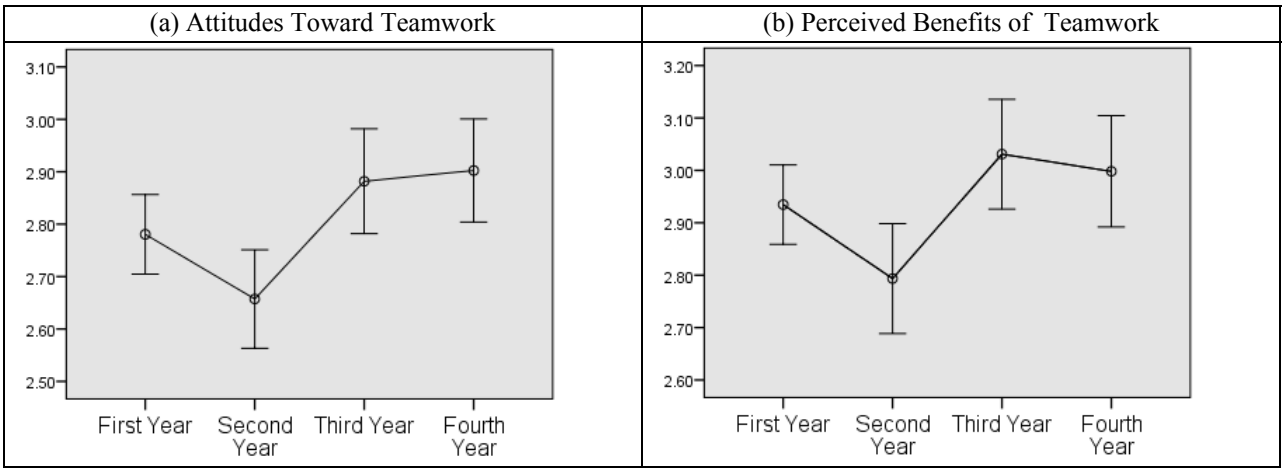


Figure 4. 95% Confidence Intervals for the Mean of the Averaged Attitude and Benefit Questions over Class Standing. *y*-axis scale: (1)-"Strongly Disagree" to (4)-"Strongly Agree"

IV. Conclusions

Throughout students' educational and professional development, there should be an importance placed on gauging and assessing engineering students' teamwork skills and abilities. To further our understanding of students' teamwork skills and abilities, this paper discusses teamwork self-efficacy, individual interest, and attitudes. A survey was developed to measure these three factors. The collected data was compared with respect to class standing, previous teamwork experience and GPA. Most engineering students had high teamwork self-efficacies due to their teamwork learning experiences; this observation is also common among student-reported surveys in the literature. Teamwork self-efficacy did not correlate with any of the demographics and background variables considered in this research. In terms of interest, the MDL was supported as we observed a growth from situational to individual interest throughout the engineering students' educational journey. In this research, interest was shown to have stronger correlations with previous teamwork experience, teamwork training, and class standing than self-efficacy had with those variables. Therefore, we recommend interest as an additional construct to assess students' teamwork KSA. Upperclassmen reported more positive teamwork attitudes than the underclassmen did due to the increased amount of teamwork in engineering programs. In future work, we will survey the literature further about student reported self-efficacies and gauge other fields in the STEM disciplines, according to teamwork self-efficacy, interest, and attitudes. To apply our findings from our team survey in engineering courses, professors could institute more relatable, intriguing group assignments and emphasize the importance of teamwork in the engineering discipline, so students will make an effort to be more interested and have a positive attitude toward teamwork.

