

# Teamwork Efficacy and Attitude Differences between Online and Face-to-Face Students

Kara Vance, Sadan Kulturel-Konak, and Abdullah Konak  
Penn State Berks, kqv5050, sadan, konak@psu.edu

**Abstract** – Professional skills, such as teamwork, global awareness, creative problem solving, and ethics, are essential for the Science, Technology, Engineering, and Mathematics (STEM) fields. The focus of this paper is teamwork. In particular, this paper discusses how efficacy and attitudes affect teamwork for the students majoring in Information Sciences and Technology programs, either virtual or face-to-face. Although online education has significantly grown, the literature discussing the incorporated online teamwork remains limited. Virtual and face-to-face teams have some similarities, but many key differences as well, such as communication, trust, and geographical boundaries. To gauge team efficacy and attitudes for virtual and face-to-face teams, we developed a survey and collected data. Our findings showed that online students had more negative attitudes toward teamwork than face-to-face students did, while both groups had a similar level of teamwork self-efficacy.

*Index Terms*– attitudes, efficacy, teamwork, virtual teams

## INTRODUCTION

Currently, online education learning is the fastest growing segment of the US education sector. The majority of higher institutions consider online education as a critical component of their long-term strategies [1]. The growth of student enrollment in online courses has steadily increased in the last decade. The Sloan Consortium found that 1.6 students took an online course [2]. Based on the Integrated Postsecondary Education Data System of the U.S. Department of Education, 5.5 million students took an online course, and 2.6 million students enrolled in fully online programs in 2012 [3].

Online distance education promises a great opportunity to broaden the accessibility of STEM programs, but this opportunity also brings out new challenges, such as providing online students with laboratory and experiential learning experiences [4, 5] and creating the opportunities for online students to improve their professional skills. Undergraduate STEM students are increasingly expected to develop their professional skills before graduation. Today, teamwork has become ubiquitous in STEM programs. Teamwork has been a norm in STEM education to not only improve student's professional skills but also implement many pedagogical approaches. Research also reports that students generally respond positively to teamwork and that team assignments and projects can be useful to develop

students' professional skills (see for a review of the relevant literature in [6]).

Motivated by the benefits of teamwork in face-to-face classes, many online courses also include group work components. The research in this paper was motivated by our previous pilot study [7] to evaluate the effectiveness of teamwork activities in online information technology courses. In that pilot study [7], the students exhibited negative attitudes toward teamwork, although they responded positively to the overall online delivery model of the courses. This finding was also contradictory to our earlier findings about the advantages of teamwork in face-to-face hands-on class activities [8, 9]. To investigate whether this observed negative attitude toward teamwork is prevalent in online distance courses, we conducted a study involving a total of 329 students, 218 face-to-face and 111 online. One of the objectives of the study was to compare the teamwork efficacy and attitudes of online and face-to-face students. In this paper, we report our findings, regarding the following research questions:

- *How confident are students with applying their teamwork skills and abilities?*
- *Is there any difference between the teamwork self-efficacy of online and face-to-face students?*
- *Is there any difference between the attitudes of online and face-to-face students toward teamwork?*

## BACKGROUND

### *I. Self-efficacy, Collective Efficacy, and Measuring Efficacy*

The social learning theory, i.e., the self-efficacy theory, developed by Bandura [10, 11] proposes that success is dependent on self-confidence. Teamwork self-efficacy is defined as how confident a team member executes the task at hand [12]. Students' teamwork self-efficacy is important to measure because one's confidence in his/her teamwork skills and abilities may determine how well he/she performs as part of a team.

Team efficacy, also known as collective efficacy, is how confident a group is in their capabilities as a whole to accomplish the task at hand effectively [13]. Collective efficacy is modeled by four sources: mastery experience, affective state, verbal persuasion, and vicarious experience. Mastery experience is the past successful experiences in a group setting, which can attribute to developing efficacy in future group work. Affective state is how anxiety and excitement affect the group's understanding of efficacy.

Verbal persuasion means an instructor or supervisor evokes confidence in the group by giving performance feedback and reassurance. Vicarious experience is the observations of higher level people performing the task [13, 14].

