


# Factors Influencing Students' Perceptions of Online Teamwork

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## Abstract

The evolution of online teaching in higher education demands a change in the types of pedagogies used in those courses. An example of one of these important pedagogies includes online teamwork. Teamwork in this context is one in which the majority of the individual's grade is dependent on the positive or negative group experiences. This study utilized the theoretical framework of social motivation and cohesion to identify the factors shaping students' perceptions of teamwork in online college courses. In these courses, the pedagogical approach known as the Five Pillars of effective collaborative work was applied. An Online Teamwork Learning Survey was developed based on these principles and completed by 62 undergraduate students enrolled in semester-long online courses required in their early childhood education program of study. Using a comparison between pre–postsurveys and regression analysis, the results showed that although the students' perceptions of teamwork did not significantly change, the factors influencing their responses during the posttest doubled in number. The results showed that through carefully designed virtual teamwork activities, students learned that essential team characteristics such as promotive interaction, individual accountability, and positive interdependence are an integral part of effective collaboration and strong predictors of teamwork perception.

## Keywords

teamwork, online teaching, student perception, attitude toward teams, higher education

## Introduction

Developing online courses has recently become a priority for most higher education institutions, especially in the context of shrinking funds and greater competition among colleges to attract students from a wider geographical region. Quality online environments need to include various forms of interaction to promote active exchanges through which students experience increased satisfaction and performance while submitting quality projects (Armstrong, 2011; Driver, 2002; Koh & Hill, 2009).

Online group work is an instructional strategy widely used in higher education courses to ensure active knowledge construction and deeper learning. Virtual groups have been defined as students working together as a small group, “executing simultaneous, collaborative work processes through electronic media without regard to geographic location” (Chinowsky & Rojas, 2003, p. 98). Online group members interact through various methods such as forums on the discussion board or peer review of each other's work before being graded by the instructor. However, the most collaborative and directed interaction among students is when the group has to work as a team to develop a common project (DeRosa & Lepsinger, 2010). While some studies emphasized the need to explore the interaction of groups in online environments to make them more effective and rewarding, others examined the components of teamwork influencing students' perceptions

in online college courses and the effect of instructor design of group interactions (DeRosa & Lepsinger, 2010; Driver, 2002).

## Challenges of Online Teamwork

Chiu and Hsiao (2010), Ostlund (2008), and Stein, Wanstreet, Calvin, Overtoom, and Wheaton (2005) emphasized the advantages of verbal and nonverbal cues in teamwork in a seated class environment. Similarly, DeRosa and Lepsinger (2010) as well as Lebie, Rhoades, and McGrath (1995) showed more frequent and meaningful communication taking place among team members in face-to-face compared with online classes. G. Smith et al. (2011) discussed logistical difficulties as harder to resolve in online classes than in seated ones, thus creating a more negative perception of teamwork in the online setup. Moreover, online students complained about their inability to find the time to work effectively with others and their

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**Figure 1.** Cooperative learning.

Source. Foundation Coalition (n.d.).

teammates' failure to do their share (Brindley & Walti, 2009; Piezon & Ferree, 2008; G. Smith et al., 2011; Wright & Lawson, 2005). Furthermore, to have effective online communication, students needed skills necessary for negotiation, conflict resolution, problem solving as a team, and collaboration with culturally diverse members (Brandon & Hollingshead, 1999). Other studies highlighted differences in learning outcomes between online and face-to-face classes depending on the nature of the task and the method of assessment. Tutty and Klein (2008) found that participants in a face-to-face collaborative project performed significantly better on an individual posttest measuring content learning as compared with the online students. However, the online students performed considerably better on the group project than those who collaborated face-to-face. This was because the online students had more frequent and meaningful interactions with their partners about the group project than the face-to-face students.

