Valuing Teams: What Influences Student Attitudes?

Molly Espey

Clemson University
Applied Economics and Statistics
Clemson, SC 29634
mespey@clemson.edu

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Introduction

The ability to work in a team and experience working in a team are two of the skills employers most desire in prospective employees. The National Association of Colleges and Employers annual survey of employers consistently finds "teamwork skills" and the ability to work with others among the top five qualities employers want in employees. Good teamwork requires effective communication, regular interaction, mutual respect and trust. Teams are more than just groups working together. Teams are comprised of a small number of people with complementary skills working cooperatively to achieve a common goal, and hold themselves mutually accountable.

Perhaps the most common experience students have working with others in academics is in group projects or group activities. Impediments to effective teamwork range from free riding to overly dominant personalities to group apathy and generally poor leadership. Many of these problems arise as a result of one-time use of groups or constantly changing groups for daily cooperative activities, limiting the opportunity to build trust and synergy. Team-based learning attempts to address these impediments to effective group interaction by keeping students in the same group throughout the semester and utilizing collaborative activities daily in class. In such a context, "teams" are distinct from and more powerful than "groups". But it is only after some period of time, as students begin to trust each other and develop a commitment to the group that the group becomes a team (Michaelson). Just as in a work environment where a team cannot be built by having a retreat for a couple of days each year, student teams are not built by doing group projects each semester. Team building is something that must be done every day.

Given the diversity of personalities, learning styles, and experiences students have had, their attitude toward the value of working with their peers is likely to vary. Most attitudes are

formed from experiences, both positive and negative. Once formed, attitudes shape a person's actions, with a continuous feedback between attitude and behavior.

This research begins by assessing students' attitudes toward teamwork at the beginning of the semester and estimates to what extent those attitudes are affected by age, grade level, gender, discipline, and prior experience working in groups. I then measure whether or not student attitudes change after a semester working in a team-based learning class.

Methodology

At the beginning of the Fall 2007 semester, a survey was administered to 91 students in two introductory level agricultural economics courses. Seven of the students failed to complete the second page of the survey so were not included in the analysis. This survey included twelve statements about working with peers both in the classroom and in a career. These statements are reproduced in Table 1. Students were asked to indicate the extent to which they agreed with each statement on a scale of 1 to 5, with one being "strongly disagree" and 5 being "strongly agree". They were also asked whether or not they had previous experience with team-based learning and if so, to rate the quality of the experience. Demographic information, including age, gender, grade level, grade point average, and major, was also collected. This same survey was administered to 26 students in an intermediate level natural resource economics course in which 75% of the students had a previous team-based learning experience in one of the introductory level agricultural economics courses, although not necessarily during the Fall of 2007.

Table 1: Value of Teams Survey Statements

1. The ability to collaborate with my peers will be necessary if I am to be successful as a student.
2. It is a waste of time to work in groups.
3. I have a positive attitude about working with my peers.
4. The ability to work with my peers is a valuable skill.
5. In my career, I can be as successful working alone as working with others.
6. Collaborating with my peers will help me be a better student.
7. Collaborating with my peers will help me in my career.
8. Solving problems in a group is an effective way to practice what I have learned.
9. Solving problems in a group is an effective way to learn.
10. Working in teams in class is productive and efficient.
11. Group decisions are often better than individual decisions.
12. Solving problems in groups leads to better decisions than solving problems alone.

During the semester, students worked in teams of 5 to 7 students with daily interaction involving both graded and un-graded activities. During the last class session of the semester, students were again asked to respond to the same statements about working with peers. The average responses by class at both the beginning and the end of the semester are summarized in Table 2.