Huh et al. [13] report three approaches to measuring collective efficacy. One approach is to collect self-evaluations, regarding a particular set of group tasks, which enables an effective method for both individual and teamwork self-efficacy. Another approach is to evaluate the individual perceptions of the whole group's capabilities. The third approach involves reaching a consensus through a complete discussion among group members communicating about the overall team efficacy.

One can measure team efficacy through beliefs scales. The Personal Efficacy Beliefs Scale assesses each team member's comfort and motivation to achieve the team's tasks [12, 15]. The Collective Efficacy Beliefs Scale [13] uses a seven-point Likert scale through various questions and statements, regarding the group's ability to work together [15]. Riggs et al. [15] suggest expectancy scales to measure efficacy. The Personal Outcome Expectancy Scale considers how results affect a team member's confidence in their performance. The Collective Outcome Expectancy Scale measures how confident the team is in their abilities.

Hardin et al. [16] report four techniques to measure group efficacy. The first approach is to measure one's attitude toward his/her group's efficacy, which does not include comparing the individual to group scores. The second method is to assess each team participant's self-efficacy fundamentals and compare these beliefs to the overall group's principles. The third approach is to measure the group's self-efficacy fundamentals toward an individual within the team and further compare those scores to the individual's beliefs. The last technique is to discuss self-efficacy beliefs among the group, until the team reaches a mutual understanding.

Purzer [17] develops a survey to assess student's team efficacy before and after a long-term team project. The survey reveals how most of the students' team efficacy increased as the semester progressed, since their knowledge and skills improved. As other team members report positive feedback, the students' post efficacies correlate with the comments. The survey concludes that efficacy can indicate possible team behaviors.

## *II. Virtual Teams and Virtual Team Efficacy*

A virtual team is defined as a group of individuals coming together through online technology with a common purpose [18, 19]. London [20] reports communication technologies could include email, online forums, video conferencing, and discussion boards. Bradner et al. [21] suggest a smaller size for virtual teams, if the focus is collaboration. A larger sized virtual team should be used for emphasizing asynchronous communication. Virtual teams are important to consider in research about teamwork because as technology has become more essential in today's world, online education's growth has significantly increased.

Therefore, virtual teams assist in allowing education to take a step further toward change and innovation.

London [20] suggests that the key difference between face-to-face and virtual teams is communication. Often times, virtual teams lack geographical convenience. In contrast to face-to-face teams, virtual teams achieve tasks and face conflict in a different manner due to the more flexible timing and the lack of social cues. A similarity between these types of teams is having common purposes and tasks. Bradley et al. [22] support that face-to-face teams have a richer communication flow of information and a better organization of presentation and delivery. The research focuses on how agreeableness affects the team's performances and outcomes. Virtual teams' agreeableness tends to have less positive effects than face-to-face teams.

Keyzerman [23] emphasizes how trust and adaptability are important to a team's success. Virtual teams tend to adapt better to change than face-to-face teams. However, establishing trust seems to be a struggle in a virtual environment. Tseng and Yeh [27] report that team coherence and closeness of group members are key indicators of trust for virtual teams. Wilson, et al. [24] claim trust involves a longer timing to develop in virtual teams. Kulturel-Konak et al. [25] suggest that since the majority of the trust is built in the earlier stages of the project, it will be beneficial to try having a team meet at least once face to face. Martins et al. [26] inform that while trust among group members increases, technical ambiguity decreases significantly more so for virtual teams than face-to-face teams.

Martins et al. [26] and Roebuck [28] report the quality and content of virtual team's decisions improve, since location has no consideration. Unlike face-to-face teams, virtual team members can monitor and maintain archives for various tasks, conversations, and priorities. In virtual teams, in terms of communication, conflict resolution is focused upon more so due to the increased conflict compared to face-to-face teams.

Ocker [29] and Martins et al. [26] mention how students prefer virtual teams for the openness to express ideas, comments, and concerns more freely. Fuller et al. [30] define virtual team efficacy as how confident the group is in accomplishing the task virtually. To assess efficacy, conflict resolution is used due to its effect on the overall group performance. Another important factor is whether the mediation is objective or perceptual. If the mediation is objective, then communication and the team's actual performance are considered. Perceptual mediation incorporates collective efficacy and group results.

