What Type of Collaboration Helps? Psychological Ownership, Perceived Learning and Outcome Quality of Collaboration Using Google Docs

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Abstract

One hundred and eighteen Open University of Israel undergraduate students participated in an experiment that was designed to test the differences between sharing and collaborating on a written assignment. Participants were randomly allocated to one of five groups that differ in types of collaboration: two groups share their draft with either an unknown audience or known peers, two other groups collaborated by either suggesting improvements to or editing each other's draft, and an additional group in which the participants kept the draft for themselves served as a control group. Findings revealed differences between groups in psychological ownership, perceived quality of the document, but not in perceived learning. In addition, students believe that a document that was written collaboratively might have higher quality than a document written alone. Nonetheless, they reported that while their contribution improved a draft written by a colleague, the colleague's contribution deteriorated their own draft. Perceived quality of the document and the improvement from draft to final version predicted perceived learning. Thus, the present study implications are that collaboration is superior to sharing, that students prefer suggestion over editing.

Keywords: online collaboration, psychological ownership, perceived learning, outcome quality, Google Docs.

Introduction

The use of collaborative technology in an educational context enhances active participation through content creation, increases students' engagement with course content, and enriches the learning process (Parker & Chao, 2007). Students' involvement in learning activities via collaborative tools improves their final course grades (Ravid, Kalman, & Rafaeli, 2008). Better outcomes were obtained with Wiki collaborative technology as opposed to asynchronous forums (Levin-Peled & Kali, 2008).

In educational contexts, collaboration through editing each others' text is usually perceived as a desired learning method (Tal-Elhasid & Meishar-Tal, 2007), but may lead to an unpleasant learning experience (Blau & Caspi, 2008b). It seems that many students and instructors are still not ready to fully accept the concept of knowledge sharing (Rick & Guzdial, 2006). For many, "working together" is not necessarily collaborative in nature, but rather cooperative, if not individualistic: Students prefer not to engage in collaborative learning using Wikis, but rather continued to cultivate a practice of individual accountability and individual ownership (Ioannou & Artino, 2008). When requested to collaborate by using Wikis, learners tend to avoid changing other students' written products (Dalke, Cassidy, Grobstein, & Blank, 2007). They often feel

that it is inappropriate to edit others' work (Coyle, 2007), and many are reluctant to interfere with “somebody else’s material” (Konja & Ben-Zvi, 2008). When they do, it was more on a language level than on a content level (Lund & Smørdal, 2006), by adding more than by deleting sentences (Berger, Gorsky & Meishar-Tal, 2008). Users also did not encourage others to edit their own entries (Da Lio, Fraboni, & Leo, 2005; Davies, 2004). Typical statements such as "Someone can change what you have written, even when you know that what you have written is correct", "My texts got deleted" reflect a sense of private ownership (Lund & Smørdal, 2006), which may explain these phenomena.

Psychological ownership refers to the relationship between an individual and an object in which the object is experienced as connected with the self (Wilpert, 1991), or becomes a part of the "extended self" (Dittmar, 1992). Ownership can be also felt toward nonphysical entities, such as ideas, words, creations, academic products (Pierce, Kostova, & Dirks, 2003) or information (Raban & Rafaeli, 2007). Studies of collaborative e-learning mostly focus on system-related variables. Understanding the nature of learners' psychological dynamics - needs, wishes and perceptions - might prove effective in investigating pedagogical issues in the online learning processes and outcomes (Barak, 2007).

The current experiment was designed to test the relations between psychological ownership, perceived learning and perceived quality of outcomes. To do so, we created five groups. One, serving as a control group, wrote a document, read a document on an irrelevant topic, and then revised their own document. Two groups shared their written document, one with an unknown audience and the other with a peer. These groups, however, did not write their document collaboratively. After writing the first draft of the document, they published the documents, read a document on the same topic they worked on that was written by a peer, and then revised their own document. Two additional groups collaborated by either suggesting improvements and receiving suggested improvements a colleague made on their first draft, or by actually editing a colleague’s document and by receiving editorial changes made by this colleague/student.

If psychological ownership plays a role, we expect that students in the collaborative groups will perceive lower psychological ownership relative to students in the sharing groups and the control group. In addition, we expect that cognitive aspect of perceived learning will not differ between groups, but that the socio-emotional aspect of perceived learning will be lower in the collaborative groups (Blau & Caspi, 2008a; b). Last, we expect that students' perceived quality of outcomes will be higher in the collaborative groups. Table 1 summarizes the procedure and presents the hypotheses.

