Attitudes Toward Teamwork and Team Effectiveness in Higher Education

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Background

Recent trends in business have pointed to teamwork as an important tool in business success and this has prompted organizations to start looking for teamwork skills in their new employees. They expect that their new employees at least possess the basic understanding of why teamwork skills are important to their organization.

As a result, the business environment has put pressure on institutions of higher education to prepare students to be effective team players[1,2,3,4]. For this reason, accreditation institutions at the collegiate level such as the Accounting Education Change Commission (AECC) and the Accreditation Board for Engineering and Technology (ABET), are requiring higher education institutions to introduce teamwork activities into their curriculums[5,6]. In response to this demand, institutions of higher education are developing methodologies for introducing teamwork in their classrooms for enhancing the process of learning.

Collaborative learning, cooperative learning and other forms of active learning are methods that are being used in classrooms as ways to promote teamwork among students and enhance their learning. Although results from studies about the use of teamwork activities in classrooms do not show that teams alone enhance students' performance, they still mention that such activities allow students to learn how to work in teams[4,7,8].

In an effort to understand why teamwork is not effective when trying to enhance students' performance, educational researchers have found that there are diverse factors affecting the dynamic of teaming in the process of teaching and learning. Factors such as the method of instruction used by teachers [9,10,11,12] student's preference for teaching methods[13], learning styles[14], grades as team reward[5], team composition[15], team longevity[18], and attitude toward teamwork[19] have been identified as influencing the process of learning.

These studies prove that trying to incorporate teams into the classroom is not an easy task. Negative teamwork experiences discourage both students and teachers from the continued using of teams in the classroom. Most of them recognize the necessity of teamwork for improving interpersonal skills but they still prefer individual work when the goal is achieving

good performance[20,21]. These results have compelled educational researchers look to the business world to find the elements that make teams effective in the workplace. They realize that it is not just putting individuals together and assigning them a task. Individuals in teams need to understand that there are specific skills for achieving team effectiveness.

According to Hackman (1990) team effectiveness is defined as the degree to which a group's output meets requirements in terms of quantity, quality, and timeliness (performance); the group experience improves its members' ability to work as a group in the future (behavior), and the group experience contributes to individual satisfaction (attitude)[22]. This definition makes team effectiveness a function of performance, behavior, and attitudes.

There are different models available in the literature to measure team effectiveness and each of them makes reference to specific and necessary characteristics for teams to become effective. Trying to identify the most relevant and common characteristics among these models, Adams, Simon, and Ruiz developed a framework to assist in the facilitation and measurement of effective teamwork [23].

In this model, seven constructs were identified as characteristics that need to be present in teams for them to be effective. The seven constructs are productive conflict resolution, mature communication, accountable interdependence, clearly defined goals, common purpose, role clarity and psychological safety.

There are few studies about the attitudes of students toward teamwork, and the majority of available studies have measured the attitudes of individuals before and after their participation in team activities. Gardner and Korth (1998) and Scarafiotti and Klein (1994) found that even though the results were not statically significant, students' attitudes changed positively after their participation in teams[14,24]. By contrast, Porter (1993), McCorkle et al. (1999) and Buckmaster (1994) found that students were frustrated by their experiences with teamwork[20, 21, 25]. Although students recognized that the experience improved their interpersonal skills, they still preferred to work individually.

It seems that teamwork is more than just putting individuals together to work. The presence in the group of certain characteristics is necessary to make an effective team. There is extensive research about cooperative and collaborative learning and the use of groups in the classroom setting. Research shows that the process of developing teamwork is highly complex and when it is not well managed it generated a negative attitude toward teamwork in students.

Therefore, the purpose of this study is to determine the relationship between the characteristics that make a team successful and student attitudes toward teamwork in order to address the following question: Does the presence of successful team characteristics produce a positive attitude towards teamwork in students?

Methodology

The participants in this study were 188 students from the College of Engineering and Technology at the University of Nebraska – Lincoln registered in senior design classes for the

Spring Semester of 2002. The participating senior design classes were from the departments of Agricultural and Biological Systems Engineering, Chemical Engineering, Computer Engineering, Construction Management, Electrical Engineering, Industrial Engineering and Mechanical Engineering. All students were administered the Team Effectiveness Questionnaire (TEQ). The TEQ was administered in person either by the investigator or the course professor during class sessions. The questionnaire was administered at the end of the semester once the students had gone through the team experience.

The TEQ was developed in 2001 by Adams, Simon and Ruiz, researchers at the University of Nebraska-Lincoln, to measure self-reported effectiveness. The TEQ utilizes the seven characteristics identified by Adams, Simon and Ruiz as characteristics of effective teams. For the purposes of this study questions were added which measure students' attitudes about teamwork. The analysis conducted in this study examines the relationship students' attitudes toward teamwork has to the seven constructs.

Descriptive statistics on demographic variables were calculated in order to define the profile of the sample. Correlation and multiple regression analyses were run to identify the relationship between variables and identify those variables that could allow for the prediction of students' attitudes toward teamwork.

Results

In the sample, 84% of the participants were male and 16% female. This gender breakdown was expected because of the characteristic sample of engineering students. These statistics reflect that male domination still exists in this field. The majority of the participants (65%) are between 22 and 24 years old and most of them (40%) have spent between four and five years in college. Forty percent of them have a GPA between 3.0 and 3.5 and only 32% have a GPA greater than 3.5. The majority of the participants in the sample (90%) were White/Caucasian.

For evaluating correlation between variables, 28 correlations analysis were needed. This situation increased the probability of making Type I error. In order to control this error, the Bonferroni approach was used and a p-value of less than .0018 (.05/28=.0018) was required for significance. Table 1 shows the correlation of values between the variables of the study. These results showed high values with significant statistical correlation between variables.