Hardin et al. [16] recommend the third and fourth methods for virtual teams mentioned above in Measuring Efficacy section. The third method, which aggregates the group scores for each group member's self-efficacy beliefs and the fourth method, consensus, are both popular among virtual teams for measuring efficacy. The authors recommend the third approach in that the data collected from each individual on the team is more reliable.

### *III. Teamwork Attitudes*

Reviewing literature about students' attitudes toward teamwork allows us to better hypothesize about how students may perceive teamwork. Ulloa and Adams [31] define attitudes toward teamwork as how agreeable a person is to work in any team.

Bacon et al. [32] as well as Pfaff and Huddleston [33] emphasize students' attitudes toward teamwork. Students tend to associate rewards, such as grades and extra credit, with teamwork attitudes. When a team receives a poor grade, the tendency is that the team members' attitudes toward teamwork are significantly reduced. Pfaff and Huddleston [33] mention as team size increases; there is a tendency for a negative attitude. The boosted team's workload for the course affects the teamwork attitude in a poor manner. Cooperation enhances the students' attitudes toward teamwork, as opposed to competitiveness, which diminishes the attitude. In these authors' experiences, peer evaluations encourage teamwork. When team members feel alone due to free riding or social loafing, students tend to dislike teamwork more so.

Barret et al. [34] consider how lone wolves in teams affect the attitudes toward teamwork. A lone wolf is a team member, who has trust issues and would rather do the tasks at hand alone, but will actively participate in the group assignment. The lone wolf in a group is most likely to cause a negative attitude toward teamwork. Pauli et al. [35] also focus on negative teamwork attitudes. Some students consider fictitious stories about the problems with teamwork, which furthers a negative attitude toward teamwork, such as a fear of group conflict or the lack of participation in the team's workload from other team members.

Chapman and Van Auken [36] emphasize both negative and positive attitudes toward teamwork. Attitudes toward teamwork depend on the role of the student. When teams are without instruction from a professor, group members are more likely to have a negative attitude toward teamwork. Students would have a more positive attitude toward teamwork, if they had the opportunity to converse with the professor, regarding the team's methods and conflicts. Gottschall and García-Bayonas [37] report that many students feel positively toward teamwork, but they do not gain any learning or motivation from teamwork.

## **RESEARCH METHODOLOGY**

### *I. Survey Instrument and Participants*

We developed a survey to measure students' overall teamwork self-efficacy and attitudes toward teamwork. Student responses represent their overall experiences and perceptions about teamwork, without being specific to a course or a single project. We adapted teamwork attitude questions from [33, 35, 38, 39], and developed teamwork self-efficacy questions based on the teamwork learning outcomes areas summarized in [40] and virtual teamwork efficacy questions based on [18, 20, 41]. The survey was

administrated in the online format, and the participants were students from the Information Sciences and Technology programs at several campuses of a public university in the northeast US. Although the participants were geographically distributed, they were all enrolled in the programs that follow the same curriculum. In addition, the program courses require a significant amount of teamwork at all academic levels.

The participation to the survey was voluntary, and after data cleaning 329 student responses, 218 (66.3%) face-to-face and 111 (33.7%) online, were utilized. The online students enrolled in the online versions of the face-to-face programs, which enabled controlling the variability due to the program. The gender ratio was almost identical for both face-to-face and online participants (78% male and 22% female). A higher percent of the face-to-face students (48.2%) indicated that they engage frequently (four or more times) in team projects during a semester than the percent of online students (26.4%) indicating so.

Table I summarizes the survey questions used to measure the overall attitude toward teamwork, the perceived benefits of teamwork, and the common student concerns about teamwork. These questions were operationalized with a four-point Likert scale, ranging from (1)-"Strongly Disagree" to (4)-"Strongly Agree". To measure the teamwork self-efficacy, we used 25 questions which were grouped based upon the Teamwork Knowledge, Skills, and Abilities (KSA) areas as follows (the number of questions in each KSA area): Goal Setting (2), Performance Evaluation (3), Team Forming (5), Team Coordination (1), Communications (7), Conflict Resolution (4), and Problem Solving (3). For the brevity of the presentation, only the average ratings of teamwork self-efficacy questions are given for each category in Table II (individual survey questions can be obtained from the authors). Finally, we used eight questions to measure virtual team efficacy. The questions in Table II were also operationalized with a four-point Likert scale, ranging from (1)-"Very Unconfident" to (4)-"Very Confident". In the tables, the reliability (Cronbach's  $\alpha$ ) of the questions in each group is also provided. Cronbach's  $\alpha$  values indicated an acceptable level of internal consistency for the survey questions in each group.