Table 2: Average Survey Responses By Class

	APEC 202		APEC 257		CRD 357	
Question	Start	End	Start	End	Start	End
1	4.35	4.49	3.94	4.42	4.22	4.28
2	2.23	1.73	2.18	1.91	1.96	1.88
3	4.35	4.24	4.00	4.22	4.15	4.36
4	4.50	4.57	4.39	4.67	4.48	4.64
5	2.80	2.86	3.08	3.09	3.15	3.20
6	4.13	4.24	3.96	4.13	4.19	4.28
7	4.28	4.41	4.18	4.27	4.37	4.48
8	4.20	4.41	4.14	4.20	4.30	4.24
9	4.05	4.27	3.92	4.13	4.26	4.36
10	3.70	4.03	3.57	3.91	4.00	4.12
11	3.60	3.97	3.69	4.11	4.00	4.28
12	3.68	4.03	3.73	4.07	4.07	4.40
# of observations	40	37	44	41	27	24

APEC 202 Introduction to Agricultural Economics
APEC 257 Natural Resources, Environment, and Economics
CRD 357 Natural Resource Economics

Demographic information is summarized in Table 3. In addition to gender, age, class level, and grade point average, students were asked if they have a scholarship that requires a B or better average be maintained. At the beginning of the semester, students were also asked if they had prior experience with team-based learning (TBL), with no definition of TBL provided. If

they had prior team-based learning experience, they were asked to rate the quality of the experience on a scale of 1 to 7 where 1 was "horrible" and 7 was "excellent".

About one-third of APEC 202 Introduction to Agricultural Economics students were freshman, one-third were sophomores, and the remainder upper classmen. Of the forty students in APEC 202, one quarter were animal science or pre-veterinary science majors, 17.5% were food science majors, 10% were agricultural economics majors and no other major had more than three students. APEC 257 Natural Resources, Environment, and Economics students were primarily sophomores (32%) and juniors (49%) majoring in wildlife and fisheries biology (32%), environment and natural resources (27%), or parks and protected areas management (23%). APEC 202 had a much greater proportion of female students at 70% to only 30% male, while APEC 257 had a much higher proportion of male students at 62% to only 38% female. APEC 202 also had a higher percentage of students on academic scholarships than APEC 257 (50% versus 38%) yet average GPA among the non-freshmen was nearly identical between the two classes. This is likely due to the higher percentage of freshman in APEC 202, many of whom typically lose their state grade-based scholarships during their first year of college.

Like APEC 257, CRD 357 Natural Resource Economics students are mostly sophomores (48%) and juniors (37%). Many of these students take APEC 257 during the fall semester of their sophomore year and CRD 357 during the following spring semester. Compared to the other two classes, CRD 357 has more gender balance with 56% males and 44% females and slightly higher average grades at 3.08.

Higher percentages of students indicated having prior TBL experience in all of the classes with only 7 out of 111 rating their experience as relatively bad (less than 4 on a scale from 1 to 7). Another eleven indicated having had a neutral experience while the majority rated

their experience relatively highly, with 7% giving it a 7, 30% giving it a 6, and 33% giving it a 5. A much higher percentage of student in CRD 357 were familiar with my teaching style from having taken either APEC 202 or APEC 257 from me. Those students in APEC 202 and APEC 257 who indicated familiarity with my teaching style had likely taken the introductory University Success Skills course from me.

Table 3: Summary Demographic Information By Class

	APEC 202	APEC 257	CRD 357
Age	19	21	21
Male	30%	62%	56%
Female	70%	38%	44%
Freshman	34%	2%	0%
Sophomore	37%	32%	48%
Junior	23%	49%	37%
Senior	6%	17%	15%
GPA	2.91	2.93	3.08
Scholarship*	50%	38%	52%
Prior TBL experience	83%	82%	100%
Neutral or bad prior TBL experience	17.5%	20.5%	7.4%
Familiar with instructor's style	10%	13.6%	74%

* Scholarship equals 1 if a student has a scholarship that requires maintenance of a B (or better) average and 0 otherwise.

Analysis

Ordered probit models are estimated to determine the role demographics and prior team-based learning experiences play in influencing student attitudes toward working with peers as reflected in their responses to the survey statements. This was done for both beginning-of-semester responses and end-of-semester responses. Age and class level are highly correlated so only age is included in the regression. Age also likely better reflects students' experiences that might influence receptivity to TBL than class level, but results were not significantly different when class level used instead of age. Since grade point averages do not exist for entering freshman and those students represent a significant proportion of the APEC 202 students, the scholarship variable is used as a proxy for academic achievement. However, results were not significantly different when GPA was used instead of scholarship.

