TEAM-BASED LEARNING: THE IMPACT OF TEAM COLLABORATION SOFTWARE ON INDIVIDUAL LEARNING OUTCOMES

Kevin Engellant
Erick E. Guzik
Sandra Williams

Abstract

Problem: *Insufficient knowledge exists about the influence of student collaboration on individual learning outcomes, especially within online learning environments.* ***Research Questions:*** *What impact does student collaboration (defined as teams of three students) have on individual learning outcomes within a beginning computer literacy course? How do learning gains for these collaborating students compare with gains for students who do not collaborate? Are student personality preferences, as indicated by the Myers Briggs Type Indicator (MBTI), correlated with student gain scores?* ***Research Method:*** *An experimental design with treatment and controls groups and pre/post testing was used to determine the significance of learning gains for students collaborating in teams of three.* ***Data Collection Procedures and Analysis:*** *Data was collected from six sections of an introductory computer literacy course during the 2013-14 academic year. A t-test was used to analyze the gain scores of collaborative student learning compared to individual student learning.* ***Findings:*** *Results indicate a statistically significant positive difference in gain scores ($p = 0.029$) of students learning collaboratively in an online environment compared to students learning individually in an online environment. In addition, a statistically significant difference in mean gain scores ($p = 0.011$) was found for collaborating students with the MBTI personality preference of Sensing and Intuition.*

Conclusions/Recommendations: *Our research results suggest that students who learn collaboratively online in teams of three students outperform students who learn online as individuals. Based on our results, we suggest the following as means to promote both collaboration skills and individual student learning outcomes within online learning environments:*

A. Shifting course format from solely individual activities to a balance of individual and collaborative activities.
B. Forming small teams of three to four students as a form of collaboration to best impact individual learning outcomes.
C. Matching the personality preference of students with the appropriate learning environments (collaborative and individual). Intuitive learners seem to especially benefit from the unique learning opportunities provided by online courses.

Dr. Kevin Engellant is an assistant professor of business at the University of Montana Western, Dillon, MT. He can be contacted at kevin.engellant@umwestern.edu.
Dr. Erik E. Guzik is an associate professor of economics at the University of Montana Western, Dillon, MT. He can be contacted at erik.guzik@umwestern.edu.
Dr. Sandra Williams is an associate professor of business at the University of Montana, Missoula, MT. She can be contacted at sandra.williams@mso.umt.edu.

Introduction

Although collaboration is emphasized as a desired student skill within many business curricula, debate continues over the actual impact of classroom collaboration on individual learning outcomes. For instance, Chesney (2003) suggests that student collaboration as a component of coursework mirrors the actual situations faced by graduates in the business world. According to this view, student collaboration better prepares students for the workplace by offering a more authentic learning experience. However, Roberts & McInnerney (2007) provide evidence that classroom collaboration, especially in the form of team projects, often leads to such issues as free-riding. From this perspective, student collaboration is often understood to hamper individual student learning.

Since collaboration and teamwork are increasingly understood as key soft skills required by graduates, business instructors now face a vexing question: How should collaboration be included as an effective component of required coursework? The recent explosion of online learning options, including Massive Open Online Courses (MOOCs) and various Learning Management Systems (LMSs), has introduced related considerations for business educators: If collaboration is indeed beneficial for students, how might instructors best implement online learning technology to take advantage of its benefits? For example, are online forums sufficient for effective student collaboration within traditional LMSs, or might other forms of collaboration be preferred within online learning environments?

This study explores the impact of team-based, online collaboration in an online introductory computer literacy course. The study compares the gain scores between pretest and posttest data of students separated into two groups: (1) students assigned to small teams of three, using collaborative learning software in an online environment; (2) students not assigned to a team, who completed the course as individuals in the same online learning environment. As an additional part of the study, the Myers-Briggs Type Indicator (MBTI) was administered online to students to determine their personality preferences. Resultant information was examined to determine potential relationships between student personality profiles and student ability to learn in an online collaborative environment.

