Evaluating the Impact and Determinants of Student Team Performance: Using LMS and CATME Data

Lynn M. Braender
Michele I. Naples
The College of New Jersey
The School of Business
2000 Pennington Ave.
Ewing, NJ 08628
braender@tcnj.edu, naples@tcnj.edu

ABSTRACT

Practitioners find it difficult to allocate grades to individual students based on their contributions to the team project. They often use classroom observation of teamwork and student peer evaluations to differentiate an individual's grade from the group's grade, which can be subjective and imprecise. We used objective data from student activity logs from our Learning Management System (LMS) as well as peer evaluations from the Comprehensive Assessment of Team Member Effectiveness' website (CATME.org) to determine impacts on team grades and peer evaluations. We found that student activity in our LMS and conflict scores from peer evaluations (CATME) do correlate with grades, as do GPAs and credits earned at the College. We also found that, while the class was in session, we could use the data from the LMS and CATME scores to intervene with those teams that were experiencing conflict to help them learn productive conflict-resolution skills.

Keywords: Team projects, Assessment, Peer Evaluation, Learning Management System (LMS)

1. INTRODUCTION

The use of teams in the classroom has risen in recent years both in industry and in education. Industrial organizations have found that, if used properly, teamwork can increase productivity and decrease costs. Assessing student team performance remains a challenge. This paper shares the implementation experience and lessons learned from incorporating subjective and objective data into a course to evaluate individual student performance within a group. We found that objective data can be a significant contributor to team assessment.

Industry teams promote creativity and enhance performance in producing products and services. (Adams, Bianey, & Ulloa, 2004) As a result of these trends, potential employers are expecting college graduates to possess a basic understanding of teamwork skills. (Ruiz, Bianey, & Adams, 2004, p. 146) Many accreditation agencies are also requiring colleges and universities to assure them that students are proficient in team skills. For instance, our accreditation agency, AACSB, expects students enrolled in a bachelor, master, or doctoral-level program to learn how to work effectively in a team environment. (AACSB International, 2013) Teamwork, if implemented properly, can create a pleasant and collaborative learning environment that enhances student knowledge.

Collaborative learning occurs when students work in a small group to accomplish shared learning goals and to maximize their individual and team understanding of the material. (Figl, 2010, p. 326) Cooperative learning can improve individual achievement and promote positive peer relationships. (Adams & Laksumanage, 2003) Typically, a team would consist of five to seven students so that a sufficient knowledge base is achieved. (LeJeune, 2003, p. 277)

Effective teams are characterized by "mature communication, clear roles, and productive conflict resolution." (Figl, 2010, p. 326) There must also be equitable distribution and quality of work when completing tasks. Course processes should be in place to identify "Social Loafers" or students who are not fully engaged in participating in team activities. (Buckenmyer, 2000, p. 98) Social loafing can undermine other students' commitment to working in a team. Student accountability within a team can minimize or reduce the risk of social loafing when the teacher can measure the individual's contribution made to the end product. (Adams, Bianey, & Ulloa, 2004, p. 4) It is also important to identify low achievers; they tend to be passive in a group setting and, therefore, may not benefit as much from a group experience as a high-achieving student.

Ensuring fairness in grading is essential to developing effective team environments. Developing good team-

evaluation strategies minimizes the possibility that poor performance is rewarded with an inappropriately high grade. Several strategies for fair grading of individual performance include individual effort analysis, peer- and self-evaluation, cross validation of student knowledge through presentations and/or tests, and student ranking of individual efforts. (Figl, 2010, p. 329) In addition, instructors can assess team skills and the timely completion of assignments. (Smith III, Smarkusky, & Corrigall, 2008, p. 105) When employing peer- and self-evaluations, student teams should have the opportunity to evaluate each other throughout the semester with initial evaluations being informational only. (Smith III, Smarkusky, & Corrigall, 2008, p. 105)

Although prior work has provided a wealth of knowledge on team formation, team preparation, and peer- and self-evaluations, these models do not provide the teacher with objective data regarding student activity within a group. This paper will discuss our investigations into (1) student usage data provided by our Learning Management Systems (LMS) that allowed us to identify students who may not have been fully engaged in participating in team activities; and, (2) peer-evaluation data and our discovery that conflict scores correlated with our students' project grades.