### Students' Perceptions of Teamwork

While students' perception of teamwork is influenced by personal factors, this perception affects their performance as group members. Myers et al. (2009) showed the effect of personality and communicative traits on students' perceptions of group work. DeRosa and Lepsinger (2010); M. K. Smith (2003, 2009), and Rovai (2002) emphasized the importance of communication skills in achieving positive outcomes in team learning and pointed out the importance of building trust among team members and connecting with each other by reducing social distance to enhance communication. However, adopting an authoritative tone by one or more members, failing to communicate, excluding one or more team members, and exhibiting mistrust weakened communication. Other studies have illustrated that students' perception of online teamwork could change depending on the students' experience within the group. Goold, Augar, and Farmer (2006) demonstrated how students' perceptions toward teamwork fluctuated during the learning period. In fact, 71% of the sampled students started an online course (i.e., the first 4 weeks) with a positive opinion about online

teamwork versus 29% who had a negative one. Eight weeks into a 13-week course, 45% of the students had a negative perception of online teamwork versus 55% who maintained a positive attitude. At the end of the 13 weeks, 34% had a negative perception of online group work, while 66% had a positive perception. Although students appreciated the flexibility of online classes, they did not like others submitting at the last minute. Fifteen percent of the students simply did not like online group work. However, they admitted having learned more through discussion with their peers and faculty than they did by reading through their assigned readings. Powell, Piccoli, and Ives (2004) also suggested an increase in the students' positive perception of virtual online teamwork as they took more online courses and their experience in working with other students grew.

### Johnson, Johnson, and Smith's (1991) Five Pillars of Effective Collaborative Work

Many educators have emphasized that effective teachers establish clear strategies and encourage students to interact with their classmates during the group process by providing them with team-building exercises, the establishment of shared norms, and the specification of a clear team structure (Hewson & Hughes, 2005; Last, 2003; Powell et al., 2004). They stressed the importance of team-building exercises, establishing shared norms, and specifying a clear team structure. Johnson et al. (1991) were among the first to clearly define cooperative college learning and, based on their research, propose five essential pillars necessary to build the foundation of an effective collaborative experience: positive interdependence, promotive interaction, individual accountability, social skills, and group processing. A visual representation of their framework is presented in Figure 1.

According to Johnson et al. (1991) and Johnson, Johnson, and Holubec (1998), the five essential pillars for building an effective collaborative experience are described as follows:

1. *Positive interdependence* refers to the belief that each group member is dependent on the contribution of everybody else and that all members have a common

goal attainable only by working together. When students clearly understand positive interdependence, they understand that each group member's efforts are required and indispensable for group success and each group member has a unique contribution to make to the joint effort (Johnson et al., 1998). According to Johnson et al. (1991), this is the most important and yet the most challenging to implement in teamwork learning.

2. *Promotive interaction* includes the exchanges among group members to help one another by sharing information, providing appropriate feedback on performance, showing trustworthiness, and facilitating members' efforts toward the accomplishment of goals. Johnson et al. (1991) named this component "Promotive Face to Face Interaction" indicating that it is crucial to meet in person as a team for it to be effective, which makes it even more challenging in online courses.
3. *Individual accountability* is closely related to the social motivation theory and refers to the awareness that each group member should be held accountable for his or her performance and learning.
4. *Group processing* refers to all interactions and exchanges among group members which either facilitated or hindered the group's productivity and advancement toward the common goal.
5. *Social skills* include the students' ability to interact smoothly with each other at the interpersonal and group level. To enhance all students' necessary communication competencies, instructors provide specific training and basic information at the beginning of the course, focusing on knowledge of basic netiquette rules.

Jones and Jones (2008) stressed how students' perceptions of online teamwork influence group functioning and how instructors could modify the way students think about teamwork by using instructional strategies designed to improve both collaboration and final team product. Based on these findings, the present study examined which components of effective teamwork learning, as identified by Johnson et al. (1991), influenced students' perception in online college courses. It also examined whether these components changed after the instructors had used specific instructional design strategies to implement the characteristics of effective teamwork suggested by the Foundation Coalition (n.d.).

