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Google Docs in an Out-of-Class Collaborative Writing Activity

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Google Docs, an online word processing application, is a promising tool for collaborative learning. However, many college instructors and students lack knowledge to effectively use Google Docs to enhance teaching and learning. Goals of this study include (1) assessing the effectiveness of using Google Docs in an out-of-class collaborative writing activity through measuring the assignment's influence on students' learning experiences, (2) teaching students to work collaboratively, and (3) teaching students to successfully communicate their understanding and application of concepts through writing. Undergraduate students (N = 35) were randomly assigned to small groups to complete two out-of-class assignments. We compared students' collaborative performance and learning across two assignments, one with Google Docs and one without. We found (1) most students were unfamiliar with Google Docs prior to the study, (2) Google Docs changed the means of communication used in collaborative writing, (3) 93% of students considered Google Docs a useful tool for group work, (4) using Google Docs had no effect on students' paper grades, and (5) half of the students reported they would like to use Google Docs in the future. Our results suggest that Google Docs was a useful tool for collaborative writing and influenced student learning.

The present study evaluated the effectiveness of using Google Docs in an out-of-class collaborative writing activity for an introductory psychology course. Our goals for this assignment were to teach students to work collaboratively and to successfully communicate their understanding and application of concepts through writing. We were interested in assessing: (1) students' knowledge and experiences with Google Docs prior to the study, (2) whether and how Google Docs changes the means of communication used in collaborative writing, (3) the effects of Google Docs in collaborative writing, (4) the effects of Google Docs on students' assignment grades, and (5) students' likelihood of using Google Docs in their future learning.

Collaborative learning has been regarded as a necessary contributor to active learning (Kieser & Golden, 2009). For example, collaborative tasks can maximize learning inside and outside of the classroom by allowing students to go beyond what they would have learned alone, to share perspectives, and to accomplish tasks more effectively (Chang & Simpson, 1997; Jones, 2007). Collaboration is also desirable for the development of problem-solving and decision-making skills (Kieser & Golden, 2009; Smith, 2005), as well as information-seeking skills (Lazonder, 2005). In order for collaboration to be successful, participants must be engaged in "a mutually beneficial relationship to meet pre-defined goals" (Vallance, Towndrow, & Wiz, 2010, p. 20). However, some research has shown that collaborations are often prevented due to the challenges of time and space (Bower & Richards, 2006).

In recent decades, there has been an increasing interest in developing new collaborative technology, such as online applications, to enhance collaboration (Apple, Reis-Bergan, Adams, & Saunders, 2011; Koch, 2010; Vodanovich & Piotrowski, 2001). For example, researchers have found that in-class use of a wiki (an essential component of Web 2.0) fosters collaborative learning among students in a quick and flexible way (Lamb, 2004). Research has shown that many web-based collaborative activities facilitate the development of three skills among college students: teamwork (Blair, 2006), social skills (Apple et al., 2011), and basic computing skills (Bottge, Rueda, Kwon, Grant, & LaRoque, 2009). The effectiveness of using online applications has also been evaluated from diverse disciplines, including foreign languages (e.g., Guerra & Bota, 2011), education (e.g., Brodahl, Hadjerrouit, & Hansen, 2011), mathematics (e.g., Cardoso & Coutinho, 2011), information management (Chu, Kennedy, & Mak, 2009), and management (Rienzo & Han, 2009).

Among newly developed online applications, Google Docs is an especially promising tool for collaboration (Gralla, 2010; Morales & Collins, 2007). Google Docs allows individuals to work on a common task without restrictions often imposed by traditional face-to-face contacts (Conner, 2008; Holliman & Scanlon, 2006; Perron & Sellers, 2011; Thompson & Coovert, 2003). Google Docs reduces the demands for interaction abilities (Educause Learning Initiative, 2008). Additionally, Google Docs is accessible to the general public, regardless of location, as long as the internet is available (Oishi, 2007).

In higher education, educators have begun to explore the educational merits of Google Docs. One study reported that students found Google Docs more enjoyable to use when compared to Microsoft Word (Apple et al., 2011). Additionally, when editing papers and writing a concluding paragraph, students wrote longer essays and were able to work on collaborative writing more efficiently, finishing more quickly when

using Google Docs as compared to Microsoft Word (Apple et al., 2011). Brodahl et al. (2011) found students' attitudes and competence using online writing applications (i.e., Google Docs and EtherPad) played more important roles in students' perceptions of collaborative writing as compared to other demographics characteristics (e.g., students' gender or age). Students reported positive experiences with collaborative writing using these tools. However, this study did not compare students' perception of their collaborative writing experiences with and without these technological tools, so it is unknown whether and how much the tools improved students' learning experiences.