Since one of the objectives of this analysis is to determine if a semester of exposure to TBL changes attitudes toward working with peers, one set of regressions was run using survey statement responses from just APEC 202 and APEC 257 students, comparing the beginning of the semester to the end of the semester. For comparison, all three classes are also pooled to determine any differences in demographic relationships with survey responses. One set of regressions was run using just age, gender, and scholarship as explanatory variables. Another set of regressions was run for the start of the semester responses adding two additional explanatory variables. The first is a dummy variable that takes a value of 1 if the student had prior TBL experience that was not positive (rated 4 or less on the 7 point scale). The second is a dummy variable that indicates whether or not the student was familiar with my teaching style at the start of the semester. This variable is used to determine if students prior experience with my use of TBL biased their attitudes relative to their peers.

Most of the coefficient estimates are not statistically significant. Given the volume of regressions (twelve for the beginning of the semester, twelve for the end of the semester, twelve with the additional variables, and twelve adding CRD 357 responses), full results are available upon request of the author while only significant results will be summarized here.

At the beginning of the semester, age (or class level) was significantly negative for all statements except 2, 5, and 9. Age was significant and positive for statement 2 ("It is a waste of time to work in groups") and insignificant for 5 and 9. Scholarship was only statistically significant for statements 1 and 3. The only gender difference was for statement 3 ("I have a positive attitude about working with my peers.") with males indicated a less positive attitude than females. So, overall, there appear to be few differences between males and females and higher achieving and lower achieving students in terms of their attitudes toward working with others. However, the older students get, the less positive they appear to be about the value of working with others. Having had a less than positive prior experience with TBL significantly and negatively impacted students' attitudes about working with others, with this variable statistically significant for statements 1, 3, 4, 5, 10, 11, and 12. Finally, familiarity with my teaching style before starting the class improved students' attitudes about working with others, with significantly more positive responses to statements 7, 8, 9, 10, and 12.

By the end of the semester, many of the differences in attitude related to age disappeared. Age only remained significantly negative for statements 3 and 4 and actually became positive for statement 5 ("In my career, I can be as successful working alone as working with others."). The gender difference on statement 3 was not significant, but at the end of the semester, males were significantly more negative in response to statements 1 and 8 and significantly more positive in response to statement 3 ("It is a waste of time to work in groups"). Closer inspection of the

responses, however, reveals that the attitudes of males became more positive, just not as much more positive as the females' attitudes, so relative to females they were less positive. Finally, those on scholarships became more positive toward working with others relative to non-scholarship students, with a positive coefficient for statements 1, 4, and 10 and the more negative response to the statement " have a positive attitude about working with my peers" that existed at the beginning of the semester not significant by the end of the semester. Thus, there appeared to be a relative improvement over the course of the semester in the attitude toward working with others for students on scholarship and for older students relative to younger students.

T-statistics were also run for the change in response to each of the survey statements for each class from the beginning of the semester to the end of the semester. These results are shown in Table 4. The results suggest that student attitudes toward working with others change significantly over the course of the semester of experiencing TBL. Students are less likely to agree that working in groups is a waste of time and more likely to agree that working in teams in class is productive and efficient and that group decisions and solving problems in groups can lead to better decisions than working alone. APEC 202 students were more likely to agree that solving problems in groups is both an effective way to learn and an effective way to practice what they have learned. APEC 257 students were more likely to agree that working with peers is a valuable skill and they had a more positive attitude about working with peers in general by the end of the semester. Few of the responses by CRD 357 changed significantly, but the students' attitudes started at a relatively high level relative to the other two classes, with not much room for change in survey responses ranked on a scale of 1 to 5.