2. BACKGROUND

2.1 The Courses' Students

At The College of New Jersey (TCNJ), undergraduate students in the Business Administration degree are required to complete six credits in Information Systems. Students have a choice of enrolling in a traditional Management Information Systems course or Database Management for Business. This research was conducted in the Database course, which relies heavily on teamwork. Information Systems (IS) courses often employ student teams to complete design, development, and applications work in the classroom. Yet IS faculty are generally not formally trained in the area of team development, assessment, and other pedagogical methodologies related to organizing and managing student teams. We hoped, with this research, to discover an effective and efficient method that IS faculty could employ to quantitatively identify potential team problems while team members could still benefit from faculty intervention.

The College of New Jersey (TCNJ) is a small undergraduate comprehensive school with a strong liberal-arts program as well as professional majors. The undergraduate population is approximately 6,500 with an average SAT score of 1300 for Critical Reading and Math only. (The College of New Jersey, 2013) The average age of our students is 20 years old, with 57% of students being female and 43% male. In our sample, approximately 31% of the students were female. This gender ratio is consistent with the student population within the School of Business. In the College, 66% of students are white, 10% Hispanic, 9% Asian, 6% African American/Black, 1% Multiracial, and 8% not reported. Most (94%) of our students are New Jersey residents. (College Portrait of Undergraduate Education, 2012)

There were between 28 and 30 students in each of the three classes used in this study. Most classes consisted of some lecture followed by students working in a team to complete either homework or a team project.

The teams were assigned a series of eight interrelated projects. The first project did not earn the student a grade but needed to be completed correctly because its output fed into the remaining seven projects. Except for the first project, each project carried the same weight when calculating the overall project grade.

2.2 Pedagogical Course Structure

In our database management course, students are placed within the first two weeks of the semester into teams that then work to complete a series of interrelated team projects. Unless there are mitigating circumstances, each student stays in one team for the entire semester. The course is a mixture of theory and application. After learning a central concept, student teams apply that concept to the design, development, and manipulation of a database system.

After spending two weeks working with different members of the class, students self-selected their teammates. This strategy was adopted because students prefer choosing their teammates as opposed to being assigned to a team, and, as a result, report better team experiences. (Bacon, Stewart, & Silver, 1999) Some research argues that faculty-assigned teams minimize the possibility of students self-selecting friends and, therefore, organizing teams that are unreflective of the business environment. (Adams & Laksumanage, 2003) It was our judgment that the learning environment would be enhanced if students chose their own teammates.

Because of the layout of our computer labs, our teams were small, ranging from two to four students with three being the norm. These small teams worked together to design, develop, and manipulate a database system. Students had approximately one to two hours of lab time each week to work with team members. They also needed, on average, four hours of time outside the class to complete their projects. Of these four hours, students self-reported that two hours were spent working with their team and two hours were spent working individually on the team project.

To facilitate team activities, we created space in our LMS for each team in the three classes. This space, which is outside of the normal course space, provided each team with a closed environment that only they and the instructor could access. For most of the students in this study (69%), this was their first exposure to a collaborative student environment in the LMS. The team space allowed email, chat and collaborative document tools for team members. Students could upload their files and create versions of each document, post instructions and messages for their teammates, and organize files. The instructor was able to enter each team's assigned space to review student usage statistics and view student work. By reviewing the system's usage data, we believed that we could objectively identify any social loafers.

