International Journal of Teaching and Learning in Higher Education 2020, Volume 32, Number 2, 293-304
http://www.isetl.org/ijtlhe/ ISSN 1812-9129

Collaborative Learning Techniques, Student Learning Outcomes, and Equal Workload within Groups in Different Teaching Modalities

Megumi Kuwabara, Susan D. Einbinder, Rui Sun, and Roya Azizi
California State University Dominguez Hills

A Faculty Learning Community comprised of four faculty members evaluated their work of implementing collaborative learning techniques (CoLTs) into their graduate and undergraduate courses that included different teaching modalities (traditional classroom, hybrid, and online). Two research questions were examined: a) Did students perceive that the implementation of CoLTs facilitated their mastery of course-specific student learning outcomes?, and b) Did students perceive that their group members worked equally? A total of 133 students participated in this study by filling out a survey asking for their evaluation of mastery of student learning outcomes and peer evaluation of group members' collaborative effort. Results show that the implementation of CoLTs facilitated students' perception that they mastered the course-specific learning outcomes and that the workload was equally distributed among their group members. The contributions of current work and the potential use of the student survey used in this study are discussed.

Collaborative learning is a form of group learning during which two or more students in a class work together and share workload equitably to complete assignments that are intentionally created to meet the student learning outcomes of the class (Barkley, Major, & Cross, 2014). Collaborative learning is rooted in two learning theories: one is social constructivism by Vygotsky (1978) stating that knowledge is constructed by socially interacting with other individuals; another is the observational learning theory by Bandura (1977) stating that knowledge is gained by imitating and modeling other individuals. By implementing collaborative learning, instructors engage three of the seven principles for good education practices suggested by Chickering and Gamson (1987): encouraging student-faculty contact, facilitating cooperation and learning among students, and active learning. Implementing collaborative learning in the classroom puts an instructor in a position of a facilitator and a guide of learning rather than a deliverer of knowledge, and it put students in charge of their learning (Flannery, 1994). While instructors in higher education have utilized student collaboration in classes, collaborative learning techniques (CoLTs) represent planned and intentional methods to facilitate collaboration in the class. The CoLTs range from simple (e.g., think-pair-share) to complex (e.g., jigsaw) techniques, but all techniques must be individualized and customized to suit the contents taught in the class (Barkley et al., 2014).

Implementing CoLTs in college and university courses has consistently been shown to enhance learning. For example, a meta-analysis conducted by Springer, Stanne, and Donovan (1999) showed that STEM (Science, Technology, Engineering, and Math) classes in undergraduate-level courses improved student exam grades. Other studies have shown that CoLTs improved student's critical thinking skills and engagement in classes (Clem, Mennicke & Beasley, 2014; Kilgo, Sheets & Pascarella, 2015; Nelson, 1994), enhanced student persistence in math courses after failure (Lan & Repman, 1995), increased student's ability to transfer knowledge gained in one class to another (Loes & Pascarella, 2017; Wright, Millar, Kosciuk, & Penberthy, 1998), and deepened the level of learning (Vogt & Skop, 2017). In addition, a study found that collaborative learning generated higher benefits for students of color and students with educational challenges (Loes & Pascarella, 2017).

The benefits of CoLTs are not only academic but also extended to social and psychological aspects. For example, Johnson, Johnson, and Smith (2014) showed that the implementation of CoLTs facilitated liking among peers in the class, increased psychological adjustment (e.g., self-efficacy and self-esteem), and better attitudes toward the university and learning. Laal and Ghodsi (2012) showed that collaborative learning increased the awareness of diversity, reduced anxiety, and increased positive attitudes toward instructors. Courses with collaborative learning also facilitated students' communication skills, problem-solving skills, innovative or creative thinking, and better working with their team in engineering courses compared with the traditional courses (Terenzini, Cabrera, Colbeck, Parente, & Bjorklund, 2001).