Despite Google Docs' potential, many college students and instructors lack knowledge of effective ways of using Google Docs to enhance teaching and learning. There has been reluctance in adopting online applications in higher education because online collaboration can lead to both positive and negative educational outcomes. Although a number of studies have found that the use of online technology in the classroom can facilitate collaborative learning among students and promote learning outcomes (Chou & Chen, 2008; Raman, Ryan, & Olfman, 2005; Vaughan, 2008), online collaborations might also lead to unpleasant learning experiences and outcomes in traditional face-to-face classrooms (Blau & Caspi, 2008). For example, students and instructors might feel uncomfortable in sharing knowledge (Rick & Guzdial, 2006), or students may not all contribute equally to the assignment.

The present study is novel in two ways. While most previous studies have used web-based applications in the classroom, in the present study we explored the effectiveness of web-based applications on an out-of-class assignment. Given that collaborative out-of-class assignments require more coordination from students as compared to in-class assignments, we predicted Google Docs might be especially useful for making collaboration easier. Furthermore, little is known about the difference in students' performance—as measured by grades or self-reports—with and without Google Docs.

Method

Participants

Participants were 35 students (21 women, 14 men, age range: 18-22 years), enrolled in Introductory Psychology (PSYC 1101) in the spring 2010 semester at the University of Georgia. All students participated in two assignments (described below) as a requirement of their class. Seven students did not complete all aspects of the study due to class absences, 31 students completed the questionnaire for Assignment 1, and 28 students completed the questionnaire for Assignment 2. Upon completion of the assignments, students were informed of the purpose of the study and given the opportunity to consent to their data being used for this research project. The university's Institutional Review Board (IRB) approved this study.

Materials and Procedure

Over a six-week period, students completed two assignments, which involved listening to a lecture, reading about a topic, and then answering questions about a topic (Table 1). The first assignment was completed without Google Docs (Assignment 1), and the second assignment was completed with Google Docs (Assignment 2). Each student was randomly assigned to two different groups, one for each assignment. Each group had three to four classmates, with the constraint that no two classmates would be in the same group in both assignments.

First, students completed an in-class questionnaire to survey their knowledge and experience with Google Docs (see Appendix A for a copy of the questionnaire). This questionnaire consisted of two questions: "Do you use Gmail (have a Gmail account)?", and, "Have you used Google Docs before?" If students used Google Docs previously, they were asked two more questions: "Have you used Google Docs to complete a course assignment?", and, "Did you find Google Docs helpful?" Students were asked to describe their use of Google Docs and in what ways they did or did not find it helpful.

Students also were surveyed to determine which upcoming topics were most interesting to them and to choose two topics that were comparable in the amount of student interest. This was done to ensure that both assignments would be on topics that the students found equally interesting. Students were asked to anonymously rank four topics, with the one they wish to work on the most in the number one position, and the one they wish to work on the least in the number four position. "Emotion and the brain" received the highest vote (70% preferred, as first choice) and was used as the topic for the first assignment. "Addiction and the brain" received the second highest vote (69% preferred as first choice) and was used as the topic for the second assignment. "Memory" and "Language" topics received the lowest ratings (50% and and 37% preferred as first choice, respectively), and so they were not used for the assignments in this study.

We created two assignments, which consisted of three short-essay questions with three to four sub-questions each (see Appendices B and C for assignment instructions). Students were asked to design their own experiment, answer a theoretical question, and apply

Table 1
Procedure for Data Collection and Course Assignments

Week	Procedure
Week One	1. Google Docs Familiarity Questionnaire: surveyed students' knowledge and experience with Google Docs. 2. Preferred Topic Questionnaire: selected two comparably interesting topics for Assignment 1 and 2. 3. Group Membership Assignment: divided students into groups for both assignments.
Week Two	1. Lecture "Emotion and the brain": presented in class. 2. Assignment 1 (non-Google-Docs condition): distributed to groups in class, allowing a one-week time to complete.
Week Three	1. Assignment 1: turned in by each group. 2. Group Evaluation Form: reported each group member's performance 3. Questionnaire for Assignment 1: surveyed learning and collaboration experience
Week Four	1. Gmail accounts: created by students and shared with the instructor. 2. Blank Google Docs word documents: created for each group and shared between group members.
Week Five	1. Lecture "Addiction and the Brain": presented in class. 2. Google Docs: introduced via a video (Lefever, 2007) and step-by-step introduction. 3. Assignment 2 (Google-Docs condition): distributed to groups in class with a requirement of using Google-Docs for completion.
Week Six	1. Assignment 2: turned in by each group. 2. Group Evaluation Form: reported each group member's performance 3. Questionnaire for Assignment 2: surveyed learning and collaboration experience 4. Informed consent: students were given the opportunity to consent to their data being used for this research project 5. Debriefing: the purpose of the study was shared with the students

their scientific knowledge to solve a real-life problem. Students used information from an in-class presentation, related material in the textbook, and other resources (e.g., articles, personal experiences) to complete the assignments.

We also created a customized rubric to score students' responses (Appendix D). Students earned up to 15 points in total, with up to three points for presentation of a clear ideas; three points for well-organized responses; three points for proper uses of psychology terminology; three points for proper grammar, style, and mechanics; and three points for overall work quality.