In the past, attempts to identify social loafers through classroom observation and peer assessment were difficult. Accuracy of student and instructor judgment, perceptional biases, student self-interest, and the high cohesiveness in some groups may bias upward the evaluation of team members and can hide the loafer. (Fellenz, 2006)

We implemented an objective avenue for tracking student participation within the team space by providing students with the ability to up/download documents that the team needed to work on using our "Collaborative Document Management" module (CDocs). Any student in a group could add a CDoc (Collaborative Document) to their group's space. Students could not, however, view CDocs that had been uploaded to teams other than their own. Unlike course space, students had full control over their team documents, allowing them the ability to upload, download, and delete documents.

One feature provided by the CDoc system allowed students to "Check out" a document, so that other team members were aware that they were actively working on that document. While "Checked Out," the document could be viewed by other team members, but could only be changed by the student who initiated the "Check Out" procedure. After a student finished working, he or she could "Check In" the new version along with a summary of what changes were made. This allowed other team members to learn quickly what work was completed, what issues were still open, and what work needed to be finished. The student was expected to post a status report update on the document he or she checked in, which promoted an open dialogue within the group. In addition, newer versions of documents were threaded with the previous version, so that there was a history of the students' work. The instructor could also post files quickly to the team space. Security was tight since files were stored on the network; backup and virus protection routines automatically ran before the system allowed the document to be made available to the team.

Through the course's administrator module, instructors could discover the level of participation of all team members by reviewing team statistics, such as the number of logins per student, activity within each module (such as CDocs), as well as the amount of time spent on a particular task. This analysis tool allowed instructors to spot problems in teams and address them before they become a major problem.

To appraise students' self- and peer-evaluations, we used a tool initially developed in 2003 by an interdisciplinary team of researchers who later were awarded a National Science Foundation (NSF) grant to continue this work. CATME (Comprehensive Assessment of Team Member Effectiveness) is a free web-based instrument developed by Loughry, et al, to measure a range of team processes. (Loughry, Ohland, & Moore, 2007) These researchers built a secure, web-based system grounded in relevant literature, best practices, and independent empirical research. The CATME evaluation tools enabled students to rate their own and their teammates' performance on a series of dimensions, including the ones used in this study (contributions, interactions, scheduling, quality, knowledge, skills, conflict, and satisfaction). The CATME application allowed us to create an environment where evaluations were completed in a confidential location (e.g., home). Because the tool provided both aggregate and detailed data for each student and team, we had the ability to ensure that all students completed evaluations for each member on their team and for each dimension of the evaluation. The system also allowed us to quickly identify those students who attempted to manipulate the process since these students were flagged by the system (e.g., giving teammates low scores while inflating their self-evaluation scores).

3. METHODS

To measure team participation, we reviewed student usage data from our LMS and peer evaluations. The usage data provided an activity log for each student within his or her team space. Each data point in the log was time-stamped and contained an activity code and description. From this data, we were able to determine the number of times each student logged into his or her team space and used any of the tools provided to them. The activity levels for email and online chatting were low, apparently because team members shared contact information and relied on personal emails, texting, and social media instead of the LMS for such communication. Therefore, we focused on two measures: LOGIN and CDocs. LOGIN data provided the date and time that each student entered the system. CDocs data included the date/time for each use of this tool and all uploads/downloads for team documents. Because each data point was time-stamped, we were able to separate the activity during the first half of the semester from the second half. Throughout the first half of the semester, students completed three group projects, two of which were graded. During the second half of the semester, students completed five graded team projects.

At the midway and end points of each semester, students assessed themselves and their team members. We used the CATME tool to conduct this self- and peer-evaluation. The categories selected for this research can be found in Table 1.

Smith and Smarkusky (2005) advocate using both mid-semester and end-of-semester student peer assessments to measure the quality of process, communication, interactions, contributions, and responsibility of team members. The CATME tool incorporates these measures either directly or indirectly. The tool also identifies students who rate themselves differently from their team members and students who manipulate the system to gain a higher evaluation than they deserve. (Ohland & et. al.)