The majority of the studies on the effectiveness of CoLTs focused on STEM courses and traditional graduate or undergraduate courses. It is not clear whether the effectiveness of CoLTs can be expanded to different teaching modalities (traditional classrooms, hybrid, and online) and different course levels (undergraduate- and graduate-level courses). Therefore, in this study we intend to fill in the research gap by examining whether the implementation of CoLTs facilitated students' perception of mastery of student learning outcomes in courses of different modalities and at different levels.

Table 1
Course Chosen for Evaluation by Level, Modality/Number of Sections, and Response Rate

Course	Level	Modality/sections	Response Rate (No. of responses/ No. of enrollment)
Undergrad 1	Undergraduate	Traditional - 2	98% (59/60)
Undergrad 2	Undergraduate	Online -1	93% (26/28)
Grad 1	Graduate	Hybrid - 1	81% (13/16)
Grad 2	Graduate	Traditional - 2	80% (35/44)

Table 2
Sample Distribution by Sex, per Class and Percentage of the Total Sample (n=133)

	Undergrad 1		Undergrad 2		Grad 1		Grad 2		Total	
	N	%	N	%	N	%	N	%	N	%
Female	58	44	18	14	9	7	30	23	115	86
Male	1	1	8	6	4	3	5	4	18	14
Total	59	44	26	20	13	10	35	26	133	100

Note: percentage differences are due to rounding.

Table 3
Sample Distribution by Race/Ethnicity, per Class and Percentage of the Total Sample (n=133)

	Undergrad 1		Undergrad 2		Grad 1		Grad 2		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
African Americans/non-Hispanic	3	2	2	2	6	5	7	5	18	14
African American/Hispanic	7	5	2	2	2	2	3	2	14	11
Asian/Pacific Islander	3	2	4	3	0	0	4	3	11	8
Caucasian/Non-Hispanic	2	2	5	4	2	2	4	3	13	10
Caucasian/Hispanic	29	22	11	8	1	1	15	11	56	43
Other	15	11	2	2	2	2	2	2	21	16
Total	59	44	26	20	13	10	35	26	133	100

Furthermore, we investigated a part of the definition of collaborative learning, "sharing workload equitably," by asking students whether they thought themselves and their peers in their groups contributed equally to the work during the CoLTs implemented activities. Based on our best knowledge, this part of the definition of collaborative learning has not been studied extensively. We found a study mentioning that despite the benefits of collaboration in the classrooms, many students complained about the unequal workload of group members to complete the collaborative activity (Chang & Brickman, 2018). Therefore, our study makes another contribution to the literature about the equal workload aspect of collaborative learning.

Methods

Three full-time and one part-time faculty at an urban, public university in Southern California, worked together over three consecutive semesters in a campus-sponsored, interdisciplinary Faculty Learning Community (FLC). The four faculty incorporated CoLTs into their classroom instruction and assessed its effectiveness using a student survey in the fall semester of 2017.

Participants

Table 1 contains details about the four courses chosen for this study, which included two graduate and two undergraduate courses.

One course was an asynchronous online course, another was a hybrid, and the remaining two were offered in a traditional classroom setting.

A total of 148 students were enrolled in these courses that utilized CoLTs. At the end of the fall 2017 semester, 133 students completed the survey, resulting in a response rate of 90 percent overall, with both graduate classes

generating lower response rates of 81 and 80 percent, respectively, while both undergraduate classes generated response rates of 93 and 98 percent, respectively.

Undergraduate students comprised 64 percent of the sample, and 86 percent were female, as shown in Table 2.

Table 3 shows the race/ethnicity of the sample by class. This distribution mirrors the diverse student population of the university.

Materials

The student survey designed for this study contained three sections (see Appendix A). The first section solicited the student's signature indicating whether or not the data could be used in this study (the informed consent text was included on the assignment guidelines, distributed to students before the survey). This section also asked for each student's year of birth, gender, and race/ethnicity. The second section asked each student to rate how well the student and other students in the collaborative group collaborated. The third section asked each student to evaluate how well the class-specific CoLTs facilitated mastering class-specific student learning outcomes.