Assignment 1: Collaborative writing without Google Docs. The following week, the first author (not the course instructor) gave a 15-minute guest presentation on the first topic, "Emotion and the brain." Then students were assigned to groups (11 groups total, consisting of three to four students each) and given Assignment 1, which they had one week to complete outside of class. The students were not given any instructions about which communication methods to use for their collaboration. A week later—after turning in Assignment 1—students evaluated their group members' performance (see Appendix E for the evaluation form). The components of the evaluation included questions on whether each group member assumed a role in the project, took responsibility, and made contributions.

Each student also reported his or her collaborative experience on the group project (Appendix F) with Likert-scale and open-ended questions such as, "How collaborative was the group work?" on a scale ranging from 1 (*completely independent*) to 5 (*complete collaboration*). We also asked, "How did you communicate with group members?" and "How effective were the communications in accomplishing the assignment?" on a scale ranging from 1 (*very effective*) to 5 (*very ineffective*).

After the class, the grading rubric was used to grade Assignment 1. The experimenters and a third party graded assignment 1; the latter was blind to the

experimental conditions. One grade was given to each group for each assignment. Inter-reliability between graders was assessed with a Pearson correlation, r = .92, p < .001. Each student received an individual grade based upon evaluations from their group members, which were used to weigh the group score. Students' assignment grades contributed 4% to their final course grade.

Assignment 2: Collaborative writing with Google Docs. In preparation for Assignment 2, students were taught to use Google Docs in class, and they were asked to use Google Docs to complete the assignment. Meanwhile, students were given one week to create Gmail accounts (if they did not already have one), and were asked to share their Gmail e-mail address with the instructor. The experimenters created a blank Google doc for each group, and they shared each Google doc with its respective group members. A short video introducing Google Docs (LeFever, 2010) was shown in class, accompanied by the instructor providing step-by-step instructions on how to use Google Docs. In class, the first author again gave a 15-minute guest presentation on the second topic, "Addiction and the brain." Assignment 2 was given in the same manner as Assignment 1, except students were instructed to use Google Docs. Students were given one week outside of class to complete the assignment. After turning in Assignment 2, students were asked to evaluate their group members' performance, just as they had for their previous group for Assignment 1. To evaluate their overall collaborative writing experiences in Assignment 2, students used the same questionnaire as Assignment 1, but we included additional questions to directly access students' experiences using Google Docs on the project (see Appendix G for the list of additional questions). Questions included, "How did Google Docs influence your group's collaborative writing experience?" on a scale ranging from 1 (*very positive*) to 5 (*very negative*). We asked students to describe their experiences using Google Docs, whether they thought it was a useful tool for learning, and whether they would be likely to use it in the future. Assignment 2 was graded in the same way as Assignment 1. Inter-reliability between graders was assessed with a Pearson correlation, r =.94, p < 0.001.