4. RESULTS

Students completed three team assignments before mid-semester grades were posted; two of these assignments were graded. One team ended up disbanding mid-term, with one student reassigned to another team and the other two students working individually and without a team. During the second half of the semester, teams completed five graded assignments with an additional overall grade for their database. Our statistical research therefore focuses first on the midterm data, and then on the performance of groups in the second half of the course, including the quality of the teamwork itself.

Categories of Measurement	
Performance Measures: Students Rate Each Other (Self Ratings Have Been Removed)	
C	Contributing to the Team's Work
I	Interacting with Teammates
K	Keeping the Team on Track
E	Expecting Quality
H	Having Related Knowledge, Skills, and Abilities
Conflict Measures: Students Measure the Team NOT Each Student	
T1	How much conflict of ideas is there in your work group? *(Task Conflict)*
T2	How frequently do you have disagreements within your work group about the task of the project you are working on? *(Task Conflict)*
T3	How often do people in your work group have conflicting opinions about the project you are working on? *(Task Conflict)*
R1	How much relationship tension is there in your work group? *(Relationship Conflict)*
R2	How often do people get angry while working in your group? *(Relationship Conflict)*
R3	How much emotional conflict is there in your work group? *(Relationship Conflict)*
P1	How often are there disagreements about who should do what in your work group? *(Process Conflict)*
P2	How much conflict is there in your group about task responsibilities? *(Process Conflict)*
P3	How often do you disagree about resource allocation in your work group? *(Process Conflict)*
Satisfaction Measures: Students Measure the Team NOT Each Student	
Q1	I am satisfied with my present teammates
Q2	I am pleased with the way my teammates and I work together
Q3	I am very satisfied with working in this team

Table 1: CATME Categories used in Research

4.1 The Determinants of Group Work Quality at Mid-semester

There are three potential sources of data for predicting group performance: the LMS for the course, the college's student information system, and CATME, the free group-assessment system available online. We began by exploring the contribution of information generated by the LMS data to predict average midterm group-project grades.

Total logins into the LMS helped explain 20% of the variation in student group-work grades (see Table 2). However, the frequency with which they accessed CDocs had an even stronger significant correlation, with an R^2 of 25% (eq. 2). Logins included emailing and online chats, which were not frequently used. A student could log in for one minute or for an hour and a half; the system did not determine the length of time a student spent on the system. When the student entered CDocs, and every time he or she uploaded or downloaded a CDocs file, this was picked up as additional CDoc activity. Consequently, CDocs scores that were higher relative to logins, or higher relative to other students', indicated more editing or organizing of files, behavior directly relevant for coursework. The ensuing regressions focused on CDocs as the preferred predictor.

Using the CATME software, we asked students to evaluate their fellow group members along three dimensions: a measure encompassing student Contributions to the team, Interactions with teammates, Keeping the team on track, Expecting quality, and Having knowledge or skills (CIKEH); a measure of team conflicts over Tasks, Relationships, and Processes (TRP); and overall satisfaction with the team (Q). At this mid-point in the semester, none of the CATME measures proved statistically significant. However, many students, as many as 12 on some CATME dimensions, did not complete the CATME assessments, so there were as few as 70 instead of 82 observations.

Early in the semester students may not have enough experience with each other to develop a good sense of each other's skills, or to feel comfortable reporting on overall satisfaction or team conflict, knowing that their teammates would see how they had been evaluated by their teammates as a group. Scores are shared to promote accountability for students with low group commitment, in principle signaling their need to improve, and encouraging those who have been participating. While scores are individually anonymous, if all evaluators within a team gave low scores to a student, for instance, this could have negative repercussions if the student who was criticized chose to be vindictive. This vindictive behavior could flow outside the classroom and into other courses, and could have potential, ongoing consequences.