Due to the heterogeneity of the courses in this study, and after reviewing existing instruments, a publicly available assessment of student collaboration (Manis, 2010-2014) was chosen (See Appendix A – Section 2). In the second section of the student survey, the assessment consisted of eight statements about collaboration and asked the student to evaluate the student's work as well as the work of each member of the group of students who had worked together on a class assignment using a rating scale where 1=weak, 2=below average, 3=average, 4=above average, and 5=superior. The questions addressed (1) participating in group discussions, (2) staying task-focused, (3) contributing usefully, (4) listening to others, (5) professionally and thoughtfully challenging seemingly incorrect responses, (6) noting the quality of contribution, (7) consistently and actively working toward the group goal, and (8) collaborating well. Two open-ended questions were included as well. The first asked the respondent to identify how to improve the collaborative work, and the other asked how the team of students might improve their future collaborative efforts.

The third section of the student survey was customized for each class. The section started with the following: "The purpose of this activity was to facilitate student mastery of the following course outcomes," and it included a list of student learning outcomes of respective courses. This section asked each student to rate how well the CoLTs helped them master student learning outcomes in each respective course using a Likert scale (0=Not at all; 1=A little; 2=A lot; 3=Totally). A score of 2 or more on this question was evidence that the CoLTs helped facilitating the mastery of student learning outcomes based on students' perceptions.

Procedure

The four faculty members who are co-authors of this study originally began collaborating in a one-semester FLC convened in spring 2017 after each member responded to a request to participate by the university's Faculty Development Center. During that period, each faculty member designed an individualized CoLT in his or her respective class. We requested, and were granted permission, to continue our work together in Fall 2017, during which time we implemented one or more CoLTs, which are listed in Appendix B, and the survey for evaluation and assessment of CoLTs were given to the students in each of the courses. The types of CoLTs used in this study were introduced by Barkley and colleagues (2014).

To assess the reliability of the survey instrument, Cronbach's alphas were conducted within each class and across all of them. Factor analysis was conducted to test whether all eight questions used in the survey instrument were necessary or if a more parsimonious number of questions could be used instead. Based on Cronbach's alphas, the alpha coefficients were extremely high (the overall alpha was .96; .93 for Undergrad 1, .86 for Undergrad 2, .92 for Grad 1, and .94 for Grad 2), suggesting that the survey questions were reliable. Factor analysis of the eight questions evaluating collaborative activities yielded one factor explaining a total of 78.73% of the variance (see Appendix C), thus that the survey questions measured one concept, collaboration among students.

Results

CoLT effectiveness

To test the first research question about whether the implementation of CoLTs facilitated students' perception of mastery of student learning outcomes taught in these courses, in the third section of survey questions students were asked to rate how well the CoLTs helped them master student learning outcomes in each respective course, and this was used as a dependent variable. Using a Likert scale (0=Not at all; 1=A little; 2=A lot; 3=Totally) across all classes and within individual course, students rated that the implementation of CoLTs helped them master the student learning outcomes as seen by the average rating (M=2.53, SD=.60 for all courses; M=2.68, SD=.58 for Undergrad 1; M=2.56, SD=.62 for Undergrad 2; M=2.15, SD=.63 for Grad 1; M=2.42, SD=.53 for Grad 2). Majorities of students also rated this question as 2 (a lot) or more (Undergrad 1 = 98.2%, Undergrad 2 = 88.5%, Grad 1 = 92.3%, Grad 2 = 80%), suggesting that there was an agreement among

students on how helpful the CoLTs were for them to master the student learning outcomes.

To compare students' perception of effectiveness of CoLTs based on class level, the student rating of student learning outcomes as a dependent variable and course level (undergraduate or graduate) as an independent variable were entered into ANOVA, which yield significant difference in students' ratings between undergraduate (M=2.64, SD=.59) and graduate level (M=2.35, SD=.56) courses, $F(1,129)=7.66$, $p<.01$. This shows that students in undergraduate-level courses rated the implementation of CoLTs more favorably than did those in graduate-level courses.

To compare students' perception of effectiveness of CoLTs based on teaching modality, the student rating as a dependent variable and teaching modality (traditional, hybrid, or online) as an independent variable were entered into ANOVA, which yielded marginal significant difference between traditional (M=2.58, SD=.57), hybrid (M=2.15, SD=.63), and online (M=2.56, SD=.62) courses, $F(1, 129)=3.02$, $p=.052$.