Purpose and Research Questions

The purpose of this study was to gather evidence of the efficacy of collaboration on individual learning outcomes. An additional goal was to develop a better understanding of effective methods of promoting collaboration in online learning environments. For instance, the possibility of whether team-based learning in small groups of three students might present a viable option for online collaboration was explored. Finally, how personality preference might influence a student's success within a collaborative, online course was investigated.

As part of the study, data was collected from six online sections offered as part of a one-credit Computer Literacy course. Three sections of the course were

offered during the Fall 2013 semester, and three sections in the Spring 2014 semester. Each of the sections contained between 18-20 students. The same Associate Professor of Business taught all six sections of the course.

Approximately half of the students were assigned to the treatment group (online collaborative learning, consisting of learning teams of three students) and approximately half of the students were assigned to the control group (consisting of online individual learning). An online learning system was used to manage and track students assigned to collaborative teams as well as students assigned to work on course assignments individually.

During the first week of each course, an external pretest (Certiport IC^3 Fast Track Assessment) was administered to students. Students in treatment and control groups then completed a series of content-related assignments throughout the semester. The assignments completed by the treatment and control groups were identical; however, as noted above, students in the treatment group were placed on teams of three students to allow for collaboration on assignments. At the end of the course, an external posttest (the same Certiport IC^3 Fast Track Assessment) was administered to determine learning gains. The maximum score for the exam was 1000 total points.

As part of the study, a t-test was used to analyze the gain scores (posttest score minus pretest score) between individual student learning and collaborative team learning. In addition, t-tests were used to analyze a student's gain score based on four MBTI personality preferences: Extravert-Introvert (E-I), Sensing-Intuition (S-N), Feeling-Thinking (F-T) and Judging-Perceiving (J-P), independent of the type of learning instruction (individual or collaborative). An Analysis of Covariance (ANCOVA) was used to analyze each student's gain score based on the four MBTI personality preferences, dependent on the type of learning instruction (individual or collaborative); likewise, an ANCOVA was used to analyze the gain scores between pretest and posttest data. Finally, a factorial ANCOVA (2 x 2) was used to analyze each student's gain score based on collaborative versus individual learning (factor 1) and the four MBTI personality preferences (factor 2).

The main null hypotheses were stated as follows (for the full list of hypotheses tested, please see Appendix A):

$H1_0$: There is no statistically significant difference in gain scores between students learning collaboratively in an online environment and students learning individually in an online environment.

$H3_0$. There is no statistically significant difference between a student's personality type of Extravert-Introvert (E-I) and mean gain scores on the IC3 Fast Track Assessment, dependent on the type of learning instruction (individual or collaborative)

$H5_0$. There is no statistically significant difference between a student's personality type of Sensing and Intuition (S and N) and mean gain scores on the IC3 Fast Track Assessment, dependent on the type of learning instruction (individual or collaborative).

$H7_0$. There is no statistically significant difference between a student's personality type of Feeling and Thinking (F and T) and mean gain scores on the IC3 Fast Track Assessment, dependent on the type of learning instruction (individual or collaborative).
$H9_0$. There is no statistically significant difference between a student's MBTI Judging and Perceiving (J and P) preference and mean gain scores on the IC3 Fast Track Assessment, dependent on the type of learning instruction (individual or collaborative).

Literature Review

In designing and implementing an online collaborative learning environment for this study, the following questions were considered, initial responses to which were based on the current literature:

- How is the construct of collaboration defined?
- What are the potential advantages and disadvantages of collaborative learning and collaboration software?
- How might effective student collaboration within an online learning environment be secured?

A Definition of Collaborative Learning

One of the initial challenges with promoting collaboration within business curricula is that experts have a difficult time agreeing on a definition of collaborative learning. According to Yazici (2009), "Collaborative learning is the instructional use of small groups or teams where peer interaction plays a key role in learning" (p. 217). Similarly, Dillenbourg (1999) defines collaborative learning as "a situation in which two or more people learn or attempt to learn something together" (p. 1). Although these and other definitions differ, common terms of collaborative learning seem to emerge from the research, which together provide an initial conceptualization of practical use to this study: Collaborative learning takes place when students learn together.