Initial student anxiety with peer evaluations is considered normal and, at times, students may not be willing to accept responsibility for evaluating their peers' performance. To increase the quality of peer assessment, students need to understand the criteria for assessment, what constitutes high quality work, and how their performance relates to their peers. Despite these concerns about the reliability of peer evaluations, they can be as effective as traditional assessment methods. (Topping, 1998) Future research might fruitfully explore the benefit of not sharing

	C	CDocs	Qave	CIKEH	RTP	GPA	Credits Complete	Credits TCNJ	F	R squared	n
1	82.564								19.42*	0.195	82
	(64.66)*										
2	82.905	0.033							27.35*	0.255	82
	(77.46)*	(5.23)*									
3	81.660	0.032		0.364					12.10*	0.249	76
	(23.04)*	(4.80)*		(0.43)							
4	88.668	0.030			-1.179				9.17*	0.257	70
	(18.47)*	(4.14)*			(-1.04)						
5	80.041	0.032	0.748						11.10*	0.258	70
	(23.65)*	(4.41)*	(1.00)								
6	68.747	0.030				4.714			19.12*	0.349	82
	(14.23)*	(5.52)*				(3.3)*					
7	78.068	0.031					0.246				
	(27.24)*	(5.08)*					(1.95)^		16.76*	0.291	82
8	77.726	0.030						0.331			
	(39.43)*	(5.2)*						(3.56)*	21.81*	0.344	82
9	63.981	0.027				4.614		0.323			
	(14.00)*	(6.60)*				(3.49)*		(3.78)*	20.71*	0.434	82
	Significance: * 1% Level			5% Level		^ 6% Level					

Table 2: Raw Projected Final Grade on LMS and CATME

the CATME results with students, to encourage more honest and complete assessments and improving reliability.

We then drew on data available from the college's student information system. Because there was evidence of heteroskedasticity, not uncommon in cross-section analysis, we provide robust estimations only. Interestingly, the accumulated credits at TCNJ outperformed total credits in explaining successful group work (significant at the 1% level vs. 5% level for a one-tailed test, and correspondingly higher R-squared). This may reflect the fact that the standard for work at TCNJ is higher than the colleges our transfer students come from, so more seniority at TCNJ means more experience meeting that standard. The subsequent analysis includes TCNJ credits only. Student GPAs were also significant, and the three variables combined explain 43% of the variance in group-project grades, which are respectable cross-section results.

4.2 The Determinants of Group Work Quality in the Second Half of the Semester

We again began with total logins to the system, which was shown to be statistically significant, adjusting estimated significance for heteroskedasticity. CDocs activity was once more a superior indicator, with comparable improvements in R^2 to what we found for mid-semester (see Table 3).

Subsequently, we experimented with the various factors CATME identified to capture how well students and teams functioned. As with the mid-semester grades, these had no statistically perceptible impact on teamwork scores. We therefore did not continue to include these measures in the analysis. It was surprising that none of these were successful in helping predict success on the Group Project.

We turned to college measures of academic performance and preparedness, regressing Group Project scores first on GPA, then GPA and accumulated credits. Again, there was evidence of heteroskedasticity, so robust estimates are offered in the table. Once more, credits accumulated at TCNJ were a more successful predictor of success than overall credits. For the end of the semester data, this simple model explained 39% of the variation in teamwork scores, which is a reasonable result.

4.3 The Determinants of Team-Member Relative Success

Sometimes, team members contribute at different levels

C	Login	CDocs	Qave	CIKEH	RTP	GPA	Credits Completed	Credits TCNJ	F	Rsq	n
81.570	0.273								21.53*	0.210	81
(46.64)*	(4.64)*										
83.262		0.059							37.79*	0.246	78
(63.87)*		(6.15)*									
78.785		0.059	1.013						20.52*	0.262	78
(16.89)*		(6.4)*	(1.07)								
81.543		0.058		0.432					19.38*	0.248	78
(14.41)*		(5.95)*		(0.33)							
89.109		0.060			(1.291)				19.56*	0.252	78
(14.56)*		(6.00)*			(-0.89)						
72.973		0.056				3.385			20.80*	0.290	78
(13.33)*		(6.32)*				(2.07)+					
68.647		0.053				3.340	0.223		12.43*	0.317	78
(10.42)*		(5.64)*				(1.97)^	(1.41)&				
67.123		0.051				3.466		0.353	13.93*	0.388	78
(11.55)*		(5.48)*				(2.1)+		(2.92)*			
Significance: * 1 % level			+5 % level		^ 6 % level		&17% level				