The present study focused on the influence of sharing or collaborating on documents using Google Doc on psychological ownership, perceived learning (Caspi & Blau, 2008), and perceived outcome quality. The Google Docs application allows access from any computer and eases the ability to collaborate by sharing a document with others as viewers or collaborators, or by publishing it on the web (Conner, 2008). Google Docs supports synchronous editing and comment writing, and saves versions of the document, options that afford real-time collaborative learning. The Educational Edition of Google Apps is free; it was built especially for schools, universities and nonprofit organizations, and does not require downloading new software or buying hardware (Oishi, 2007). Sharing content using the application is very simple, may facilitate collaboration, allows peer review of academic materials, and affords collective generation of knowledge (Educause Learning Initiative, 2008). Similar to Wikis, Google Docs enables collaboration by editing a document written by other students, and by suggesting modifications through comment writing, without editing the document itself.

Table 1. Procedure and hypotheses

	PROCEDURE			HYPOTHESES		
	Phase 1	Phase 2	Phase 3	Psychological ownership	Perceived learning	Perceived outcome quality
Control	Write a document (draft)	Read another document	Revise own document	High	Similar, but lower socio-emotional aspect in Editing group	Low
Publishing		Publish own document, read someone's document		High		Low
Reading		Share own document with a peer, read peer's document		High		Low
Suggesting		Give own document for review by a peer, read peer's document and suggest improvements		Low		High
Editing		Give own document for editing by a peer, read peer's document and editing it		Lowest		High

Method

Participants: 118 undergraduates (80% women) from the Department of Education and Psychology at the Open University of Israel received an academic credit for participation in this research. The participants' ages ranged from 16 to 54, mean age was 27.1 years, and the median was 25. None of the participants had utilized Google Docs before, but all reported that the application was easy or very easy to use (Mean > 5.09, scale from 1 to 6).

Instruments and procedure: Participants were randomly allocated to one of five experimental conditions. Each participant first read the same academic material (a slightly shortened version of Myers, 2007 translated to Hebrew) and was asked to write a document with up to 400 words. Then they evaluated the quality of their draft. In the following phase, the participants read another document and then revised their own document. The last task was to reevaluate the quality of the final version, and to report a sense of ownership, perceived quality of collaboration and perceived learning. As presented in Table 1, groups differed at phase 2. At this phase students in the five groups were asked to either: (1) read an irrelevant document "published" by someone else (Control, N = 23); (2) publish their own document on the web and read someone else's document (Publishing, N = 22); (3) read another participant's document while the other participant reads their draft (Reading, N = 23); (4) read and suggest improvements for another participant's draft while the other participant suggests improvements to their draft (Suggesting, N = 25); (5) read and edit another participant's document while the

other participant edits their draft (Edit, N = 25). As presented in Table 2, there were no significant demographic differences between groups in terms of age, gender, and number of courses already completed.

Table 2. Participants' demographics

Condition:	Age (SD)	Women (%)	Number of courses (SD)
Control	26.7 (4.3)	78.3	11.2 (9.7)
Publishing	26.7 (6.6)	72.7	7.53 (5.1)
Reading	27.9 (7.6)	78.7	9.9 (6.5)
Suggesting	27.2 (6.4)	92.0	7.7 (5.6)
Editing	26.9 (4.9)	80.0	7.5 (4.5)

Participants evaluated psychological ownership, collaboration quality, perceived learning, and document's quality through a self-report online questionnaire[1]. Psychological ownership was measured by 2 items that correlated significantly, $r = .62$, $p < 0.001$, scale ranges from 1 to 6. Perceived learning had two distinct aspects: cognitive and socio-emotional (Blau & Caspi, 2008a). Six items based on the six basic conceptions of learning (Marton, Dall'Alba, & Beaty, 1993; Marton & Säljö, 1976a; b), measured the cognitive aspect of perceived learning. Cronbach's alpha was .77. Five items measured the socio-emotional aspect, Cronbach's alpha was .86. The correlation between the two aspects of perceived learning was $r = .66$ ($p < 0.001$). The perceived quality of the document was measured twice, before and after the revision of the document, by six items – Cronbach's alpha = .93 for pre-revision and .94 for post-revision, the scale ranged from 1 to 10.