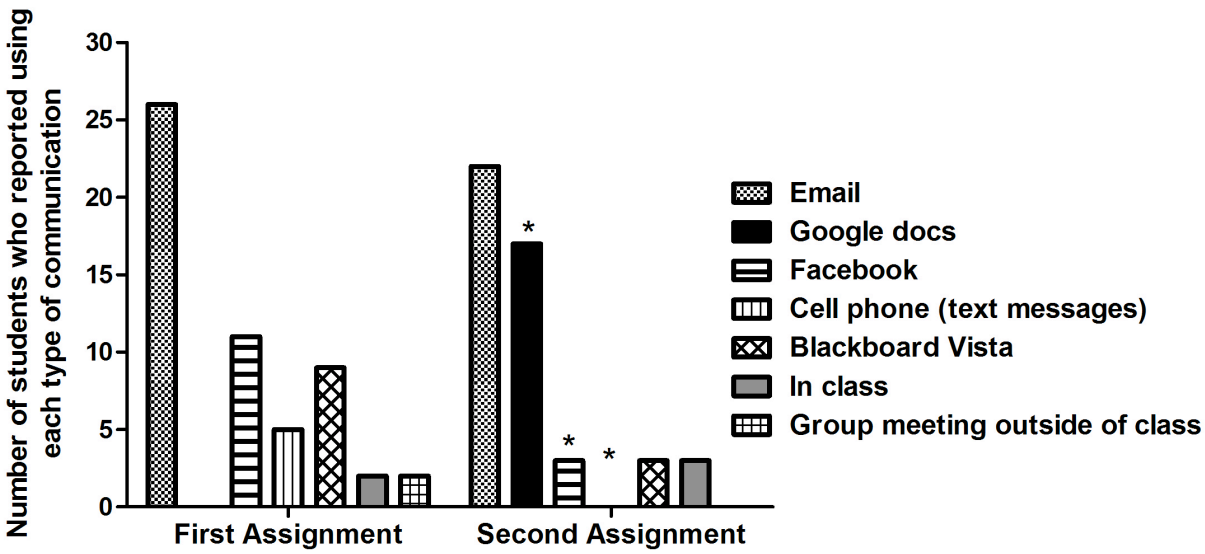
Results

We assessed students' knowledge of, and experiences with, Google Docs before and after the assignments with three types of questions: open-ended, Likert-Scaled, and "yes" or "no." Before the first assignment, 31 students completed the questionnaire, and four students did not due to being absent from class. Six of the 31 students reported some knowledge of Google Docs; these six students all reported pleasant experiences with Google Docs. Five students' experiences with Google Docs were academic-related activities, of which four students used Google Docs in some kind of collaborative task such as to complete a research paper, to create a study guide in a class group for an exam, or to complete a group assignment in a technology class. After the second assignment, 28 students completed the questionnaire to report their experience with Google Docs; seven students did not complete the questionnaire due to class absence. For Assignment 2, 26 of the 28 students reported using Google Docs, among whom 85% rated their experience as either positive or very positive. For example, students commented that "Google Docs helped keep everyone's work together," "provided an effective way for sharing and editing among group members," and "is an easy and interesting method for communication." Not all comments were positive, however. Two students reported negative experiences with Google Docs, explaining that "Google Docs made group work more difficult due to its lack of accurate tracking of each member's contribution" and reporting "a number of flaws in the formatting." The remaining four students reported no preference.

After students completed each assignment, they reported the methods they used for communication (e.g., face-to-face, e-mail) during the activity (Figure 1). There were differences in the communication methods used in Assignment 1 (no Google Docs mentioned) and Assignment 2 (Google Docs required). Of the 31 students who completed Assignment 1, 84% students used e-mail, 35% used Facebook, 29% used Blackboard Vista, 16% used text messaging, and 13% used face-to-face meeting(s). Interestingly, no students reported using Google Docs for Assignment 1, even though they were free to use whatever communication tools they wanted. A two-tailed z approximation test revealed that the proportion of students using Google Docs was greater in Assignment 2 (93%) as compared to Assignment 1 (0%), p < .001. A two-tailed z approximation test revealed that the proportion of students who reported using Facebook and text messages in Assignment 2 (35.5% and 16.1%, respectively) was significantly less than those reported in Assignment 1 (10.7% and 0%, respectively), p < 0.05. There were no other changes in communication methods between assignments, p > .05. E-mail remained the most popular communication method for both assignments, and it continued to be used more often than Google Docs, even in the second assignment (78.6%).

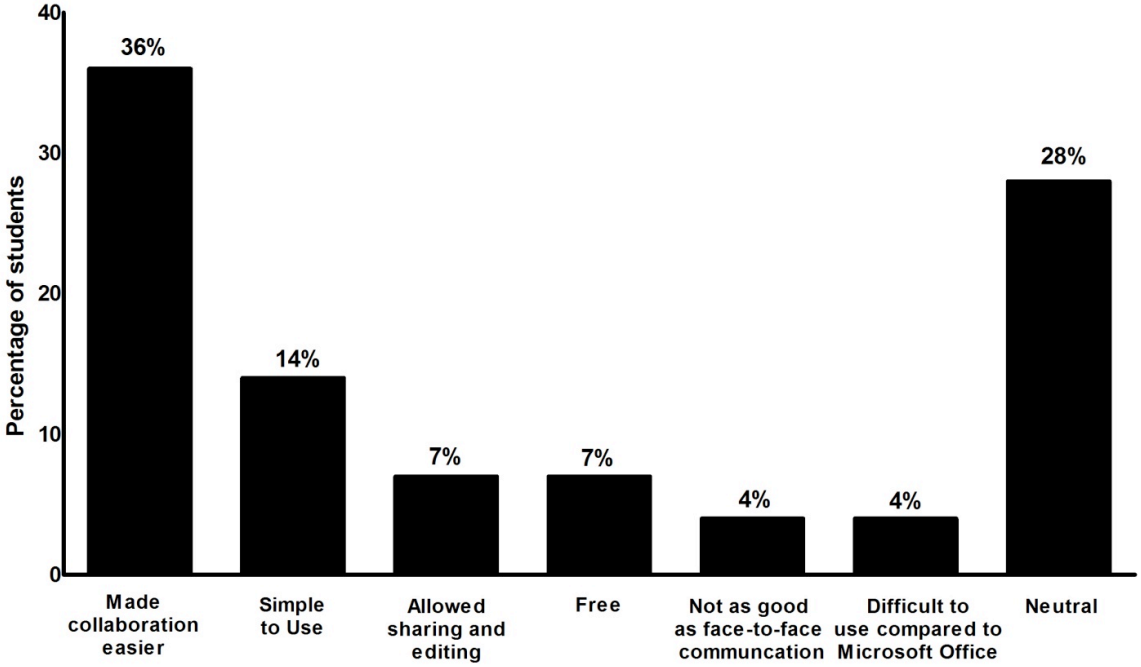
After completing the second assignment, we asked students who reported using Google Docs whether Google Docs was a useful tool (Figure 2). Responses were categorized as positive (i.e., a useful tool), negative (i.e., not a useful tool), and neutral. Out of 28

Figure 1
Means of Communication Used During Collaborative Writing



Note. Google Docs changed the means of communication used during collaborative writing. A two-tailed *z* approximation test assessed whether the proportions of students who used each method of communication varied between Assignment 1 and Assignment 2. *$p < 0.05$.