## Research Questions

This study addressed the following research questions:

**Research Question 1:** Which factors influenced the students' perception of online teamwork learning before and after instruction?

**Research Question 2:** In what ways were these factors modified after implementing the five pillars of collaborative learning by Johnson et al. (1991)?

## Method

### Participants

In this study, there were 62 participants enrolled in 5 three-credit hour semester-long courses at a medium size public university in the Southeast United States. These courses were a requirement in the birth to kindergarten teacher education program, leading to a license in birth to kindergarten in this state. The initial number of students was 108, but 46 were dropped from the study because they failed to respond to the posttest. The 62 participants ranged in age from 25 to 43 years old. The group consisted of 31 (50%) Caucasian, 17 (27%) African American, and 14 (23%) Native American female students. All of these students were familiar with online courses as they were all enrolled in an entirely online program of study at this University.

### Context

The study was conducted during the 2011-2012 academic year and included five courses in which teamwork learning was an important part of the grade. In all courses, the instructors used the same specific strategies to support and facilitate group cohesion and collaboration. These instructional strategies were aligned with the five pillars of effective teamwork as described by Johnson et al. (1991), recommended by the Foundation Coalition (n.d.) and consisted of the following:

- *Development of a team charter* in which members had to introduce themselves as well as their group-related skills and decide on group rules, modes of communication, and strategies to both overcome possible barriers and resolve conflicts.
- *Team-building assignment* was used to support the initiation of group process and to help with group cohesion; this exercise lasted a week (the week immediately preceding the main group project) and required the participants to come to an agreement over a particular controversial issue. At the completion of this assignment, the students were asked to participate in a discussion forum, comment about the way their group performed, and identify the things that went well during the decision making process as well as the things that needed to be changed. Each group member had to come up with at least one suggestion for improving team functioning.
- *Explicit guidelines* including instructions and grading rubrics about the group activities and processes were provided. The instructors made it clear that the grade

would be determined by both the quality of the final product as well as the collaborative behavior of the participants. The participants were aware that interdependence, interaction, and accountability would represent 40% of their grade. Group members' grades were largely determined by their collaborative performance evaluated by both the instructors and the team members. Explicit instructions were provided about keeping all interactions accessible online to all group members.

- *The group project* was designed to promote interdependence and individual accountability. Thus, the project could not be easily divided into tasks to be accomplished individually and then "assembled" by one group member at the end. Moreover, each group member had to interact and exchange information with the others to be considered "accountable" for the final product.
- *Periodic evaluation of the group's functioning and productivity* required formal group discussions at least twice during the duration of the project. The students were asked to participate in a forum and comment on what was going well during the group process as well as what needed improvement. All group members were asked to offer suggestions on how to improve their group process.
- *Netiquette and social interaction basic rules* were reinforced after students were required to read about them and discuss them.
- *Monitoring and guidance* of group processes were constantly provided by the instructors. The instructors were periodically monitoring the group process and either offering suggestions or asking the students to stop and assess their group functioning.

In using the above strategies, the instructors focused on making the students aware of the importance of the group process by guiding the groups through developing a charter and by assigning specific periods of time for the group members to reflect on and monitor their group process.

The participants in each course were randomly assigned by the "Groups" function in Blackboard to groups of four or five members. Each group had to work on a team project assigned by the course instructor for a period of 6 to 7 weeks.

### Online Teamwork Survey Instrument

The online teamwork survey instrument was based on the essential characteristics of collaborative work proposed by Johnson et al. (1991). A survey was developed to explore students' perception and evaluation of group activities in reference to positive interdependence, promotive interaction, individual accountability, and group processing. The social skills category was included in the group processing one as their characteristics overlapped. The survey consisted of 38 statements related to the behavior

and expectations involved in effective collaborative work, each category comprising six to seven statements (the appendix contains examples of these questions). A 5-point Likert-type scale was used so that the respondents could select *always, very often, sometimes, almost never, or never* for each statement to indicate how they qualified the various statements related to their teamwork experience.