In support of this definition, it should also be noted that the terms cooperative learning and collaborative learning have often been confused and used interchangeably. Although there are some similarities between these two terms, cooperative learning and collaborative learning have slightly different meanings. With cooperative learning, each member is often responsible for solving a portion of the problem (in essence, team members operate at the same time), often times independently from the rest of the group. In contrast, with collaborative learning, the members of the team work interactively on the same task. Indeed, an important, constituent factor of collaboration is the quality of interactions among the team members (Dillenbourg, 1999). For the purposes of this study, the initial conceptualization of collaboration is as follows: Collaborative learning takes place when students learn together in an interactive and interdependent manner.

Advantages of Collaborative Learning and Online Collaborative Learning

Lai (2011) indicated that collaboration can have positive effects on student learning, especially for low-achieving students. Collaboration may also enhance student motivation, as working with others often triggers situational interest and curiosity. Moreover, collaborative learning activities often allow students to explain their understanding to peers (Van Boxtel et al., 2000). This form of peer explanation may help students better elaborate, reorganize, and reify knowledge (Dillenbourg, 1999).

In regards to online learning, existing research indicates student collaboration may likewise be of great benefit to students. As McAlpine (2000) noted, online learning affords students the opportunity to work at a time and a place that fits individual schedules. In online environments, students also tend to have greater time for reflection within group contexts. Although misunderstandings and disagreements can often occur in a collaborative learning environment, these misunderstandings can also aid in the learning process if individuals have the time and opportunity to explain and justify viewpoints and positions.

Additional learning benefits have been identified relating to online collaboration. Klemm (1997) noted the following: (a) teachers can see and respond to what all students are thinking; (b) shy students have a voice; (c) aggressive students are less able to dominate; (d) slow students are less embarrassed; (e) all students have time to produce good work; (f) students showcase better focus on provided tasks; (g) work is more efficient; (h) work can be anonymous, and (i) students exhibit pride of ownership. Brindley and Walti (2009) identified several pedagogical benefits of online collaborative learning, including the: (a) development of critical thinking skills, (b) co-creation of knowledge, and (c) student participation in the creation of meaning, reflection and transformative learning.

Disadvantages of Online Collaborative Learning

Although there are many advantages of online collaboration, there are disadvantages as well. Indeed, according to Kezar (2005), over 50% of collaborations fail. One possible reason for this seemingly high failure rate is what Yazici (2009) terms the *malfunction of teams*, which may itself be the result of several factors. For instance, students may not be properly trained on how to collaborate effectively or may not understand the potential benefits of collaboration, including its robust use and central role within the actual workplace (Roberts and McInnerney, 2007).

Another potential problem with online collaboration is the well-known *free rider effect* (Kerr & Bruun, 1983), a situation in which one or more of the group members do little or no work to contribute to the group, thereby reducing the potential and effectiveness of all group members. Free riders perceive that their efforts are not necessary to the overall success of the team. If a team has a free rider, the other members of the group must make up for the lack of work and effort of the free rider. The free rider effect is especially pernicious given the often

negative perceptions of group-work held by many students; students oftentimes loathe any form of collaboration given the belief that only some students within a group or team will end up doing the bulk of the work (Aggarwal and O'Brien, 2008). Kerr and Bruun (1983) also indicated the *sucker effect* can be an issue with collaborative learning, which occurs when one or more of the more capable students in the group feel compelled to complete the majority of the assigned work. Potential solutions to the free rider and sucker effects are instructor assessment of student work at the individual level rather than group level, as well as anonymous peer assessment (Wagar & Carroll, 2012).

According to Capdeferro and Romero (2012), frustration is one of the most mentioned emotions associated with online collaborative learning. The authors noted the following areas of frustration involving online learners and the collaborative learning experiences: (a) team members' lack of shared goals, (b) difficulties related to group organization, (c) the inequities in the level of commitment of team members, (d) the quality of team members' contributions, (e) imbalance between individual and collective grades, and (f) difficulties in communication. Further, technology issues, such as inaccessible websites or software bugs, often increase a student's level of frustration (Goold, et al., 2008).