In the survey, the four-point Likert scale without a mid-point was used to force students to make a selection between negative and positive scales. The responses of the two groups were compared using the *t*-test to ascertain, whether the mean responses were statistically different between the groups or not. In the tables, the *p*-values of the *t*-tests are also provided.

### *II. Analysis of Results and Discussions*

In Table I, the averages and standard deviations of the responses to each attitude question are shown by the two groups. As seen in Table I, the online students responded to the attitude questions more negatively than the face-to-face students. In Question 2 particularly, the face-to-face

students were indiscriminate between teamwork and individual work, while the online students preferred working individually. Based on the responses to Questions 1 through 4, it can be concluded that the online students had a more negative attitude toward teamwork than the face-to-face students did in this study. Surprisingly, the two groups' responses to the concern questions were quite similar, excluding Question 10, where the online students were more likely to state that teamwork complicates class projects. This raises the question of why the two groups had significantly different attitudes toward teamwork, although they had some level of challenges and concerns. In this paper, we posit that this question could be answered by the responses to the questions about the perceived benefits of teamwork. As seen in Table I, the online students were less

appreciative of the benefits of teamwork than the face-to-face students were. Note that the face-to-face students' mean ratings for this set of questions were close to 3.0, which indicated that this group of students observed the contribution of teamwork to their education and professional development. Particularly, the online students rated Questions 2, 8, and 10 negatively with respect to the face-to-face students. These negative ratings confirmed that conducting projects virtually is more challenging as indicated in the literature. However, we argue that the observed negative attitude toward teamwork was not a sole result of virtual team challenges but also a result of not observing the pedagogical benefits of teamwork in online settings.

TABLE I  
OVERALL STUDENT ATTITUDES TOWARD TEAMWORK

Questions	Face-to-face		Online		p-value
	Mean	Std. Deviation	Mean	Std. Deviation	
<b>Overall Attitude (Cronbach's <math>\alpha=0.686</math>)</b>					
1. I usually have a negative experience with teamwork	2.27	0.888	2.47	0.877	0.052
2. I would rather work on team projects than on my own	2.48	0.890	1.94	0.890	0.000
3. I like to participate in teamwork	2.95	0.697	2.50	0.777	0.000
4. I am usually motivated to participate in teamwork	2.97	0.774	2.66	0.852	0.001
<b>Perceived Benefits (Cronbach's <math>\alpha=0.872</math>)</b>					
5. Teamwork improves the quality of final project outcomes	2.89	0.885	2.47	0.867	0.000
6. Teamwork keeps me more engaged and interested in project tasks	2.76	0.880	2.25	0.824	0.000
7. Teamwork helps me learn new concepts from others	3.03	0.781	2.72	0.869	0.001
8. Teamwork makes it possible to complete class projects on a timely manner	2.67	0.955	2.09	0.855	0.000
9. Teamwork helps me to improve my communication skills	3.10	0.786	2.80	0.858	0.002
<b>Concerns (Cronbach's <math>\alpha=0.694</math>)</b>					
10. Teamwork unnecessarily complicates class projects most of the time	2.69	0.894	2.91	0.883	0.037
11. My grade is affected by other's poor performance	3.02	0.864	3.11	0.835	0.364
12. Individual effort of each team member is not evaluated properly in teamwork	2.96	0.785	3.09	0.908	0.186
13. Scheduling team meetings is difficult	2.99	0.834	2.97	0.832	0.816
14. Dealing with personality differences makes teamwork challenging	2.76	0.805	2.86	0.763	0.285

As seen in Table II, no significant difference was observed in the teamwork self-efficacy of the face-to-face and online students. The average ratings of both groups were very high and almost identical in each teamwork KSA area. In summary, the students in both groups felt very confident about their teamwork KSA. Therefore, the difference in attitudes toward teamwork cannot be explained by the low self-efficacy of any group. In terms of virtual teamwork self-efficacy questions, the ratings of the online students were slightly higher than those of the face-to-face students, but with a statistically significant difference only for Questions 17 and 22.