The survey was administered in two phases. All participants took both pre- and postsurveys on their perceptions about participating in virtual teams. In the presurvey phase, that is, Phase 1, students were asked to answer the questions by referring to their teamwork experience prior to taking the current course. In the postsurvey phase, that is, Phase 2, students were asked to take the same survey; the objective of Phase 2 was to test the internal validity of the model and examine the changes, if any, in students' perception of teamwork.

### Research Model

To examine the factors that affect students' perception of online teamwork learning, a logistic regression model was used to classify students into two categories according to their positive or negative view of teamwork (dependent variable). The logistic regression model is superior to other models because of its ability to identify the two categories of students based on the predictive power of the independent variables, especially when the assumptions of the normality of the independent variables are not met. In addition, the results are easier to read and interpret because its dependent variable takes the value of either 0 or 1 (Lee, Yeh, & Liu, 2003).

In tallying the data, students were classified into one of the following two categories based on their responses to the statement "I learned effectively in teams": category 1 = positive perception ( $Y = 1$ ) and category 2 = negative perception ( $Y = 0$ ). The cutoff point for dividing the students in the two categories was the score of 3, meaning that the students who chose "always," "very often," or "sometimes" were assigned to the positive perception category, while those students who chose "almost never" or "never" were assigned to the negative perception category. This category assignment was performed for both the pre- and posttest and the groups were compared. The following is the model of the logistic regression output:

$$Y(0 - 1) = A + B_1X_1 + B_2X_2 + B_3X_3 + \dots + B_nX_n,$$

where  $A$  is a constant;  $Y$  is the perception with a 0 value = negative perception, and 1 value = positive perception;  $B_n$  stands for the coefficient of the independent variable (i.e., essential characteristics) entered the model.

**Reliability of the model.** Two measures were used to test the model reliability:

1. *Coefficient of Determination*: It is similar to that of the ordinary least squares (OLS) regression:

$$R^2_{\text{Logit}} = 1 - (2LL_0 / 2LL_1)^{2/n},$$

where  $-2LL_0$  is the log likelihood (represents unexplained variations) of the model without independent variables.  $-2LL_1$  is the log likelihood of the research model based on the independent variables remaining in the model that exhibited significant power in explaining the two groups.  $N$  is the sample size. In general, the interpretation of  $R^2_{\text{Logit}}$  is similar to the coefficient of determination  $R^2$  in the multiple regressions. Its value ranges between 0 and 1. When  $R^2_{\text{Logit}}$  approaches 0, the model is poor. When  $R^2_{\text{Logit}}$  approaches 1, the model is a perfect predictor.

2. *Hit Ratio*: A  $Z$  (normal) test is performed to test the significance of hit ratio (percentage of correctly classifying the cases). The following formula is applied:

$$Z \text{ test} = [P - 0.5] / [0.5 (1 - 0.5) / N]^{1/2},$$

where  $P$  = hit ratio = proportion correctly classified results,  $N$  = sample size. The “ $Z$  test” tests the significance of the hit ratio, the percentage of times the model accurately classifies the cases into the two groups (i.e., if the model completely explains the dependent variable, the overall hit ratio will be 100%).

The significance of each statement is tested at a level of significance of 5%.

*Internal validity of the model.* Examination of the model’s internal validity was done by testing the students’ perception about teamwork learning at two different time frames: 1—before starting the online class (pretest); 2—after completing the requirements of the online class (posttest).

**Data Analysis**

*Phase 1: Pretest.* The data were entered into SPSS version 19 (IBM Corp., 2010), using “Forward Stepwise Likelihood Ratio.” The summary output of students’ perception in the pretest survey showed the following overall hit ratio results:

Table 1 includes the four statements that entered the model and correctly classified students’ perception at 85%. Table 2 shows the coefficient of determination of the model. The four statements explained variations to 71.8%, which supports the reliability of the model.