Figure 2
Distribution of Responses to the Open-Ended prompt: "Describe Your Experience Using Google Docs for this Group Collaboration." (Appendix G, Question 3)



Note. Neutral responses were those in which students for or against the use of Google Docs provided no specific reasons.

students, 64% considered Google Docs a useful tool for working in a group. Typical student statements were that Google Docs "made collaboration much easier," "was simple to use," and "encouraged editing and sharing among peers." In contrast, 7% of students did not think Google Docs was useful. These students claimed that Google Docs was not as effective as either face-to-face communication or other word processing software. The remaining 28% of students listed neither positive nor negative comments describing their experience using Google Docs.

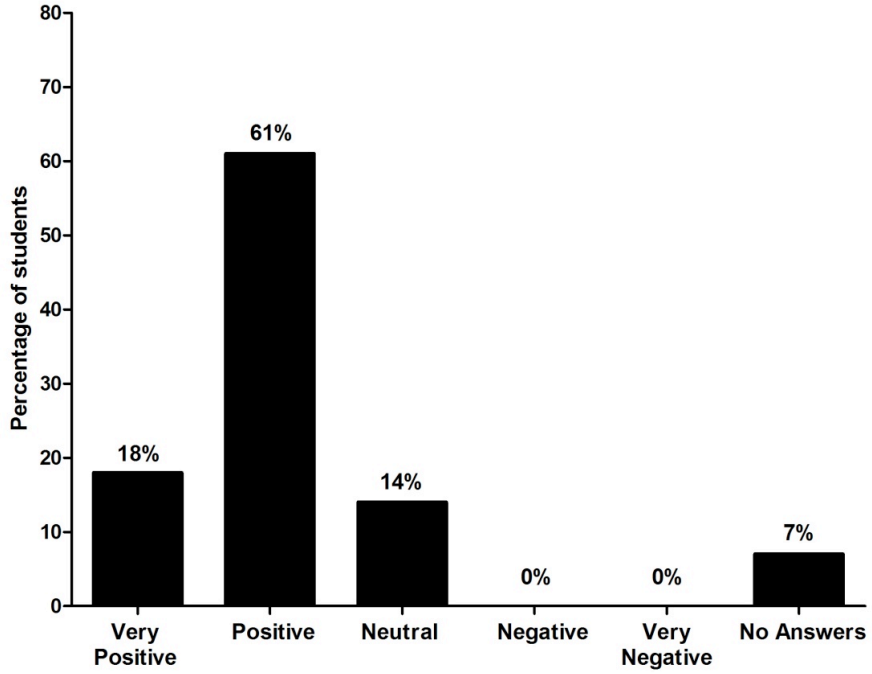
We assessed the amount of collaboration within groups by calculating the average group evaluation score for each student. Students evaluated group members' role in the project, responsibility, and contribution, on a scale from 5 (*excellent)* to 0 (*failing*), for a maximum score of 15, as shown in Appendix E. Ratings for the evaluation of group members did not differ between the Google Docs assignment (M = 14.34, SD = 2.65) and the non-Google-Docs assignment (M = 13.10, SD = 4.52), $t(34) = 1.40$, $p = .172$.

Google Docs did influence students' perceptions of group work, as revealed by the question, "How did Google Docs influence your group's collaborative experience?" (Appendix G, question 2). Students' responses were overwhelmingly positive: 79% of students said either "very positive" or "positive" (Figure 3). Fourteen percent of students rated Google Doc's influence on their group work as "neutral," and no students made any negative ratings.

We measured students' learning with their grades on the two assignments. The first author and a third party—who was blind to the experimental conditions—graded each assignment. A 2×2 analysis of variance (ANOVA) examined whether students' grades varied as a function of the Grader (first author, third party) or the Assignment (Assignment 1, Assignment 2). There was no main effect of Grader, $F(1,34) = .14$, $p = .711$, nor was there a main effect of Assignment, $F(1,34) = 1.61$, $p = .213$. No interaction between grader and assignment was found, $F(34) = .14$, $p = .711$. The grades between Assignment 1 (M = 12.95, SD = 2.368) and Assignment 2 (M = 13.67, SD = 1.359) did not differ, $t(34) = 1.52$, $p = .137$.

Half of the students indicated that they were willing to use Google Docs in the future. The majority of these students (approximately 43%) preferred to use Google Docs only for group projects. Students also valued Google Docs as an "easy means of communication," since it is "accessible," and "makes sharing and editing among peers easier."