Equal Workload

To test the second research question, whether students perceived the implementation of CoLTs made the workload among group members equally, we used the second section of survey in which students rated eight questions about themselves and their group members on how well they collaborated. To do this, we calculated the standard deviation of the rating given by each student to measure the variability in rating, which suggested the variability in workload or collaborative effort. Therefore, the smaller the standard deviation given by a particular student was, the better the student's perception of equal workload among group members (including themselves) the student had. We counted how many students' ratings fell between zero to one standard deviation and zero to 0.5 standard deviations for each course (see Appendix D for an example rating given by a student). Overall, 97.7% of students' ratings fell into the range of standard deviation of zero to one (98.3% for Undergrad 1, 100% for Undergrad 2, 91.7% for Grad 1, and 97.1% for Grad 2), and 84.6% of students' ratings fell into the range of a standard deviation of zero to 0.5 (89.8% for Undergrad 1, 84.0% for Undergrad 2, 50.0% for Grad 1, 88.2% for Grad 2), suggesting that students felt that they and their group members contributed to the activity equally.

To compare students' perception of equal workload based on class level, the standard deviation of ratings as a dependent variable and course level (undergraduate or graduate) as an independent variable were entered into ANOVA, which yielded no significant difference between undergraduate (M=.20, SD=.28) and graduate level (M=.26, SD=.31) courses, $F(1,129)=1.44$, $p>.05$.

To compare students' perception of equal workload based on teaching modality, the standard deviation of ratings as a dependent variable and teaching modality (traditional, hybrid, or online) as an independent variable were entered into ANOVA, which yield significant difference among traditional (M=0.19, SD=.28), hybrid (M=.46, SD=.33), and online (M=.22, SD=.26) courses, $F(1, 129)=4.65$, $p<.05$.

Conclusion

This study investigated two research questions. The first question asked whether the effectiveness of CoLTs expands to different teaching modalities (traditional, hybrid, and online) and different course levels (undergraduate- and graduate-level courses). For this question, we specifically tested whether the implementation of CoLTs facilitated students' perceptions of the mastery of student learning outcomes. The second question asked whether students perceived themselves and their peers in their groups contributed equally to the work during the CoLTs implemented activities. For the first question, we found that although undergraduate students perceived the CoLTs more favorably than did the graduate students, the majority of students across all classes (all modalities across all levels) perceived the implementation of CoLTs to be an effective way to master their course-specific student learning outcomes. For the second question, although there were differences by teaching modalities, we found that the majority of students perceived the workload among themselves and their group members during the CoLTs implemented activity to be equal. These findings strongly suggest that the CoLTs introduced in these classes facilitated students' perceptions of mastery of course-specific student learning outcomes and effectively enhanced students' abilities to collaborate by equalizing the workload among their group members.

This study contributes to the expansion of findings showing the effectiveness of CoLTs in different teaching modalities and different course levels. It also adds knowledge to a new line of research investigating the workload among students during the CoLTs-implemented activities, which by definition should make the workload equitable. Our findings confirm that by implementing CoLTs, students perceived the workload to be equal among group members. Another contribution of this study is the survey instrument, which is reliable and can be individualized to measure specific course outcomes for any type of course in any modality.

Limitations

There are several caveats to this study. First, the students examined in this study were not randomly sampled: they were students of the instructors who were committed and actively working to improve the

quality of their teaching. Thus, the findings of this study cannot be generalized to all students, but they can probably describe students in classes with faculty who devote time to designing and implementing CoLTs and those who would be just as enthusiastic and invested in their teaching as the four instructors in this study.

Second, this was a non-experimental, post-test only study with a design that relied exclusively on students' perceptions for the dependent variables. The nature of this research effectively rules out using quasi-experimental or experimental designs. Future studies would benefit from triangulation, including student course grades, written comments in the instructor's teaching evaluation, and a pre-test inventory of perceived collaborative skills would enhance the rigor of the protocol.