Testing the significance of the overall hit ratio is done by using  $Z$  distribution.  $Z_{\text{critical}}$  value at a level of significance of 5% is  $= 1.65$ ,  $n = 62$ . The model is reliable for any value that is equal to or exceeds  $1.65$ .  $Z_{\text{stat}} = [0.85 - 0.5] / [0.5 (1 - 0.5) / 62]^{1/2} = 5.51$ ; therefore, this model is significantly reliable.

**Table 1.** Students’ Perception of Teamwork on the Pretest Survey.

Step	Statement	% correct
1	I expressed my ideas clearly to team members	71.7
2	Conflict was beneficial for accomplishing team goals	76.7
3	I was satisfied with the quality of my team experience	86.7
4	I maintained a positive relationship with team member(s) I was in conflict with	85

**Table 2.** Coefficient of Determination—Pretest Survey.

Reliability of model: Step and statement	$R^2$ (variation)
Step 1: I expressed my ideas clearly to team members	.391
Step 2: Conflict was beneficial for accomplishing team goals	.580
Step 3: I was satisfied with the quality of my team experience	.660
Step 4: I maintained a positive relationship with team member(s) I was in conflict with	.718

**Table 3.** Significance of Statements’ Coefficients ( $B$ ) for the Pretest Survey.

Statement	$B$	$p$	95% CI for exp( $B$ )	
			Lower	Upper
I expressed my ideas clearly to team members	3.381	.011	2.185	395.288
Conflict was beneficial for accomplishing team goals	2.613	.002	2.676	69.519
I was satisfied with the quality of my team experience	2.222	.010	1.706	49.860
I maintained a positive relationship with team member(s) I was in conflict with	-1.426	.030	.066	.873

Table 3 is the summary output of the 95% confidence interval (CI) estimates of the statements that entered the model with their related coefficients ( $B_n$ ). The interval boundaries of the four statements that entered the model have the same sign (i.e., positive sign), which means they are all significant.

The results of Phase 1 answered the first research question by identifying four specific factors that significantly affect students’ perception about teamwork learning in online classes before the implementation of activities determined by the five principles of effective collaborative work. As expected, these initial factors focus on relationships and communication with the team members rather than accountability, promotive interaction, and positive interdependence.

*Phase 2: Posttest.* The summary output of students’ perceptions in the posttest is presented in Table 4.

**Table 4.** Students' Perception of Teamwork—Posttest Survey.

Step	Statement	% correct
1	I felt free to discuss ideas with team members	74.2
2	In general, I trusted other team members to perform their part of the team task	83.9
3	I want to learn in teams	80.6
4	All team members carried their weight in accomplishing the goals	79.0
5	Conflict was beneficial for accomplishing team goals	88.7
6	I respected ideas different from my own	85.5
7	I asked team member for clarification if something was not clear	93.5
8	Team members trusted me to accomplish the assigned tasks	93.5

**Table 5.** Coefficient of Determination—Posttest Survey.

Reliability of model: Step and statement	R <sup>2</sup>
Step 1: I felt free to discuss ideas with team members	.356
Step 2: In general, I trusted other team members to perform their part of the team task	.487
Step 3: I want to learn in teams	.556
Step 4: All team members carried their weight in accomplishing the goals	.623
Step 5: Conflict was beneficial for accomplishing team goals	.730
Step 6: I respected ideas different from my own	.780
Step 7: I asked team member for clarification if something was not clear	.840
Step 8: Team members trusted me to accomplish the assigned tasks	.876

**Table 6.** Significance of Statements' Coefficients (B)—Posttest Survey.

Statement	B	p	95% CI for exp(B)	
			Lower	Upper
I felt free to discuss ideas with team members	8.399	.021	3.517	5613981.005
In general, I trusted other team members to perform their part of the team task	-3.728	.084	.000	1.650
I want to learn in teams	4.355	.017	2.166	2,797.381
All team members carried their weight in accomplishing the goals	6.862	.015	3.779	241,574.576
Conflict was beneficial for accomplishing team goals	4.044	.014	2.251	1,445.849
I respected ideas different from my own	-8.891	.013	.000	.157
I asked team member for clarification if something was not clear	6.244	.023	2.377	111562.856
Team members trusted me to accomplish the assigned tasks	-5.797	.071	.000	1.651

Eight statements entered the model with an overall hit ratio of 93.5%. Table 5 reflects the coefficient of determination ( $R^2$ ) values of the eight-step process.