Figure 3
The Effect of Google Docs on Students' Perception of Group Work



Note. Students were asked, "How did Google Docs influence your group's collaborative experience?" (Appendix G, question 2).

Discussion

In our study, students learned to use Google Docs, a web-based digital collaborative writing tool. Although web-based technologies' effects on learning have been controversial (McInnerney, 2002; Raman, et al., 2005; Vaughan, 2008), our results suggest that Google Docs holds potential for collaboration in an out-of-class collaborative writing activity. Specifically, we found Google Docs altered the ways students communicated during out-of-class collaboration. Students were less dependent on Facebook and text messaging for communication after Google Docs was introduced. Though students remained dependent on e-mail as their primary communication method, Google Docs was used nearly as much as e-mail in the second assignment. The majority of students rated their experience with Google Docs positively, and half of the students were willing to use Google Docs in future academic activities.

Does the Use of Google Docs Influence Students' Learning?

There was no significant effect of using Google Docs on students' learning, as measured by students' assignment grades. Several factors may have contributed to this result. First, students' assignment grades may not have accurately reflected the richness of their learning experiences. Second, we assessed learning in student groups, which may have masked learning at the individual level. Further tests are necessary to determine whether learning is influenced by online collaborative writing tools. However, Google Docs did influence students' learning experiences, such as changing the ways that students collaborated. For example, in our study, students claimed that, "Work can be done simultaneously by multiple people in Google Docs" and "Information can be traded easily in Google Docs." Google Docs can be a useful collaborative tool that allows sharing and editing in a more simple and flexible way as compared to traditional communication methods (Morales & Collins, 2007).

Challenges Encountered While Using Google Docs

To achieve better educational outcomes, it is important for educators to acknowledge both the benefits and limitations of using Google Docs as a teaching tool. In the questionnaire, student also reported problems using Google Docs. For example, one student reported that Google Docs made the collaboration more complicated, because it was difficult to keep track of each group members' contributions. Other students mentioned problems in formatting the document, which made their work less efficient. Specifically, Google Docs had formatting which was incompatible with certain non-web-based word-processing applications, making it difficult to go back and forth between two documents. Challenges using Google Docs may additionally result from other factors, including: (1) students may not fully understand the features or operations in Google Docs; (2) students might be deterred from using Google Docs due to the problems they encountered; and (3) problems encountered during online collaboration may not be the consequence of the tool itself, but may be a consequence of the social skills of the users (Vallance et al., 2010). To prevent these problems from precluding successful use of Google Docs, instructors can provide detailed in-class demonstrations with specific examples, as we did in the present study. Demonstration in a computer lab would be especially effective because it would allow students to directly interact with the software.

Benefits of Using Google Docs

In spite of these limitations, we demonstrated the potential benefits of using Google Docs in an educational setting, which was consistent with others' findings (e.g., Cardoso & Coutinho, 2011). Despite the fact that most students were unfamiliar with Google Docs prior to the study, students successfully utilized this new technology in their group collaborative writing. When the use of Google Docs was required, students showed enriched learning experiences compared to the assignment without Google Docs. Additionally, introducing Google Docs changed the means by which students communicated during their collaborative writing. Even though some students had experience with Google Docs prior to the study, no students used Google Docs on their own in the first assignment, though students responded well when encouraged to use Google Docs for the second assignment. This suggests that instructors may need to prompt students to use this technology, as students may not yet see its potential for improving their collaborative experiences. While using Google Docs, students decreased their use of traditional communicative tools (e.g., Facebook and text messaging) and increased their use of Google Docs. With Google Docs, students showed trends of relying less on e-mail, the course management system, and face-to-face meetings. Students adjusted their means of communication to utilize the tools they found most effective for collaboration, and there was a need to use fewer tools when using Google Docs. Also, while employing Google Docs, no students met outside of class; less face-to-face meeting has obvious benefits for students with busy schedules.

Last, students reported interest in using Google Docs for future assignments, suggesting that Google

Docs is, and will continue to be, a useful tool for collaborative writing.

In summary, the positive perception of using Google Docs among students in the study revealed the potential merits of using Google Docs for out-of-class writing activities, in addition to traditional in-class assignments. Today's students rarely meet face-to-face for group projects, but rather they find effective ways to collaborate through e-mails, instant messaging, video conferencing, and various web-based tools (Koch, 2010). Thus, Google Docs is well-suited as a tool for out-of-class collaborative assignments.

Limitations and Future Directions

There are some limitations in the present study, and below we suggest future research to address these limitations. First, though students were told to use Google Docs in the second assignment, there was no measurement of how much students actually used Google Docs. In future work we would like to monitor groups' actual usage of Google Docs and measure the contribution of each individual. Second, the evaluation of group members may have failed to reflect the contribution of each group member to the collaborative project. Though students evaluated their group members' performance, students' overall ratings were quite high, and therefore they may not have allowed for differentiating different students' contributions. One potential way to solve this problem is to evaluate the editing comments made by each student over the course of the assignment. Google Docs has the function that individual comments and changes can be tracked on the paper. In each assignment, students would be asked to submit their drafts with comments at several points before the final paper. Instructors could evaluate their contributions more directly.