Table 4: Change in Survey Responses By Class

	APEC 202			APEC 257			CRD 357		
Question	Start	End	t-statistic for difference	Start	End	t-statistic for difference	Start	End	t-statistic for difference
1	4.35	4.49	-0.97	3.94	4.42	-3.16**	4.22	4.28	-0.40
2	2.23	1.73	2.62**	2.18	1.91	1.85**	1.96	1.88	0.39
3	4.35	4.24	0.74	4.00	4.22	-1.70**	4.15	4.36	-1.17
4	4.50	4.57	-0.53	4.39	4.67	-2.47**	4.48	4.64	-1.14
5	2.80	2.86	-0.24	3.08	3.09	-0.04	3.15	3.20	-0.17
6	4.13	4.24	-0.93	3.96	4.13	-1.16	4.19	4.28	-0.50
7	4.28	4.41	-0.95	4.18	4.27	-0.72	4.37	4.48	-0.68
8	4.20	4.41	-1.56*	4.14	4.20	-0.44	4.30	4.24	0.29
9	4.05	4.27	-1.45*	3.92	4.13	-1.21	4.26	4.36	-0.62
10	3.70	4.03	-1.76**	3.57	3.91	-1.95**	4.00	4.12	-0.55
11	3.60	3.97	-1.73**	3.69	4.11	-2.58**	4.00	4.28	-1.38*
12	3.68	4.03	-1.90**	3.73	4.07	-2.20**	4.07	4.40	-1.78**
N =	40	37		44	41		27	24	

** significant at 5% or better, * significant at 10% for a one-tailed test

Finally, the enduring effect of team-based learning experiences on attitudes and team interactions is explored through comparison of the survey responses of the Spring 2008 intermediate level class to the average responses of the introductory level courses. Seventy-four percent of the CRD 357 students had taken either APEC 202 or APEC 257 taught using TBL, although only 30% during the Fall 2007 semester. As shown in Table 5, there were several differences between the starting attitudes of the two groups of students, the introductory students in the fall as a whole and the intermediate students in the spring, suggesting that the CRD 357 students enter the class with a generally more positive attitude about working in teams and with peers. Comparison of the end-of-semester Fall 2007 responses to the beginning-of-semester Spring 2008 responses indicates almost no differences, suggesting that the changes in attitudes achieved over the course of the semester carry over to subsequent courses.

Table 5: Comparison of CRD 357 to APEC 202 and APEC 257

	APEC Courses		CRD 357	t-statistic for CRD v APEC at the start	t-statistic for CRD v APEC at the end
Question	Start	End	Start		
1	4.12	4.45	4.22	-0.80	1.91**
2	2.20	1.83	1.96	1.32	-0.77
3	4.15	4.23	4.15	0.04	0.62
4	4.44	4.62	4.48	-0.37	1.23
5	2.96	2.99	3.15	-0.76	-0.63
6	4.03	4.18	4.19	-1.09	-0.02
7	4.22	4.33	4.37	-1.30	-0.36
8	4.16	4.29	4.30	-0.96	-0.03
9	3.98	4.20	4.26	-2.17**	-0.48
10	3.63	3.96	4.00	-2.24**	-0.22
11	3.65	4.05	4.00	-2.00**	-0.27
12	3.70	4.05	4.07	-2.39**	-0.16

** significant at 5% or better, * significant at 10% for a one-tailed test

Conclusions

The ability to work in a team is a highly valued skill which academics can cultivate in students through team-based and collaborative learning. However, many group activities do not allow time to build team dynamics and trust, and many group projects result in significant free riding and consequent excessive burden on the few students willing to do all the work. Such experiences are likely to negatively influence student attitudes about working with others and may negatively affect subsequent group interactions.

Awareness of demographic differences in acceptance of peer collaboration can help faculty more carefully design experiences to enhance outcomes. For example, most effective teams will have members with complementary skills but effectiveness may also be enhanced by having a mix of age, grade level, and gender as well. Positive attitudes on the part of certain members should help offset negative, or less positive, attitudes on the part of others, in building teamwork over time.

This research also suggests that a positive learning experience can enhance attitudes toward working with others, possibly making students more employable upon graduation, having had experience working in teams and having a positive attitude about the experience.

References

Michaelsen, Larry K., Arletta B. Knight, and L. Dee Fink (2002). Team-Based Learning: A Transformative Use of Small Groups in College Teaching, Praeger Publishers, Westport, CT.

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