Table 3: Raw Project Final Grade, Five Final Assignments, Robust Estimations

to any group project. To capture this, a Team Contribution grade was incorporated into the course grade. CATME creates an Adjustment Factor for team performance based on team members' CIKEH ratings of a particular member as a proportion of the total average team CIKEH ratings. CATME caps the Adjustment Factor at 1.05, but mandates no lower limit; the lowest score in the three course sections we studied was .49. This Adjustment Factor was multiplied by 10% and added to the other course scores, which together were weighted 90%. So the Adjustment Factor *qua* Team Contribution grade would function as extra credit for those students whom peers saw as contributing to the group above everyone else. When all team members pulled together, each student received 100% for their Team Contribution grade. But when a team member pulled more than their weight, they could earn up to 105% of their Team Contribution grade, reflecting their greater input; under-performing team members would earn a lower Adjustment Factor and therefore a lower course grade.

We explored statistically discernible contributors to Team Contribution. Like their work-product grades, accessing CDocs and the student's GPA positively influenced Team Contribution. However, credits accrued at TCNJ had no significant impact on Team Contribution (see the second equation estimate, Table 4). This was surprising, since TCNJ business courses tend to incorporate group work, which would mean that those having taken more business courses would be more experienced group participants. In case CATME's truncation of the Team Contribution measure at 1.05 was distorting the results, we also experimented with the unaltered CIKEH measure as the dependent variable, with comparable results (t=.66 for TCNJ credits, including CDocs and GPA in the equation).

The other two CATME factors besides CIKEH (conflict and satisfaction) might also impact Team Contribution. Since some conflict is natural in a creative team process, a two-tailed test was necessary for the first explanatory variable. The Conflict measure (RTP) had a negative impact, but significant only at the 32% level. We then explored the possible contribution of the individual underlying components of this factor. One, Task Conflict, proved significant at the 14% level in a two-tailed test. With GPA (only significant at the 11% level) and CDocs, the combined R^2 is 19%.

The second CIKEH measure we included, student satisfaction with their team (Q_{ave}), was also not significant (see Table 5). As we had for the conflict measure, we experimented with individual measures comprising the average, and found that the first, satisfaction with teammates, was significant at the 10% level, but garnered a negative sign, a spurious result. The other two dimensions, satisfaction with how the team worked together, and satisfaction with working in this team, had no appreciable impact.

C	CDocs	TCNJ Credits	GPA	RTPavg	Ravg	Tavg	Pavg	R-squared	F
4.005 (25.32)*	0.002 (2.48)*							0.059	6.13+
3.890 (13.2)*	0.002 (2.45)*	0.007 (0.54)						0.063	3.17+
2.267 (3.69)*	0.001 (2.57)*		0.577 (3.07)*					0.163	7.30*
2.505 (2.87)*	0.001 (2.56)*		0.576 (3.05)*	-0.052 (-0.33)				0.164	4.89*
1.788 (1.81)+	0.001 (2.61)*		0.576 (3.02)*		0.104 (0.61)			0.167	4.91*
3.160 (3.59)*	0.001 (2.67)*		0.574 (3.02)*			-0.193 (-1.57)^		0.179	5.73*
2.285 (2.86)*	0.001 (2.53)*		0.577 (3.09)*				-0.004 (-0.02)	0.163	5.49*