Google continues to update and improve their applications. Many problems that students had with Google Docs have since been corrected. For example, each online collaborator is now identifiable with his or her name above a different-colored cursor moving on the screen. In addition, students can now view the contributions of each group member in real time (Gralla, 2010). In the future this will allow students to more effectively evaluate the contributions of their group members.

As Google continues to improve and add new functions, new opportunities will be available for instructors and educational institutions to incorporate them into their curriculum (Morales & Collins, 2007). For example, another useful feature is that all collaborators are able to chat with each other simultaneously in a chat sidebar as they are editing the Google document (Gralla, 2010). In addition, more instructors will share creative ideas for the use of Google Docs for teaching (Gehringer, 2010; Green, 2010), and other web-based applications for collaboration will become available (for a summary see Vallance et al., 2010). It is important for instructors to educate both themselves and their students on the latest features. Perhaps most importantly, instructors should carefully examine their course learning goals to determine whether any new technologies would better prepare students to meet their specific learning outcomes.

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Appendix A
Questionnaire to Survey Students' Knowledge and Experience with Google Docs

Please answer the following questions:

1. Do you use Gmail (have a Gmail account)? Circle one: Yes/No

2. Have you used Google Docs before? Circle one: Yes/No

If yes:

a) Have you used Google Docs to complete a course assignment? Circle one: Yes/No
Please describe what you did:

b) Did you find Google Docs helpful? Circle one: Yes/No
Please describe:

Appendix B
Assignment 1 Instructions

Group Project 1: Examining Emotion
Worth: up to 15 points
Due: Mon., Feb. 1st (turn in one hard copy, per group, at beginning of class)

Directions: Please answer the following questions with your group. See the grading rubric for information about grading criteria. You will evaluate (and be evaluated by) your group members, which will influence your grade for this project. Keep in mind that different group members made earn different grades, depending on these evaluations.

Resources: Use your textbook, class lectures/activities (Ch. 1-3), guest lecture (by Wenyi Zhou), and videos shown in class, to help you answer these questions.

Questions:

1. Design a simple experiment to study some aspect of emotion. Pick something that interests you! For example, you might be interested in whether there's a change in a child's heart rate when you steal a toy from them. (Please come up with your own experiment.)
    a) Briefly describe your experiment.
    b) What is the research question?
    c) What is your group's hypothesis, or what are you predicting?
    d) What are your independent variables (IV), and dependent variable(s) (DV)?
    e) Are there any extraneous (confounding) variables that you need to control? How might you do this?

2. Describe an example of a situation that triggers a "fight-or-flight" response. For example, a rat receiving an electric shock on his tail might trigger this response. (Please come up with your own example.)
    a) Briefly describe the situation.
    b) What is happening in the body as a consequence of the sympathetic nervous system?
    c) Please describe the part(s) of the brain that is/are responsible for this emotional reaction.

3. You should now be familiar with Darwin's concept of natural selection. Think about how this applies to the emotion system(s) in the brain.
    a) In your own words, summarize Darwin's concept of natural selection. (Hint: See page 87 of your text.)
    b) Based upon evolutionary theory, how do emotional responses improve your reproductive success (chances of surviving and reproducing)?

Appendix C
Assignment 2 Instructions

Group Project 2: Examining Addiction
Worth: up to 15 points
Due: Mon., Feb. 10th (turn in one hard copy, per group, at beginning of class)

Directions: Please answer the following questions with your group. See the grading rubric for information about grading criteria. You will evaluate (and be evaluated by) your group members, which will influence your grade for this project. Keep in mind that different group members may earn different grades, depending on these evaluations.

Resources: Use your textbook, class lectures/activities (Ch. 1-5, specifically: pages 156-161, 164-165, 382), guest lecture (by Wenyi Zhou), and videos shown in class, to help you answer these questions.

Questions:
1. Think about the causes of addiction.
   a) Please give an example of a way in which genes might influence addictive behavior.
   b) Give an example of a way in which environmental factors might contribute to addiction.
   c) How might these genetic and non-genetic factors interact? For example, could the presence of one amplify/reduce the effects of the other?

2. Design an experiment to explore the consequences of addiction on the brain and behavior.
   a) What type of addiction would you explore? For example, drugs (be specific!), internet, gambling, sex, shopping, smoking, alcohol, etc.
   b) Briefly describe your study, including your hypothesis, method, variables (IV and DV) and predicted results.
   c) What are the limitations of this study (for example, ethical or experimental)?

3. Based on what you know about the consequences of addiction, think about what behaviors are healthy and unhealthy, both for the individual and society.
   a) Do you think that the government should restrict an individual's ability to engage in addictive behaviors (for example, drug use, pornography, alcohol abuse, etc.)? Explain.
   b) Do the members of your group agree on this topic?
   c) What might influence these different perspectives?