Effective Online Collaborative Learning

As noted previously, a key for a successful collaborative learning experience is proper preparation of students for online collaboration (Bernard et al., 2000). Many students have no prior online collaboration experience or lack proper training for effective online collaboration. Lai (2011) noted that educators should "provide explicit instruction that encourages development of skills such as coordination, communication, conflict resolution, decision-making, problem-solving, and negotiation" (p. 2). Providing effective team-building exercises and establishing shared norms also support the creation of effective online teams (Goold et al., 2008).

Selecting the correct group size for online collaborative learning is also an important consideration (Wagar et al., 2012). Brandon and Hollingshed (1999) noted that online collaboration does not work well in large groups. Though according to Bernard, et al. (2000), there is no magic ideal size for collaborative online groups, current literature on collaborative online learning suggests that using small groups for online work is best (Johnson et al., 2000). Research stresses that groups of three or four are preferred sizes for online collaboration (Johnson et al., 2000; Wagar et al., 2012). With larger numbers than four students participating in online collaboration, time, organizational, and communication issues may appear.

Forming the actual groups of students within online environments also presents a challenge (Jahng & Bullen, 2012). There are two main methods often used by instructors to form groups in online collaborative learning: (1) allowing students

to select their own groups and (2) instructors instead forming the groups without student input. Research shows the latter to be the more effective method. In terms of more specific methods that the instructor might pursue to form effective teams, Jahng and Bullen (2012) and Kagan (1997) indicate that forming heterogeneous groups may be useful due to the different perspectives brought to the group. Further, Roberts & McInnerney (2007) argue that random selection is as effective as any other method of group formation, and tends to be easier in online environment than in a face-to-face environment. In general, it is argued that, selecting groups at random in an online environment produces fewer difficulties than in a face-to-face environment (Roberts & McInnerney, 2007).

Merely selecting students to perform online collaboration activities in groups does not ensure successful collaborative learning. Tu (2004) suggests four important iconsiderations for successful implementation of online collaboration: (a) empowering learners, (b) building communities, (c) continuing support, and (d) being patient. According to Bernard et al. (2000), collaborative learning must include the following: (a) sharing the learning task, (b) combining expertise, (c) combining knowledge and skills to improve the quality of the learning process, and (d) building a learning community. Tu (2004) also noted that "The sense of community must be sustained when implementing online collaborative learning" (p. 11). The sense of community is often fragile in an online environment. If learners feel their opinions, knowledge, and contributions are valued, they are more likely to be engaged and motivated in the online collaborative learning process (Garrison, 2006).

Many researchers note that the particular collaboration software and tools utilized in online collaborative learning should allow for both asynchronous and synchronous communication. Frequently used tools in online collaborative learning include document sharing, screen sharing, social bookmarking, polling software, blogs, wikis, portals, groupware, discussion boards, and instant messaging (Fichter 2005; Raths, 2013).

Finally, for students to have a successful collaborative experience, the collaboration software must function properly and efficiently. Today, most collaboration tools and software use cloud storage and operate through a web-based environment. One advantage to using cloud storage is that students do not have to install the software on computers. Brown (2012) indicated cloud computing can help facilitate collaboration, and also allows for computing opportunities anywhere and anytime.

Research Environment and Participants

Given the previously mentioned considerations, this study was designed and implemented for what was termed an 'ideal online learning environment.' Subjects within the treatment group were placed on teams of 3-4 students. Assignments

were provided in a module format. Treatment and control groups received the exact same set of modules and assignments, with one exception: the treatment group completed modules designed to promote and scaffold communication and collaboration between team members as the course assignments were completed. An initial module for the treatment group, for example, asked students to introduce themselves, post reasons for taking the course, and describe their expectations about working as a part of a team for course assignments.

For both treatment and control groups, all content modules followed the same format: students were asked to review the learning materials for the content area in question (module content usually consisted of videos, chapter lessons, etc.) and then post at least three questions or comments relating to the reviewed content. Students were then asked to complete a series of experiential learning exercises to help reinforce module content. An example of the module requirements for the treatment and control groups has been provided as part of Appendix B.