Finally, the effectiveness of the collaboration among students might differ based on the demographics of students, which we did not have enough samples to investigate. For example, a previous study has found that cultural backgrounds, such as individualistic or collectivistic cultures, influenced the students' perception of collaboration (Popov et al., 2014). Another study found that immigration status influenced the effectiveness of collaboration (Stebleton, Soria, Alexixo, & Huesman, 2012). In addition to the demographic of students, we did not measure or evaluate how much learning climate might influence the effectiveness of CoLTs. For example, a previous study found that having staff support increased the effectiveness of collaboration in the classroom setting (Lizzio & Wilson, 2015).

Recommendations for Future Research

Replicating this study with other instructors who have designed and implemented CoLTs in their classes, and adding course grades, written comments from teaching evaluations, and a pre-test of perceived collaborative skills are recommended. A larger sample would also enable detailed analyses of student characteristics to evaluate whether gender, age, race, or ethnicity differences emerge in collaborative effectiveness. Ideally, systematically incorporating this survey into all courses that include a CoLT would enable the campus to develop a longitudinal database of CoLT effectiveness. As technological tools continue to grow, this database could be linked to overall student retention and graduation rates, allowing the university to model its work and to show that CoLTs enhance student retention and graduation rates.

References

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.

Barkley, E. E., Major, C. H., & Cross, K. P. (2014). *Collaborative learning techniques: A handbook for college faculty* (2nd ed.) San Francisco, CA: Jossey-Bass.

Chang, Y., & Brickman, P. (2018). When group work doesn't work: Insights from students. *CBE Life Science Education, 17*(3), 1-17.

Chickering, A. W., & Gamson, Z. F. (1987). Seven principles for good practice in undergraduate education. *American Association for Higher Education (AAHE) Bulletin, 39*(7), 3-7

Clem, J. M., Mennicke, A. M., & Beasley, C. (2014). Development and validation of the experiential learning survey. *Journal of Social Work Education*, *50*, 490-506. doi: 10.1080/10437797.2014.917900.

Flannery, J. L. (1994). Teacher as co-conspirator: knowledge and authority in collaborative learning. *New Directions for Teaching and Learning, 59,* 15-23.

Johnson, D. W., Johnson, R. T., & Smith, K. A. (2014). Cooperative learning: Improving university instruction by basing practice on validated theory. *Journal on Excellence in College Teaching, 25,* 85-118.

Kilgo, C. A., Ezell Sheets, J. K., & Pascarella, E. T. (2015). The link between high-impact practices and student learning: Some longitudinal evidence. *Higher Education*, *69*, 509-525. doi:10.1007/s10734-014-9788-z

Laal, M., & Ghodsi, S. M. (2012). Benefits of collaborative learning. *Procedia – Social and Behavioral Sciences, 31,* 486-490.

Lan, W. Y., & Repman, J. (1995). The effects of social learning context and modeling on persistence and dynamism in academic activities. *Journal of Experimental Education, 64*(1), 53-67.

Lizzio, A., & Wilson, K. (2005). Self-managed learning groups in higher education: Students' perception of process an outcomes. *British Journal of Educational Psychology, 75,* 373-390.

Loes, C. N., & Pascarella, E. T. (2017). Collaborative learning and critical thinking: Testing the link. *The Journal of Higher Education*, *88*(5), 726-753 doi:10.1080/00221546.2017.1291257

Manis, C. (2010-2014). *Cooperative learning: How to assign meaningful tasks to group members*. Retrieved from https://www.dailyteachingtools.com/cooperative-learning-tasks.html

Nelson, C. E. (1994). Critical thinking and collaborative learning. *New Directions for Teaching and Learning, 59,* 45-58.

Popov, V., Noroozi, O., Barrett, J. B., Biemans, H. J. A., Teasley, S. D., Slof, B., & Mulder, M. (2014). Perceptions and experiences of, and outcomes for, university students in culturally diversified dyads in a computer-supported collaborative learning environment. *Computers in Human Behavior, 32,* 186-200.