Table 1
Pearson Correlations (*)

Variables	Attitude	PsySaf	AccInt	Conflict	Commun	Role	Purpose
Attitude							
PsySaf	.790						
AccInt	.782	.807					
Conflict	.726	.790	.778				
Commun	.751	.833	.762	.788			
Role	.543	.694	.579	.625	.683		
Purpose	.800	.797	.830	.754	.793	.726	

Goal	.726	.708	.735	.680	.762	.696	.839

(*) All correlations significant at the 0.001 level.

For evaluating the variation in the variable attitude that is accounted for by the seven independent variables, a regression analysis was run using the enter method, entering all variables one by one. The first variables entered were those thought, according to the literature, to contribute the most to the variation of the dependent variable. Said entering order was as follows: communication, accountable interdependence, psychological safety, purpose, role, goal and at last conflict.

It was observed that the first six variables accounted for 72.4% of the variance as Table 2 shows. The contribution of conflict was just of 0.1%, being this no statistical significant.

Table 2
Regression Analysis Summary

Model (*)	R	R^2	R^2 Change	F Change	Sig. F Change
1	.750	.563	.563	230.762	.000
2	.811	.658	.095	49.255	.000
3	.828	.686	.028	15.852	.000
4	.839	.704	.018	10.805	.001
5	.847	.717	.013	8.067	.005
6	.851	.724	.006	3.989	.047
7	.851	.725	.001	.766	.383

(*) 1. Variables entered: Communication
2. Variables entered: Communication, Interdependence
3. Variables entered: Communication, Interdependence, and Psy. Safety
4. Variables entered: Communication, Interdependence, and Psy. Safety, Purpose
5. Variables entered: Communication, Interdependence, and Psy. Safety, Purpose, Role
6. Variables entered: Communication, Interdependence, and Psy. Safety, Purpose, Role, Goal
7. Variables entered: Communication, Interdependence, and Psy. Safety, Purpose, Role, Goal, Conflict
Dependent Variable: Attitude

In testing whether the presence of the seven characteristics of team effectiveness could predict attitudes toward teamwork, the B coefficients for the regression were analyzed. Table 3 shows the B coefficient values.

Table 3
Multiple Regression – Coefficients

Variable	B Coefficient	t	Sig. (.05)
Constant	1.691	1.073	.285
Communication	**.203**	**1.248**	**.214**
Interdependence	**.194**	**1.619**	**.107**
Psy. Safety	.696	4.011	.000
Purpose	.528	2.909	.004
Role	-.524	-3.237	.001

Goal	.373	2.004	.047
Conflict	**.119**	**.875**	**.383**

According to the results it seems that conflict, interdependence and communication are not statistically significant for predicting attitudes toward teamwork. This result was not expected because according to the literature, communication and interdependence are factors that have a significant impact on team effectiveness. However, in reviewing the results from the regression analysis, it is observed that conflict does not contribute to the variance explained (0.1%) and goal, even though its contribution was statistically significant (p=.047), didn't overly contribute to the explained variance (0.6%). Taking into account these results, this researcher decided to analyze a new model that excludes the Goal and Conflict variables. Tables 4 and 5 show the results.

Table 4
Regression Analysis Summary

Model (*)	R	R^2	R^2 Change	F Change	Sig. F Change
1	.750	.563	.563	230.762	.000
2	.811	.658	.095	49.255	.000
3	.828	.686	.028	15.852	.000
4	.839	.704	.018	10.805	.001
5	.847	.717	.013	8.067	.005

(*) 1. Variables entered: Communication
2. Variables entered: Communication, Interdependence
3. Variables entered: Communication, Interdependence, and Psy. Safety
4. Variables entered: Communication, Interdependence, and Psy. Safety, Purpose
5. Variables entered: Communication, Interdependence, and Psy. Safety, Purpose, Role
Dependent variable: Attitude

Table 5
Multiple Regression – Coefficients

Variable	B Coefficient	t	Sig. (.05)
Constant	2.917	2.137	.034
Communication	.319	2.088	.038
Interdependence	.242	2.070	.040
Psy. Safety	.688	4.035	.000
Purpose	.691	4.187	.000
Role	-.454	-2.840	.005

Tables 4 and 5 show that this model accounts for 71.7% for the explained variance and that Mature communication, Accountable Interdependence, Psychological Safety, Common Purpose and Goal Clarification could be predictors of attitude. The model is represented by the follow expression.

Attitude = 2.917 + .319 * Communication + .242 * Interdependence + .688 * Psychological Safety + .691 Purpose - .454 * Role

The model shows that Psychological Safety and Common Purpose contribute the most for explaining variation on attitude. In other words, these variables are important predictors of attitude toward teamwork.

Conclusion

As expected the results showed that attitude towards teamwork is highly related to each of the seven characteristics considered essential for a team to become effective, however, all of them did not account for the explained variance on attitude. In fact, only six of these characteristics were shown to contribute to the explanation of the variance on attitude toward teamwork. Therefore, the results show that mature communication, accountable interdependence, psychological safety, common purpose, role clarity and clear goals during the process of teaming will have an effect on attitude toward teamwork.

Also, results allow for the assumption that as a minimum requirement for predicting attitude towards teamwork, it is necessary take into account mature communication, accountable interdependence, psychological safety, common purpose and role clarity as predictor variables.

In summary, the presence of the characteristics for effective teams makes a difference in the attitudes of students toward teamwork. When students are able to work in teams while demonstrating mature communication, accountable interdependence, psychological safety, having a common purpose and a clear understanding of what their role is within the team it will be safe to assume that the team experience is going to contribute to and support a better attitude towards working in teams in the future.

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