The testing system allowed the treatment teams to work on a series of course-related projects, using both synchronous and asynchronous technologies (chat, posts, messages, etc.). The system also captured user interactions with the system (log in attempts, log in time, time spent on each activity, etc.) and offered an advanced set of assessment tools, including tools for formative and summative assessment of multiple choice, open-ended, and project-based assignments. The resultant software platform allowed for the assessment of work at both the individual and team level.

Students that were placed on teams as part of the treatment group logged into accounts that only showed the work and progress of the particular team. Further, collaboration and interaction was limited to the team members themselves; that is, teams could not view the work or progress of other teams. All students, including those placed on teams, were scored and assessed for individual contributions and performance on content-related assignments, including multiple choice, open-ended questions, and small projects. In addition, for team-based students, course assessment included such indicators of collaboration as number of comments posted on others' work, log-in time, and so on. All students, including both treatment and control groups, had access to general question and comment boards for the course which allowed them to post and respond to any course questions and issues.

There were 121 total students enrolled in the six online sections included in this study. However, only 82 of these students (39 students from the Fall 2013 semester, and 43 students from the Spring 2014 semester) completed the course with a complete set of data that could be analyzed for the study. The reasons for incomplete data included some students dropping the course and others not completing the final post-test. As a result, there were 39 students in the experimental (online collaborative learning) group and 43 students in the control (online individual learning) group whose data were included in the results provided below.

Data Collection and Results

Table 1 shows the main Null Hypotheses tested, the corresponding *p* value and whether the result was statistically significant (see Appendix A for a full listed of hypotheses tested and test results).

Table 1

Null Hypotheses, p values and Statistical Significance

Null Hypothesis	*p* value	Statistically significant or Non-statistically significant
$H1_0$: There is no statistically significant difference in gain scores between students learning collaboratively in an online environment and students learning individually in an online environment.	0.029	Statistically significant
$H3_0$: There is no statistically significant difference between a student's personality type of Extravert-Introvert (E-I) and mean gain scores on the IC^3 Fast Track Assessment, dependent on the type of learning instruction (individual or collaborative).	0.641	Non-statistically significant
$H5_0$: There is no statistically significant difference between a student's personality type of Sensing and Intuition (S and N) and mean gain scores on the IC^3 Fast Track Assessment, dependent on the type of learning instruction (individual or collaborative).	0.011	Statistically significant
$H7_0$: There is no statistically significant difference between a student's personality type of Feeling and Thinking (F and T) and mean gain scores on the IC^3 Fast Track Assessment, dependent on the type of learning instruction (individual or collaborative).	0.105	Non-statistically significant
$H9_0$: There is no statistically significant difference between students with Judging and Perceiving (J and P) preferences and mean gain scores on the IC^3 Fast Track Assessment, dependent on the type of learning instruction (individual or collaborative).	0.144	Non-statistically significant

The results indicate two of the main null hypotheses were rejected. First, $H1_0$ was rejected. In support of this conclusion, Table 2 below shows a statistically significant positive difference in gain scores ($p = 0.029$) between students learning collaboratively in an online environment and students learning individually in an online environment. The gain score was calculated as the difference between the posttest and the pretest results, given a maximum score of 1000 points for each

of the tests.

Table 2

Gain Scores for Individual and Collaborative Groups

Instruction		Mean Gain Score	Standard Deviation	*N*	*t* value	*p* value
Individual		91	89	43	−2.230	.029
Collaborative		136	93	39	−2.230	.029

Notes. Total $N = 82$. Levene's Test of Equality of Error Variances: $F(.002, .963)$.

Second, $H5_0$ was rejected. In support of this conclusion, Table 3 shows a statistically significant difference in gain scores ($p = 0.011$) between students with Sensing and Intuition (S and N) preferences and mean gain scores on the IC^3 Fast Track Assessment, dependent on the type of learning instruction (individual or collaborative).

Table 3

ANCOVA for Individual and Collaborative with MBTI (Sensing-Intuition)

Instruction	MBTI Type	Mean Gain Score	Standard Deviation	*N*	*F* value	*p* value
Individual	Sensing	114	94	28	6.788	.011
Individual	Intuition	49	62	15		
Collaborative	Sensing	125	85	30		
Collaborative	Intuition	173	113	9		

Notes. Total $N = 82$. Levene's Test of Equality of Error Variances: $F(.352, .788)$.