Significance: * 1 % level +5 % level ^14% level, 2-tailed test

Table 4: Team Performance (CIKEH) Results, Conflict Measures, Robust Estimates

C	Cdocs	GPA	Tavg	Qavg	Q1	Q1	Q3	R-squared	F
2.561 (3.11)*	0.001 (2.54)*	0.584 (3.10)*		-0.071 (-0.74)				0.170	5.65*
2.674 (3.68)*	0.001 (2.56)*	0.583 (3.09)*			-0.097 (-1.37)&			0.18	6.21*
2.389 (2.79)*	0.001 (2.54)*	0.579 (3.08)*				-0.029 (-0.20)		0.164	5.22*
2.449 (3.01)*	0.001 (2.56)*	0.585 (3.13)*					-0.046 (-0.48)	0.166	5.48*
3.347 (3.71)*	0.001 (2.62)*	0.579 (3.04)*	-0.160 (-1.22)		-0.082 (-1.1)			0.190	5.25*

Significance: * 1 % level &10% level

Table 5: Team Performance (CIKEH) Results, Satisfaction and Conflict Measures, Robust Estimates

These results do not inspire confidence in the non-CIKEH CATME measures. It is possible that the problem stems from students' hesitation to report the truth, knowing their teammates might discern who rated them and how. Or, the problem may inhere in the framing of the survey; these are questions for future research. Nevertheless, the results do suggest two different points of entry for faculty for early intervention that will help improve team functioning: using learning management systems to check which team members are accessing team work products through CDocs, and using a CATME or other survey to identify teams with high Task Conflict.

We found that when students realized that we were monitoring their activity and were meeting with individual students who generated low CDocs activity and/or high conflict scores, the extent of social loafing was reduced. We also discovered that having constructive conversations, backed up with objective data, with students who were identified as contributing to an inequitable distribution and quality of work helped many students reengage in the course and with their teams. By reviewing activity levels measured

by individual CDoc data, we were able to identify potential low achievers and then counsel them on methods for improving the quantity and quality of contributions to the group. Finally, by having access to self-reported conflict scores, we were able to engage in meaningful conversations with students struggling with weak team members and provide them with guidance and coping mechanisms.

5. CONCLUSION

To evaluate student contributions to teamwork objectively, we examined data from our LMS, student information system, and CATME, a free, online student-evaluation system. We found that a student's participation activity in the assigned team space located in the LMS could help us identify students who were not actively engaged with their team. Student activity logs correlated with team project grades and, as a result, helped us unearth potential "Free Riders" or "Social Loafers". By using student usage data that correlates with team project grades, we were able to move away from subjective analyses of team dynamics to objective analyses. Because of this switch, we were able to recognize real team problems and either help students effectively manage team members or disband a team and reconfigure it to create a more successful learning environment.

In this study, we discovered that students who had earned more credits at TCNJ achieved higher project grades than transfer students and underclassmen. These findings suggest that the School of Business has been successful in providing students with positive team experiences that prepared them for their careers. This may or may not be true of other schools and these findings should be confirmed at our school with more research.

In addition to student usage data, GPA, and credits earned, we examined peer evaluations data from CATME.org. The data we collected with this free online tool had no statistically perceptible impact on teamwork scores. In fact, our results showed that the CIKEH scores (see Table 1) had no effect on project scores in this study. We also found that CDocs and GPA correlated to some degree with team contribution scores but that credits earned at TCNJ did not. This is concerning, given our hypothesis that learning to do group work at TCNJ was part of the reason that that measure outperformed total credits accumulated. It also raises questions about the reliability of the peer evaluations expressed in CIKEH scores. More study needs to be conducted in this area since the problem may stem from a number of issues including potential student hesitation to report the truth.

We found that the only CATME measure that provided us with some insight into projected team scores was Task Conflict. So, our findings overall suggest that reviewing the data usage statistics provided for students in a team space within the LMS and examining high Task Conflict measures in CATME could provide early intervention assistance to improve team functioning.