Springer, L., Stanne, M. E., & Donovan, S. S. (1999). Effects of small-group learning on undergraduates in science, mathematics, engineering, and technology: A meta-analysis. *Review of Educational Research, 69*(1), 21-51.

Stebleton, M. J., Soria, K. M., Aleixo, M. B., & Huesman Jr., R. L. (2012). Student-faculty and peer interactions among immigrant college students in the United States. *Multicultural learning and Teaching, 7*(2), 1-21. doi:10.1515/2161-2412.1122.

Terenzini, P. T., Cabrera, A. F., Colbeck, C. L., Parente, J. M., & Bjorklund, S. A. (2001). Collaborative learning vs. lecture/discussion: Students' reported learning gains. *Journal of Engineering Education, 90*(1), 123-130.

Vogt, B. J. & Skop, E. (2017). The Silverton Field experience: A model geography course for achieving high-impact educational practices (HEPs). *Journal of Geography in Higher Education*, *41*(4), 574-589. doi:10.1080/03098265.2017.1331421

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Wright, J. C., Millar, S. B., Kosciuk, S. A., & Penberthy, D. L. (1998). A novel strategy for assessing the effects of curriculum reform on student competence. *Journal of Chemical Education, 75*(8), 986-992.

MEGUMI KUWABARA earned her Ph.D. in Developmental Psychology from Indiana University, Bloomington. She is an Associate Professor in Child Development Department at California State University, Dominguez Hills. Her research investigates cross-cultural differences in cognitive development. In the areas of scholarship of teaching and learning, her research interests are the intersection between emotion and learning, student learning, collaborative learning techniques, active learning, and evaluation of teaching strategies.

SUSAN D. EINBINDER, MS, Ph.D., received her BA from Barnard College and her MS and Ph.D. from Columbia University. She is a Professor and founding faculty member of the graduate MSW Program at California State University Dominguez Hills in Carson, California, where she has been appointed a Faculty Fellow at the campus Faculty Learning Community in Fall 2018. Her interdisciplinary research explores how social policies can ameliorate poverty; translating Critical Race Theory into social work practices; expanding the use of research methods throughout social work education and professional practices; and evaluating different approaches to improve teaching excellence.

RUI SUN is a tenured Associate Professor in the Department of Public Administration at the California State University, Dominguez Hills (CSUDH). She received her Ph.D. in Policy Studies from the University of Maryland in 2009. Dr. Sun's research focuses on fiscal federalism, government budgeting, and nonprofit financial management. She has published in peer-reviewed journals and books. Dr. Sun has more than 10 years' experience in teaching public administration undergraduate and graduate courses both on campus and online. She is committed to High Impact Practices and has led the assessment of the public administration programs at the CSUDH.

ROYA AZIZI received her doctoral degree in Policy, Planning, and Development from the University of Southern California. She is an adjunct assistant professor at California State University, Dominguez Hills and California State University, Fullerton and an advisory council member of the Advancement of Sustainability in Higher Education (AASHE). Her research interests are in the areas of sustainable policy and planning, mentorship, and collaborative learning strategies. Dr. Azizi has been featured in KIRN 670am Radio programs regarding her work in sustainable policy objectives.

Acknowledgment

We thank the students who participated in this study. We also acknowledge and thank Provost Michael Spagna, MA, Ph.D., Kara Dellacioppa, PhD., Director, and Erika Torres, Assistant Director, Faculty Development Center at California State University Dominguez Hills for awarding faculty grants enabling our ongoing participation in this Faculty Learning Community from January 2017 through June 2018.

Appendix A

Student Survey

[Course Number and Title goes here]

Section 1

Your name_____

Date_____
This evaluation of your class activity is routine component of higher education instruction and may be required by your instructor. You are being asked to allow your instructor to use your feedback in a research study that will include similar feedback from a minimum of 200 CSUDH students in undergraduate and graduate classes.

☐ I agree to allow this feedback to be included in the instructor's research.

☐ I do NOT agree to allow this feedback to be included in the instructor's research.

Your signature_____

Demographic Characteristics
Please write down the year in which you were born _____
Please pick the one response that best describes your gender.