The research presented in this paper has some limitations as well. The collected data represents only the perception of information technology students, although it was collected across multiple campuses. To generalize the results, further data collection is required to involve other STEM areas. In addition, we observed a very high level of teamwork self-efficacy in this study. It should be noted that this result is common in many student reported self-efficacy research.

## CONCLUSIONS

Knowing that students' teamwork knowledge, skills and attitudes are important factors for future career success, this research focused on investigating the differences in attitudes of online and face-to-face students toward teamwork. Despite its prevalence in the online distance education, online students' attitudes toward teamwork have not been frequently reported in the literature. Therefore, this paper addresses an important gap in the literature. In this study, online students exhibited more negative attitudes toward teamwork than face-to-face students did, verifying our previous observation in an online course. We hypothesize that online students perceived that teamwork does not always contribute to their educational and professional development; therefore, they do not justify the additional effort for teamwork. It is a subject of further research to investigate whether this observation is a result of perception or an objective fact.

TABLE II  
STUDENTS' PERCEPTION OF TEAMWORK EFFICACY

Teamwork Self-Efficacy (Cronbach's $\alpha$ )	Face-to-Face		Online		p-value
	Mean	Standard Deviation	Mean	Standard Deviation	
Goal Setting (0.786)	3.27	0.557	3.35	0.575	0.206
Performance Evaluation (0.748)	3.29	0.522	3.32	0.581	0.732
Team Forming (0.875)	3.17	0.537	3.17	0.625	0.920
Team Coordination (N/A)	3.11	0.706	3.12	0.785	0.854
Communications (0.869)	3.25	0.499	3.27	0.565	0.728
Conflict Resolution (0.856)	3.15	0.550	3.15	0.649	0.981
Problem Solving (0.856)	3.21	0.584	3.21	0.667	0.995
<b>Virtual Teamwork Self-Efficacy</b>					
15. Communicating effectively with other team members using the available online technologies	3.27	0.727	3.42	0.656	0.074
16. Communicating effectively online with your team members without observing their social cues and body language	3.14	0.750	3.20	0.705	0.452
17. Resolving conflict through online communication	3.03	0.778	3.21	0.708	0.042
18. Developing team goals using the online technologies	3.23	0.706	3.31	0.702	0.328
19. Devising a team time plan that considers geographical time differences	3.14	0.734	3.20	0.730	0.461
20. Encouraging team participation using the offered online communication technologies	3.19	0.709	3.30	0.660	0.163
21. Providing, seeking, and accepting feedback well through communicating with the online technologies	3.18	0.718	3.31	0.634	0.104
22. Participating in an online team discussion, such as discussion boards and online forums	3.16	0.698	3.35	0.643	0.020

## ACKNOWLEDGMENT

This work is partially supported by the National Science Foundation (NSF) under Award Numbers DUE-1141001 and DUE-1044800. Any opinions, findings, conclusions, and/or recommendations expressed in this paper are those of the authors and do not necessarily reflect the views of the NSF.