6. REFERENCES

AACSB International. (2013). 2013 Business Accreditation Standard 9. Retrieved June 24, 2013, from AACSB International: http://www.aacsb.edu/accreditation/business/standards/2013/learning-and-teaching/standard9.asp

Adams, S. G., & Laksumanage, B. (2003). Building Successful Student Teams in the Engineering Classroom. Journal of Science Mathematics, Engineering and Technology , 4/3 & 4.

Adams, S., Bianey, R., & Ulloa, C. (2004). A Conceptual Framework for Designing Team Training in Engineering Classroom. Proceedings of the 2004 American Society for Engineering Education Annual Conference & Exposition , 1-12.

Bacon, D. R., Stewart, K. A., & Silver, W. S. (1999). Lessons from the Best and Worst Student Team Experiences: How a Teacher Can Make a Difference. Journal of Management Education , 23, 467.

Buckenmyer, J. A. (2000). Using Teams for Class Activities: Making Course/Classroom Teams Work. Journal of Education for Business , 76 (2), 98-107.

College Portrait of Undergraduate Education. (2012, Fall). Compare Colleges. Retrieved July 23, 2013, from TCNJ College Portraits: http://www.collegeportraits.org/side_by_side/430

Fellenz, M. R. (2006). Toward Fairness in Assessing Student Groupwork: A Protocol for Peer Evalutions of Individual Contributions. Journal of Management Education , 30 (4), 570-591.

Figl, K. (2010). A Systematic Review of Developing Team Competencies in Information Systems Education. Journal of Information Systems Education , 21 (3), 323-337.

LeJeune, N. (2003). Critical Components for Successful Collaborative Learning in CS1. Journal of Computing Sciences in Colleges , 19 (1), 275-285.

Loughry, M. L., Ohland, M. W., & Moore, D. D. (2007). Development of a Theory-Based Assessment of Team Member Effectiveness. Educational and Psychological Measurement , 67 (3), 505-524.

Ohland, M., & et. al. (n.d.). System Help/Team-Maker Data & Team Assignments. Retrieved June 16, 2013, from CATME: https://www.catme.org/faculty/help#tm_display_results

Ruiz, U., Bianey, C., & Adams, S. G. (2004). Attitude Toward Teamwork and Effective Teaming. Team Performance Management , 10 (7/8), 145-151.

Smith III, H., & Smarkusky, D. (2005, October). Competency Matrices for Peer Assessment of Individual Team Projects. SIGITE'05: Proceedings of the 6th Conference on Information Technology Education , 155-162.

Smith III, H., Smarkusky, D., & Corrigall, E. (2008). Defining Projects to Integrate Evolving Team Fundamentals and Project Management Skills. Journal of Information Systems Education , 19 (1), 99-111.

The College of New Jersey. (2013, 06). TCNJ at a Glance. Retrieved 07 23, 2013, from TCNJ: Admissions: http://admissions.pages.tcnj.edu/about-tcnj/tcnjataglance/

Topping, K. (1998). Peer Assessment between Students in Colleges and Universities. Review of Educational Research , 68 (3), 249-276.

AUTHOR BIOGRAPHIES

Lynn M. Braender (Ph.D. Drexel University) is an

Assistant Professor of Management Information Systems in the School of Business at The College of New Jersey. She's taught courses in Software Engineering, Web Development, MIT, and Database Management. She currently leads the Assurance of Learning activities at the School of Business and has recently held the post of Academic Computing Advisor to The College of New Jersey. Before joining TCNJ, she worked for McGraw-Hill as a software editor and as a software consultant to businesses along the New Jersey shores.

Michele I. Naples, Associate Professor of Economics at The

College of New Jersey. PhD University of Massachusetts, Amherst 1982; A.B. Princeton University 1976. Research interests include the contribution of financialization to increasing income inequality, teamwork in the workplace and in the classroom, and autism, including educational costs and environmental and dietary impacts

STATEMENT OF PEER REVIEW INTEGRITY

All papers published in the Journal of Information Systems Education have undergone rigorous peer review. This includes an initial editor screening and double-blind refereeing by three or more expert referees.

ISSN 1055-3096