The eight statements explained 87.6% of the total variations. As for  $Z_{stat}$  of the overall hit ratio, it had a value =  $[0.935 - 0.5] / [0.5 (1 - 0.5) / 62]^{1/2} = 6.85$ , which supports the reliability of the posttest model. Table 6 shows the summary output of interval estimates of the statements that entered the model. The eight statements had upper and lower limit boundaries above zero, which means they are all significant.

The results of Phase 2 of the study provided strong evidence supporting the internal validity of the model as it showed consistent predictive power in identifying the two groups. In addition, it showed progress in students' perception about online teamwork learning; the number of identified factors increased from four to eight, that is, students were able to give a broader description of online teamwork learning. As a result, the strategies used by instructors made an impact on students' perception.

## Discussion

Consistent with prior research, the results of this study showed that students' perception of teamwork learning changed considerably after the instructor implemented the recommended strategies for increasing collaboration effectiveness. The analysis of the pretest data of students' perceptions of online teamwork learning revealed that personal characteristics such as course, department, grade point average (GPA), age, and sex did not play a significant role in explaining the differences in perceptions. However, four survey statements had significant power in predicting students' perception of teamwork at the beginning of the course. The analysis showed that group interactions, that is, "I expressed my ideas clearly to team members"; group processing, that is, "I maintained a positive relationship with team member(s) I was in conflict with" and "Conflict was beneficial for accomplishing team goals"; and general attitude about team experience, that is, "I was satisfied with the quality of my team experience" were the most important predictors of students' perceptions in Phase 1 or before the intervention. This confirms what DeRosa and Lepsinger (2010), M. K. Smith (2003, 2009), and Rovai (2002) stated regarding the importance of similar skills related to communication such as building trust among team members, connecting with each other and reducing social distance. These findings are indicators of the participants' limited repertoire of teamwork components before the implementation of the five pillars of effective collaboration strategies (Johnson et al., 1991). This is evident because the students did not refer to individual accountability or positive interdependence, the two most important pillars of collaboration. It is interesting to note that these results explained 72% of the variability in the data. During the online courses included in this study, the students were

made aware from the beginning that the group project had two main objectives: first, to have them acquire content knowledge and second, to develop collaborative skills. During monitoring and guiding, the instructors constantly reminded the students that the final product was only one of the goals of the assignment and that group collaboration was equally important in grading their performance. The analysis of the posttest data about students' perceptions and experiences of teamwork collaboration at the end of the courses included in the study indicated an increase from four to eight in the number of statements involved in predicting student's perception of teamwork. While the previous statements referring to group interactions, group processing and general attitude toward teamwork were still strong perception predictors, additional components belonging to promotive interaction, individual accountability, and positive interdependence appeared to become stronger predictors of students' perception. In fact, the added predictive factors for the promotive interaction and individual accountability categories were now stronger than the interaction and group processing ones.

As expected, after taking the courses included in the study, students were able to provide a wider definition of teamwork learning; their statements increased from four categories of the essential elements of collaborative learning in the pretest to eight categories in the posttest. These findings confirmed the fluctuation of students' perception of teamwork at different points in the semester (Goold et al., 2006) and the changes in perception as students got more experienced with collaborative work (Powell et al., 2004). However, while Powell et al. (2004) suggested that the perceptions became more positive with experience, this study did not indicate this. The factors influencing students' perception doubled in number, but the direction of change or the reason were not determined. Additional studies are necessary to answer those questions. Nevertheless, the increase in factors influencing the students' perception of teamwork could be interpreted as an indication of the students' acquired information related to the essential components of team learning. In addition, teaching strategies used by the instructors might have made the students consider individual accountability and positive interdependence as important for teams as group processing, attitudes toward teams, and promotive interaction, characteristics evidenced in the pretest survey.