Participants within this study were not part of true random selection. The participants were intentionally selected based on course enrollment, an example of a purposive sample. Since students were non-randomly selected, the case for external validity (generalizability) requires greater study. Consequently, it is recommended that future studies incorporate a stratified random sample if possible.

Conclusions and Implications

The results show a statistically significant impact on testing gains for students learning collaboratively in an online environment. The research results suggest the following: about the merits and potential of student collaboration: students who learn collaboratively online in teams of three students outperform students who learn online as individuals. The limitation of our study regarding the sample

size included within each condition, approximately 40 students. It is also noted that the definition of collaboration within this study is a team of three students, a team size that has received support within recent research as conducive to more effective learning outcomes

In addition, this research suggests that personality preference may impact learning gains in online courses. Resultant information from the MBTI indicates that collaborative students identified with the MBTI Type of Intuition showed a significant gain on post-test scores relative to 'individual's peers. Intuition reveals a preference for analyzing and considering information; therefore, students indicating this type of preference may be more inclined to benefit from the asynchronous information, communication, and media that defines many online learning environments. Though testing students for their personality type may currently present sizable time and resource challenges for business instructors, the results suggest that a shorter, more simplified personality profile that focused exclusively on the Intuition personality preference may be of great potential benefit to students and instructors.

Based on our results, the following is provided as means to promote both collaboration skills and individual student learning outcomes within online learning environments:

A. Incorporating additional collaborative learning opportunities in online courses. Instructors should consider shifting course format from solely individual activities to a balance of individual and collaborative activities.
B. Forming small teams of students as a form of collaboration to positively impact individual learning outcomes.
C. Matching the personality preference of students with the appropriate learning environments (collaborative and individual). Intuitive learners seem to especially benefit from the unique learning opportunities provided by online courses. A shorter, more concise version of current personality tests would seem to be especially effective and relevant for instructors facing time and resource constraints.

Appendices

Appendix A

Table 4

Full Listing of Null Hypotheses, p values and Statistical Significance

Null Hypothesis	*p* value	Statistically significant or Non-statistically significant
$H1_0$: There is no statistically significant difference in gain scores between students learning collaboratively in an online environment and students learning individually in an online environment.	0.029	Statistically significant
$H2_0$: There is no statistically significant difference between student's with Extravert-Introvert (E-I) preferences and mean gain scores on the IC3 Fast Track Assessment, independent on the type of learning instruction (individual or collaborative).	0.285	Non-statistically significant
$H3_0$: There is no statistically significant difference between a student's with Extravert-Introvert (E-I) preferences and mean gain scores on the IC^3 Fast Track Assessment, dependent on the type of learning instruction (individual or collaborative).	0.641	Non-statistically significant
$H4_0$: There is no statistically significant difference between students with Sensing and Intuition (S and N) preferences and mean gain scores on the IC^3 Fast Track Assessment, independent on the type of learning instruction (individual or collaborative).	0.277	Non-statistically significant

Table 4 *(continued)*
Full Listing of Null Hypotheses, p values and Statistical Significance

Null Hypothesis	*p* value	Statistically significant or Non-statistically significant
$H5_0$: There is no statistically significant difference between students with Sensing and Intuition (S and N) preferences and mean gain scores on the IC³ Fast Track Assessment, dependent on the type of learning instruction (individual or collaborative).	0.011	Statistically significant
$H6_0$: There is no statistically significant difference between students with Feeling and Thinking (F and T) preferences and mean gain scores on the IC³ Fast Track Assessment, independent on the type of learning instruction (individual or collaborative).	0.592	Non-statistically significant
$H7_0$: There is no statistically significant difference between students with Feeling and Thinking (F and T) preferences and mean gain scores on the IC³ Fast Track Assessment, dependent on the type of learning instruction (individual or collaborative).	0.105	Non-statistically significant
$H8_0$: There is no statistically significant difference between students with Judging and Perceiving (J and P) preferences and mean gain scores on the IC³ Fast Track Assessment, independent on the type of learning instruction (individual or collaborative).	0.154	Non-statistically significant
$H9_0$: There is no statistically significant difference between students with Judging and Perceiving (J and P) preferences and mean gain scores on the IC³ Fast Track Assessment, dependent on the type of learning instruction (individual or collaborative).	0.144	Non-statistically significant