Female
Male
Trans
Other [Please describe_____]

Please pick the one response that best describes your race/ethnicity, which is presented using the nationally standardized classification system used by the US Census Bureau.

African American/Black, non-Hispanic
African American/Black, Hispanic
Asian or Pacific Islander
Caucasian/White, non-Hispanic
Caucasian/White, Hispanic
Other [Please describe _____]

Section 2

Instructions: Write the names of your group members in the numbered boxes below. Then, assign yourself a value for each listed attribute. Then, do the same for each of your group members. When you have finished, submit this online on Blackboard.

Score: 5=Superior
4=Above average
3=Average
2=Below average
1=Weak

Attribute[1]	**Myself**	**1.**	**2.**	**3.**	**4.**	**5.**
Participated in group discussions						
Stayed task-focused (Not distracted or distracting)						
Contributed usefully						
Listened to others						
Professionally and thoughtfully challenged responses that appeared to be incorrect						
Quality of contribution						
Consistently and actively worked toward a group goal						
Collaborated well						
TOTAL						

Additional comments about collaborating with your classmates (optional):

[1] Manis, Chad. (2010-2014). Daily Teaching Tools blog. Copied with permission from http://www.dailyteachingtools.com/cooperative-learning-evaluate.html

Open-ended qualitative questions

If you were to participate in this activity again, would you do anything differently to improve your work? Why/why not?

_____

_____

_____

How could your team improve its collaboration efforts?

_____

_____

_____

Section 3

The purpose of this activity was to facilitate student mastery of following course outcomes.

- ***Course Outcome X1***: Write the student learning outcome from the course that this activity addresses.
- ***Course Outcome X2***: Write the student learning outcome from the course that this activity addresses.

Using the scale below, please rank how well you think this activity accomplished its goal.

0=Not at all
1=A little
2=A lot
3=Totally

Purpose	Rank
Course Outcome X1	
Course Outcome X2	

Additional comments [optional]:

Appendix B

List of CoLTs used in each respective course

Undergrad 1	**Undergrad 2**	**Grad 1**	**Grad 2**
Note Taking Pairs	Round Robin	Test-taking Teams	Think-Pair-Share
Affinity Grouping	Talking Chips	Peer Editing	Note-Taking Teams
Round Table	Critical Debate	Team Matrix	Test-Taking Teams
Structured Problem Solving	Learning Cell	Jigsaw	Jeopardy

Appendix C

Reliability of Survey Questions: Principal Component Analysis for Eight Survey Questionnaire

		Loading
Participated in group discussion		0.886
Stayed task-focused (not distracted or distracting)		0.864
Contributed useful ideas		0.913
Listened to others		0.874
Professionally and thoughtfully challenged responses that appeared to be incorrect		0.816
Quality of contribution		0.908
Consistently and actively worked toward a group goal		0.918
Collaborated well		0.915
	Eigenvalue	6.298
	% of Variance	78.725

Appendix D

Example rating given by a student based on the different standard deviation

SD = 0.5

Attribute	**Myself**	**Peer 1**	**Peer 2**	**Peer 3**	**Peer 4**
Participated in group discussions	5	5	5	4	5
Stayed task-focused (Not distracted or distracting)	5	5	5	4	5
Contributed usefully	5	5	5	4	5
Listened to others	5	5	5	4	5
Professionally and thoughtfully challenged responses that appeared to be incorrect	5	5	5	4	5
Quality of contribution	5	5	5	3	5
Consistently and actively worked toward a group goal	5	5	5	4	5
Collaborated well	5	5	5	4	5

SD = 1.03

Attribute	**Myself**	**Peer 1**	**Peer 2**	**Peer 3**
Participated in group discussions	3	3	3	5
Stayed task-focused (Not distracted or distracting)	3	2	3	5
Contributed usefully	3	2	3	5
Listened to others	4	4	3	4
Professionally and thoughtfully challenged responses that appeared to be incorrect	3	3	3	5
Quality of contribution	4	2	3	5
Consistently and actively worked toward a group goal	5	4	3	5
Collaborated well	5	3	3	4