Appendix D
Grading Rubric for Assignments 1 and 2

Student received the following grading rubric prior to completing Assignments 1 and 2:

	3	**2**	**1**	**0**
Ideas	Writing and ideas are clear, focused, and easy to follow	Writing and ideas are somewhat hard to follow	Writing and ideas are difficult to identify and follow	Writing and ideas are unclear and unfocused
Organization/ Structure	Sentences and paragraphs are clear, well structured, and well-organized	Structure is present, but order and writing are unclear	Lacks sufficient structure or transitions in sentences and/or paragraphs	Little to no structure and transitions are apparent
Word choice and spelling	Accurate, specific, powerful words are used; No spelling errors	Adequate use of word choice; One or two spelling errors	Inadequate use of word choice; Three or four spelling errors	Little attempt to choose words wisely or carefully; Numerous spelling errors
Mechanics (Punctuation, capitalization, grammar, sentence structure)	No errors	One or two mechanics errors	Three or four mechanics errors	Five or more mechanics errors
Personal Review or Evaluation	Detailed discussion of personal reactions, lessons learned, and application	Fairly detailed discussion of personal reactions, lessons learned, and application	Undeveloped discussion of personal reactions, lessons learned, and application	Superficial discussion of personal reactions, lessons learned, and application

Appendix E
Evaluation Form for Students to Evaluate Their Group Members

The following Evaluation form was completed after each assignment, for each group member:

You are responsible for grading every other person in your group using this rubric. Assign a score (0-5) for each of the criteria below. **Note: Your evaluation will be kept confidential.**

Criteria	Excellent (4-5)	Average (2-3)	Poor (1)	Failing (0)
Assuming a role in the project **___ / 5**	Student suggests an appropriate role for him/herself and accepts their role and duties without question.	Student requires some guidance to define his/her role and requires guidance to complete his/her duties	Student requires much direction and guidance to determine his/her role and requires help in completing the tasks.	Student never accepted a role.
Responsibility **___ / 5**	Student always completed tasks on time and arrived on time to group meetings.	Student usually completed tasks on time and usually arrived on time to group meetings.	Student sometimes completed tasks on time and occasionally arrived on time to group meetings.	Student rarely completed his/her tasks on time and rarely arrived on time to group meetings.
Contribution **___ / 5**	Student definitely contributed to the project by completing the responsibilities associated with their role and helped others with their tasks.	Student completed his/her responsibilities, but helped nobody else.	Student did not complete his/her responsibilities and required help to finish.	The student did very little and required a lot of help from the group.

Person you are evaluating: _____

Total ___/15

Appendix F
Students' Evaluation of Assignment 1

Feedback Group Project on Emotion & the Brain

Please answer the following questions as honestly as possible. Your feedback is anonymous, so please do not put your name on this sheet. Responses will be typed by Wenyi Zhou, so your instructor will not be able to identify you by your handwriting.

1. How difficult was this assignment? Circle one:

1	2	3	4	5
(not difficult)	(difficult)	(neither difficult, nor easy)	(easy)	(very easy)

2. How would you evaluate your group performance? Circle one:

1	2	3	4	5
(very good)	(good)	(neither good, nor bad)	(bad)	(very bad)

3. How collaborative was the group work? Circle one:

1	2	3	4	5
(completely independent)	(neither independent, nor collaborative)	(independent)	(lots of collaboration)	(complete collaboration)

4. How did you communicate with group members? Please list all methods of communication (eLC [course management system], e-mail, etc.):

_____

_____

5. How effective are the communication in accomplishing the assignment? Circle one:

1	2	3	4	5
(very effective)	(effective)	(neutral)	(not effective)	(very ineffective)

6. Did you enjoy the assignment? Circle one: Yes / No – Please explain why or why not.

_____

_____

7. Would you like to do similar assignments again in the future? Circle one: Yes / No – Please explain why or why not.

_____

_____

Appendix G
Students' Evaluation of Assignment 2

The same questions for the evaluation of Assignment 1 were asked (Appendix F) in addition to the following questions:

1. Did you use Google Docs to complete the assignment? Circle one: Yes / No.

_____

_____

2. How did Google Docs influence your group's collaborative experience?

1	2	3	4	5
(very positive)	(positive)	(neutral)	(negative)	(very negative)

3. Describe your experience using Google Docs for this group collaboration.

_____

4. Do you think Google Docs is a useful tool for learning? Circle one: Yes / No – Please explain why or why not.

_____

5. Will you be using Google Docs for your study in the future? Circle one: Yes / No – Please explain why or why not.

_____

6. Did you enjoy the assignment? Circle one: Yes / No – Please explain why or why not.

_____

_____

7. Would you like to do similar assignments again in the future? Circle one: Yes / No – Please explain why or why not.

_____

_____