Appendix B

Table 5

Course Example Assignments for Control and Treatment Groups

Assignment	Control Group (Individuals)	Treatment Group (Collaborative Teams)
Experiential Learning Exercise: Create a two paragraph Word Document on the topic of saving energy in the home.	**Assignment #1:** Many are now looking at ways to save money and do what they can to help save the planet. One of these ways is by starting at home and changing some habits there. You will now create a list of items you can do at home to help save energy as well as reduce any more contributing damage to the planet. After writing an opening paragraph explaining the purpose of this report, include example points such as: • Turn off any computer equipment if not in use. • Use energy saving light bulbs wherever possible. **For this assignment, complete the following steps:** 1. Brainstorm a list of item ideas at home to help save energy (minimum of 5 ideas). 2. Review and comment on your master list. 3. Rank your top 5 ideas in order: 1-best idea, 2-next best idea, etc. Based on your top 5 ideas, create a one-page report with an introductory paragraph and a description on your ideas. Be sure to consider the following: effectiveness, public acceptance, cost, impact, etc. (**DUE: OCTOBER 27, 11:59 pm**)	**Assignment #1:** Many are now looking at ways to save money and do what they can to help save the planet. One of these ways is by starting at home and changing some habits there. You will now create a list of items you can do at home to help save energy as well as reduce any more contributing damage to the planet. After writing an opening paragraph explaining the purpose of this report, include example points such as: • Turn off any computer equipment if not in use. • Use energy saving light bulbs wherever possible. **As a team, complete the following steps:** 1. Brainstorm a list of item ideas at home to help save energy (minimum of 5 ideas should be submitted by each team member). You will only be able to view other team member's ideas after you have submitted your 5 ideas. (**DUE: OCTOBER 22, 11:59 pm**) 2. Review and comment on master list. Each team member must submit 5 comments. (**DUE: OCTOBER 23, 11:59 pm**)

Table 5 *(continued)*
Course Example Assignments for Control and Treatment Groups

Assignment	Control Group (Individuals)	Treatment Group (Collaborative Teams)
		3. As individuals rank your top 5 ideas in order: 1-best idea, 2-next best idea, etc. **(DUE: OCTOBER 24, 11:59 pm)** 4. Based on your top 5 ideas, as a team collaboratively create a one-page report with an introductory paragraph and a description on your ideas. Be sure to consider the following: effectiveness, public acceptance, cost, impact, etc. You can use the chat feature and the notes section to help your team communicate. **(DUE: OCTOBER 27, 11:59 pm)** 5. Each team member must make at least 2 contributions to content and 2 comments on the draft before submitting. **(DUE: OCTOBER 27, 11:59 pm**

References

Aggarwal, P., & O'Brien, C. L. (2008). Social loafing on group projects. *Journal of Marketing Education*, 30, 255–264.

Apedoe, X., Ellefson, M., & Schunn, C. (2012). Learning Together While Designing: Does Group Size Make a Difference? *Journal of Science Education and Technology*, *21*(1), 83-94.

Bernard, R. M., Rojo de Rubalvaca, B., & St-Pierre, D., (2000). Collaborative online distance learning: Issues for future practice and research. *Distance Education*, *21*(2), 260–277.

Brandon, D. P., & Hollingshead, A.B. (1999). Collaborative learning and computer-supported groups, *Communication Education*, *48*(2), 109–26.

Brindley, J. E., & Walti, C. (June 2009). Creating effective collaborative learning groups in on online environment. *The International Review of Research in Open and Distance Learning*, *10*(3), 1–19.

Brown, H. F. (2012). Technological trends affecting the business education curriculum and instruction. *Trends & Issues in Business Education: 2012 Yearbook*, 50, 89-105.