## REFERENCES

- [1] I. E. Allen and J. Seaman, "Going the Distance: Online Education in the United States, 2011," Bobson Survey Research Group 0984028811, 2011.
- [2] I. E. Allen and J. Seaman, "Grade Change: Tracking Online Education in the United States," Babson Survey Research Group and Ouahog Research Group 2014.
- [3] C. Straumsheim. (2014) Identifying the Online Student. *Inside Higher ED*.
- [4] D. Lowe, S. Murray, E. Lindsay, and L. Dikai, "Evolving Remote Laboratory Architectures to Leverage Emerging Internet Technologies," *IEEE Transactions on Learning Technologies*, vol. 2, pp. 289-294, 2009.
- [5] A. Konak, T. Clark, and M. Nasereddin, "Using Kolb's Experiential Learning Cycle to Improve Student Learning in Virtual Computer Laboratories," *Computers & Education*, vol. 27, pp. 11-22, 2014.
- [6] R. S. Hansen, "Benefits and Problems with Student Teams: Suggestions for Improving Team Projects," *Journal of Education for Business*, vol. 82, pp. 11-19, 2006.
- [7] A. Konak, R. Jungwoo, and S. Kulturel-Konak, "Student Perceptions of a Hands-on Delivery Model for Asynchronous Online Courses in Information Security," in *ASEE Mid-Atlantic Section Fall 2014 Conference*, Swarthmore, PA, 2014, pp. 1-8.
- [8] A. Konak, M. Bartolacci, and H. Huff, "An Exploratory Factor Analysis of Student Learning in a Collaborative Virtual Computer Laboratory," in *The 18th Americas Conference on Information Systems (AMCIS 2012)*, Seattle, Washington 2012, pp. 1-8.
- [9] K. G. Wagner, M. C. Myers, and A. Konak, "Fostering Student Learning in Information Security Fields through Collaborative Learning in Virtual Computer Laboratories," in *2013 IEEE Integrated STEM Education Conference (ISEC)*, Princeton, NJ, 2013, pp. 1-4.
- [10] A. Bandura, "Self-Efficacy Mechanism in Human Agency," *American psychologist*, vol. 37, pp. 122-147, 1982.
- [11] A. Bandura, "Social Cognitive Theory of Self-Regulation," *Organizational behavior and human decision processes*, vol. 50, pp. 248-287, 1991.
- [12] A. C. McClough and S. G. Rogelberg, "Selection in Teams: An Exploration of the Teamwork Knowledge, Skills, and Ability Test," *International Journal of Selection and Assessment*, vol. 11, pp. 56-66, 2003.
- [13] Y. Huh, C. M. Reigeluth, and D. Lee, "Collective Efficacy and Its Relationship with Leadership in a Computer-Mediated Project-Based Group Work," *Contemporary Educational Technology*, vol. 5, pp. 1-21, 2014.
- [14] S. Staples and J. Webster, "Exploring Traditional and Virtual Team Members 'Best Practices': A Social Cognitive Theory Perspective," *Small group research*, vol. 38, pp. 60-97, 2007.
- [15] M. L. Riggs, J. Warka, B. Babasa, R. Betancourt, and S. Hooker, "Development and Validation of Self-Efficacy and Outcome Expectancy Scales for Job-Related Applications," *Educational and psychological measurement*, vol. 54, pp. 793-802, 1994.
- [16] A. M. Hardin, M. A. Fuller, and J. S. Valacich, "Measuring Group Efficacy in Virtual Teams: New Questions in an Old Debate," *Small Group Research*, vol. 37, pp. 65-85, 2006.
- [17] S. Purzer, "The Relationship between Team Discourse, Self-Efficacy, and Individual Achievement: A Sequential Mixed-Methods Study," *Journal of Engineering Education*, vol. 100, pp. 655-679, 2011.
- [18] P. M. Alexander, "Virtual Teamwork in Very Large Undergraduate Classes," *Computers & Education*, vol. 47, pp. 127-147, 2006.
- [19] J. Lipnack and J. Stamps, *Virtual Teams: People Working across Boundaries with Technology*. New York: John Wiley & Sons, 2000.
- [20] M. London, "Generative Team Learning in Web 2.0 Environments," *Journal of Management Development*, vol. 32, pp. 73-95, 2013.
- [21] E. Bradner, G. Mark, and T. Hertel, "Team Size and Technology Fit: Participation, Awareness, and Rapport in Distributed Teams," *IEEE Transactions on Professional Communication*, vol. 48, pp. 68-77, 2005.
- [22] B. H. Bradley, J. E. Baur, C. G. Banford, and B. E. Postlethwaite, "Team Players and Collective Performance: How Agreeableness Affects Team Performance over Time," *Small Group Research*, vol. 44, pp. 680-711, 2013.