In summary, the results clearly showed that through the design of teamwork activities according to the social motivation and cohesion theories of collaborative groups, students in online undergraduate courses included additional important components of effective collaboration. This was demonstrated by the factors which influenced their perceptions of teamwork. However, the study showed that this was not enough to modify their perceptions from negative to positive. In fact, there were students whose perceptions changed from positive to negative, even as their knowledge about the components of effective collaborations increased.

All participants in this study were enrolled in teacher education programs conducted mainly online and in which teamwork learning was essential to the teaching goals. The current professional standards for teacher preparation adopted across the United States emphasize 21st-century skills (Partnership for 21st Century Skills, n.d.) which include critical thinking, problem solving, collaboration, and communication skills along with technology use skills. By participating in effective collaborative experiences during their preservice years, the teacher candidates do not only acquire important skills for their professional career but also learn how to organize collaborative teams within their own classrooms.

Studies such as this one are highly needed because they investigate and validate the new pedagogies of the digital age. The institutions of higher education need to prove that their ever expanding online courses are not only a solution for reduced funding, increased demand or response to the needs of their digital native students; they need to demonstrate that the online courses use empirically proven effective pedagogies for ensuring the learning of the content and the development of teamwork abilities in their students.

## Limitations and Recommendations

This study shed light on students' perceptions about online teamwork learning. However, the results were limited by the fact that it was self-perceived data and the sample was a sample of convenience. A repeat of this study in similar classes would yield a larger sample size from an increasing diverse population of students. Then an explanatory factor analysis could be completed on the survey instrument. In addition, it would be interesting to include in the study students taking online courses other majors such as business or the sciences and compare the data with those in education. Another direction for continuing this study could be the addition of an individual content test to see whether those in the online group environment also learned more content and thus verifying Tutty and Klein's (2008) findings about the superiority of face-to-face classes in acquiring content.

Although this study showed high reliability in the analyses of both pre- and posttest data, external validity of the model should be tested in the future. Further investigations could delve into the reasons why students' perceptions of working in teams changed during the study. Another area of further investigation could be ways in which college instructors could modify the teamwork experience using the five pillars based on these results. This could yield different results in regard to online team learning.

This study demonstrated that online instructors can influence students' perception of teamwork experience by specific instructional strategies that expand their values repertoire. Through explicit teamwork instructions, gradual team building through tasks assigned within sequential time frames, as well as constant monitoring and calls for reflection time, the students' perception of teamwork has been

determined by a broader frame of reference. However, well-designed and well-explained teamwork assignments together with carefully planned team-building tasks will not change students' perception in the absence of the constant online presence of the instructor. The online instructor provides time and space for students to assess and reflect on their collaboration while reminding them that the final group project is only one of the several objectives of teamwork.

## Appendix

### Online Teamwork Learning Survey Sample questions.

#### Positive interdependence

- Team members should rely on each other to accomplish their tasks.
- The team goals can be accomplished only if every member actively participates.

#### Promotive interaction

- I felt free to discuss ideas with team members.
- I expressed my ideas clearly to team members.

#### Individual accountability

- In general, I trusted other team members to perform their part of the team task.
- Everyone in the team had a clear understanding of what was expected from me.

#### Communication process

- I felt free to discuss ideas with team members.
- I expressed my ideas clearly to team members.

#### Conflict resolution

- Conflict was beneficial for accomplishing team goals.
- I accepted ideas that were different from my own.

#### Attitudes Toward Teams

- I want to work in teams in the future.
- I learn effectively in teams.

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