Capdeferro, N., & Romero, M. (April 2012). Are online learners frustrated with collaborative learning experiences? *The International Review of Research In Open and Distance Learning*, *13*(2), 26–44.

Dillenbourg, P. (1999). What do you mean by 'collaborative learning?' In P. Dillenbourg (Ed.), Collaborative-learning: Cognitive and Computational Approaches (pp. 1–19). Oxford, England.

Elsevier, P. G. (2012). Collaborative learning activities in online courses: issues and strategies. *ASEAN Journal of Open Distance Learning*, (1), 1-16.

Fichter, D. (2005). The many forms of e-collaboration: blogs, wikis, portals, groupware, discussion boards, and instant messaging. *Online*, *29*(4), 48–50.

Garrison, D. (2006). Online collaboration principles. *Journal of Asynchronous Learning Networks*, *10*(1). 25-34.

Goold, A., Craig, A., & Coldwell, J. (2008). The student experience of working in teams online. Retrieved on May 20, 2013 from http://www.ascilite.org.au/conferences/melbourne08/procs/goold.pdf

Graves, D. (1976). Let's get rid of the welfare mess in the teaching of writing. *Language Arts,* 53*,* 645-651.

Hiltz, S. R., & Turoff, M. (2005). The evolution of online learning and the revolution in higher education. *Communications of the ACM*, *48*(10), 59–64.

Jahng, N., & Bullen, M. 2012. Exploring Group Forming Strategies by Examining Participation Behaviours during Whole Class Discussions. *European Journal of Open, Distance and E-Learning*, 1.

Johnson, C. M. (2001). A survey of current research on online communities of practice. *Internet and Higher Education*, *4*(1), 45–60

Johnson, D. W., Johnson, R.T., & Smith, K.A. (2000). *Cooperative learning: Increasing college faculty instructional productivity*. San Francisco, CA: Josey-Bass.

Kerr, N. L. (1983). Motivation losses in small groups: A social dilemma analysis. *Personality and Social Psychology*, 45, 819–828.

Kerr, N. L., & Bruun, S. E. (1983). Dispensability of member effort and group motivation losses: free rider effects. *Journal of Personality and Social Psychology*, 44, 78–94.

Kezar, A. (2005). Redesigning for collaboration within higher education institutions: An exploration into the developmental process. *Research in Higher Education*, *46*(7), 831–860.

Klemm, W. R. (1997). Benefits of collaboration software for on-site classes. *Teaching in the Community Colleges 1996-2007 Presentations*.

Kolloffel, B., Eysink, T. H. S., & Jong, T. (2011). Comparing the effects of representational tools in collaborative and individual inquiry learning.

International Journal of Computer-supported Collaborative Learning, 6(2), 232–251.

Lai, E. R. (2011). Collaboration: A literature review. *Pearson Research Report*, 2.

McAlpine, I. (2000). Collaborative learning online. *Distance Education*, *21*(1), 66–80.

Raths, D. (2013). Togetherware: Tools for teamwork. *Campus Technology*, *26*(6), 18-22.

Roberts. T. S., & McInnerney, J. M. (2007). Seven problems of online group learning (and their solutions). *Educational Technology & Society*, *10*(4), 257-268.

Tu, C. (2004). *Online collaborative learning communities: Twenty-one designs to building.* Westport, CT: Libraries Unlimited.

Tutty, J. I., & Klein, J. D. (2008). Computer-mediated instruction: a comparison of online and face-to-face collaboration. *Education Technology Research and Development*, 56, 101–124.

Van Boxtel, C., Van der Linden, J., & Kanselaar, G. (2000). Collaborative learning tasks and the elaboration of conceptual knowledge. *Learning and Instruction*, *10*(4), 311–330.

Wagar, T., & Carroll, W. 2012. Examining Student Preferences of Group Work Evaluation Approaches: Evidence From Business Management Undergraduate Students. *Journal of Education for Business*, 87 (6).

Yazici, H. J. (2009). A study of collaborative learning style and team learning performance. *Education and Training*, *47*(3), 216–229.