- [23] Y. Keyzerman, "Trust in Virtual Teams," in *IEEE International Professional Communication Conference* Orlando, FL 2003, pp. 391-399.
- [24] J. M. Wilson, S. G. Straus, and B. McEvily, "All in Due Time: The Development of Trust in Computer-Mediated and Face-to-Face Teams," *Organizational behavior and human decision processes*, vol. 99, pp. 16-33, 2006.
- [25] S. Kulturel-Konak, C. R. Maurer, and D. L. Lohin, "Teaching Students How to Effectively Work in Virtual Teams," *International Journal of Information Technology Project Management (IJITPM)*, vol. 1, pp. 61-78, 2010.
- [26] L. L. Martins, L. L. Gilson, and M. T. Maynard, "Virtual Teams: What Do We Know and Where Do We Go from Here?," *Journal of management*, vol. 30, pp. 805-835, 2004.
- [27] H. W. Tseng and H.-T. Yeh, "Team Members' Perceptions of Online Teamwork Learning Experiences and Building Teamwork Trust: A Qualitative Study," *Computers & Education*, vol. 63, pp. 1-9, 2013.
- [28] D. B. Roebuck, "Colonel Mustard in the Library with the Knife... Experiencing Virtual Teaming," Cincinnati, OH, 2002.
- [29] R. J. Ocker, "Influences on Creativity in Asynchronous Virtual Teams: A Qualitative Analysis of Experimental Teams," *IEEE Transactions on Professional Communication*, vol. 48, pp. 22-39, 2005.
- [30] M. A. Fuller, A. M. Hardin, and R. M. Davison, "Efficacy in Technology-Mediated Distributed Teams," *Journal of Management Information Systems*, vol. 23, pp. 209-235, 2006.
- [31] B. C. R. Ulloa and S. G. Adams, "Attitude toward Teamwork and Effective Teaming," *Team Performance Management*, vol. 10, pp. 145-151, 2004.
- [32] D. R. Bacon, K. A. Stewart, and W. S. Silver, "Lessons from the Best and Worst Student Team Experiences: How a Teacher Can Make the Difference," *Journal of Management Education*, vol. 23, pp. 467-488, 1999.
- [33] E. Pfaff and P. Huddleston, "Does It Matter If I Hate Teamwork? What Impacts Student Attitudes toward Teamwork," *Journal of Marketing Education*, vol. 25, pp. 37-45, 2003.
- [34] T. F. Barr, A. L. Dixon, and J. B. Gassenheimer, "Exploring the "Lone Wolf" Phenomenon in Student Teams," *Journal of Marketing Education*, vol. 27, pp. 81-90, 2005.
- [35] R. Pauli, C. Mohiyeddini, D. Bray, F. Michie, and B. Street, "Individual Differences in Negative Group Work Experiences in Collaborative Student Learning," *Educational Psychology*, vol. 28, pp. 47-58, 2008.
- [36] K. J. Chapman and S. Van Auken, "Creating Positive Group Project Experiences: An Examination of the Role of the Instructor on Students' Perceptions of Group Projects," *Journal of Marketing Education*, vol. 23, pp. 117-127, 2001.
- [37] H. Gottschall and M. Garcia-Bayonas, "Student Attitudes Towards Group Work among Undergraduates in Business Administration, Education and Mathematics," *Educational Research Quarterly*, vol. 32, pp. 3-29, 2008.
- [38] M. Beigi and M. Shirmohammadi, "Attitudes toward Teamwork: Are Iranian University Students Ready for the Workplace?," *Team Performance Management*, vol. 18, pp. 295-311, 2012.
- [39] B. K. Payne and E. Monk-Turner, "Students' Perceptions of Group Projects: The Role of Race, Age, and Slacking," *College Student Journal*, vol. 40, pp. 132-139, 2006.
- [40] K. Vance, S. Kulturel-Konak, and A. Konak, "Assessing Teamwork Skills and Knowledge," in *Integrated STEM Education Conference (ISEC)*, Princeton, NJ, 2014, pp. 1-6.
- [41] J. S. Lurey and M. S. Raisinghani, "An Empirical Study of Best Practices in Virtual Teams," *Information & Management*, vol. 38, pp. 523-544, 2001.

#### AUTHOR INFORMATION

**Kara Vance**, Business Student, Penn State Berks.

**Sadan Kulturel-Konak**, Professor, Management Information Systems, Penn State Berks.

**Abdullah Konak**, Professor, Information Sciences and Technology, Penn State Berks.