V. Acknowledgment

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VI. References

1. Driskell, J. E. & Salas, E. (1992) Collective behavior and team performance. Human Factors: The Journal of the Human Factors and Ergonomics Society, 34(3), 277-288.
2. Alexander, P. A., Murphy, K. P., Woods, B. S., et al. (1997) College instruction and concomitant change in students' knowledge, interest, and strategy use: A study of domain learning. *Contemporary Educational Psychology* 22, 125-146.
3. Kulturel-Konak, S., Konak, A., Okudan Kremer, G., & Esparragoza, I. (2014) Professional skills assessment: Is a model of domain learning framework appropriate? *International Journal of Quality Assurance in Engineering and Technology Education*, 4(4), forthcoming.
4. Baker, D. P. & Salas, E. (1992) Principles for measuring teamwork skills. *Human Factors: The Journal of the Human Factors and Ergonomics Society* 34(4), 469-475.
5. Ellis, A., Bell, B., Ployhart, R., et al. (2005) An evaluation of generic teamwork skills training with action teams: effects on cognitive and skill-based outcomes. *Personnel Psychology* 58(3), 641-672.
6. Koski, E. L. & Tubbs, S. L. (2010) Utilization and implementation of the predictive index ® (PI) for global leadership development. *The Business Review* 15(2), 74-79.
7. Loughry, M. L., Ohland, M. W., & Moore, D. D. (2007) Development of a theory-based assessment of team member effectiveness. Educational and Psychological Measurement, 67(3), 505-524.
8. McClough, A. C. & Rogelberg, S. G. (2003) Selection in teams: An exploration of the teamwork knowledge, skills, and ability test. *International Journal of Selection and Assessment* 11(1), 56-66.
9. Pazos, P., Micari, M., & Light, G. (2010) Developing an instrument to characterize peer-led groups in collaborative learning environments: assessing problem-solving approach and group interaction. *Assessment and Evaluation in Higher Education* 35(2), 191-208.
10. Thomas, S. R., Tucker, R. L., & nKelly, W. R. (1999) Compass: An assessment tool for improving project team communications. *Project Management Journal* 30(4), 15-24.
11. Willey, K. & Gardner, A. (2009) Developing team skills with self- and peer assessment. *Campus-Wide Information Systems* 26(5), 365-378.
12. Bandura, A. (1977) *Social Learning Theory*. Englewood Cliffs, NJ: Prentice Hall.
13. Bandura, A. (1982) Self-efficacy mechanisms in human behavior." *American Psychologist* 37, 122-147.
14. Huh, Y., Reigeluth, C. M., & Lee, D. (2014) Collective efficacy and its relationship with leadership in a computer-mediated project-based group work. *Contemporary Educational Technology,* 5, 1-21.
15. Lent, R. W., Schmidt, J., & Schmidt, L. (2006). Collective efficacy beliefs in student work teams: Relation to self-efficacy, cohesion, and performance. *Journal of Vocational Behavior* 68, 73-84.
16. Staples, S. & Webster, J. (2007, February) Exploring traditional and virtual team members' 'best practices': A social cognitive theory perspective. *Small Group Research*, 38(1), 60-97.
17. Riggs, M. L., Warka, J., Babasa, B., Betancourt, R., & Hooker, S. (1994) Development and validation of self-efficacy and outcome expectancy scales for job-related applications. *Educational and Psychological Measurement,* 54, 793-802.
18. Hardin, M., Fuller, M. A., & Valacich, J. S. (2006) Measuring group efficacy in virtual teams: New questions in an old debate. *Small Group Research,* 37, 65-85.
19. Ulloa, C. R. & Adams, S. G. (2004) Attitude toward teamwork and effective teaming. *Team Performance Management,* 10, 145-151.
20. Pfaff E. & Huddleston, P. (2003) Does it matter if I hate teamwork? What impacts student attitudes toward teamwork. *Journal of Marketing Education,* 25, 37-45.
21. Bacon, D. R., Stewart, K. A., & Silver, W. S. (1999) Lessons from the best and worst student team experiences: How a teacher can make the difference. *Journal of Management Education,* 23, 467-488.
22. Barr, T. F., Dixon, A. L., & Gassenheimer, J. B. (2005) Exploring the "lone wolf" phenomenon in student teams. *Journal of Marketing Education,* 27, 81-90.
23. Pauli, R., Mohiyeddini, C., Bray, D., Michie F., & Street, B. (2008) Individual differences in negative group work experiences in collaborative student learning. *Educational Psychology,* 28, 47-58.
24. Chapman K. J. & Van Auken, S. (2001) Creating positive group experiences: An examination of the role of the instructor on students' perceptions of group projects. *Journal of Marketing Education,* 23, 117-127.
25. Payne, B. K. & Monk-Turner E. (2006) Students' perceptions of group projects: The role of race, age, and slacking. *College Student Journal,* 40, 132-139.

26. Vance, K., Kulturel-Konak, S., & Konak, A. (2015). Teamwork efficacy and attitude differences between online and face-to-face students. Paper presented at *The Integrated STEM Education Conference (ISEC)*.
27. French, K. A. & Kottke, J. L. (2013) Teamwork satisfaction: Exploring the multilevel interaction of teamwork interest and group extraversion. *Active Learning in Higher Education* 14(3), 189-200.
28. McDermott, A. N. & Dell, T. F. (2014) Test review: Vocational preference inventory. *Rehabilitation Counseling Bulletin* 57(3), 182-184.
29. Kline, T. J. B. (2008) The team player inventory: Reliability and validity of a measure of predisposition toward organizational team-working environments. *Journal for Specialists in Group Work* 24(1), 102-112.
30. McIntyre, J. S. (2011) Effectiveness of three case studies and associated teamwork in stimulating freshman interest in an introduction to engineering course. *Journal of STEM Education* 12(7, 8), 36-44.
31. Beard, D., Schwieger, D., & Surendran, K. (2008) Integrating soft skills assessment through university, college, and programmatic efforts at an AACSB accredited institution. *Journal of Information Systems Education* 19(2), 229-240.
32. Vance, K., Kulturel-Konak, S., & Konak, A. (2014, March) Assessing teamwork skills and knowledge. Paper presented at the *Integrated STEM Education Conference (ISEC)*
33. Stevens, M. J., & Campion, M. A. (1999). Staffing work teams: Development and validation of a selection test for teamwork settings. Journal of Management, 25(2), 207-228.
34. Multon, K. D., Brown, S. D., & Lent, R. W. (1991) Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. *Journal of counseling psychology*, *38*(1), 30.
35. Moore, D. A. & Healy, P. J. (2008). The trouble with overconfidence. *Psychological review*, *115*(2), 502.
36. Vancouver, J. B., & Kendall, L. N. (2006) When self-efficacy negatively relates to motivation and performance in a learning context. *Journal of Applied Psychology*, *91*(5), 1146.
37. Vancouver, J. B., Thompson, C. M., Tischner, E. C., & Putka, D. J. (2002) Two studies examining the negative effect of self-efficacy on performance. *Journal of Applied Psychology*, *87*(3), 506.