Results and Discussion

Psychological ownership: As hypothesized, a significant effect for condition was found, $F(4, 113) = 5.12$, $p < 0.001$, partial $\eta 2 = 0.15$. Post-hoc comparisons confirmed that Editing was considered to be intrusive: the Editing group had a significantly lower sense of ownership compare to the Suggesting and Publishing groups (both p's < 0.01). Surprisingly, the Suggesting group also had high sense of ownership. As expected, the Publishing group showed a significantly higher sense of ownership ($p < 0.05$, for all comparisons with other groups, except the Suggesting group). But as opposed to our hypothesis, the Reading group had a low sense of psychological ownership. Table 3 shows means and SD of psychological ownership. Effect sizes were large for all the significant comparisons ($d > 0.7$). At the moment, we have no unitary plausible explanation for why the Reading and Suggesting groups did not have psychological ownership the way expected.

Table 3. Sense of ownership (scale: 1-6)

Condition:	Mean	SD
Control	4.33	1.02
Publishing	4.68	.95
Reading	3.89	1.28
Suggesting	4.98	.85
Editing	3.84	1.22

[1] The full versions of the pre- and post- questionnaires are available from the authors upon request.

Perceived quality of the document: A significant difference was found between pre- and post-revision, $F(1,113) = 11.85$, $p < 0.001$, partial $\eta 2 = 0.09$. The average perceived quality after revising was higher than prior to revising (Mean: 7.74, SD: 1.43 and Mean: 8.01, SD: 1.50 for pre- and post-revision respectively), signifying that students overall felt that revising the document improved it. But more important is the significant interaction between condition and timing measurement of the perceived quality, $F(4,113) = 11.85$, $p < 0.001$, partial $\eta 2 = 0.10$. The interaction is presented in Figure 1. The effect of condition was not significant. As revealed by a post-hoc analysis, significant changes in perceived document quality were found only for collaboration. This post-hoc analysis showed significant differences between pre- and post-revision for the Editing group, $t(24) = 4.24$, $p < 0.001$, $d = 0.87$, and for the Suggesting group, $t(24) = 2.03$, $p = 0.05$, $d = 0.86$, but not for the other groups. Thus, our hypothesis was confirmed.

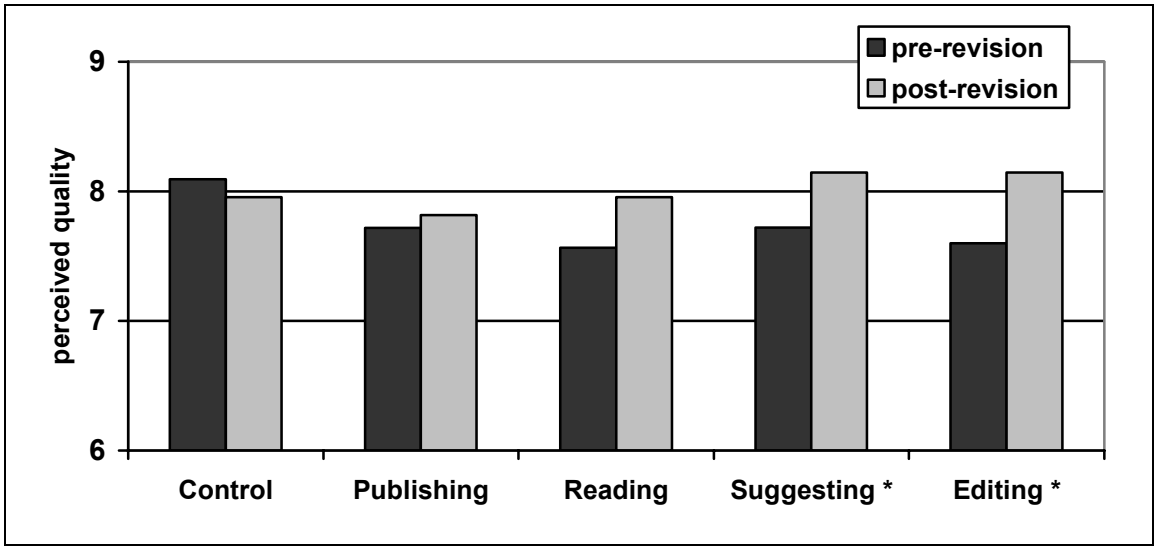

Figure 1. Perceived quality of document before and after revision (* statistically significant difference)

Perceived learning: Participants in all five groups perceived their learning to be high for the cognitive aspect (Mean: 4.26, SD: 0.91) and for the socio-emotional aspect (Mean: 4.30, SD: 1.22). There was no effect for aspects or condition, and the interaction between the two was also not significant (all p's > 0.5). These results supported our hypothesis. However, we failed to find lower socio-emotional perceptions for the editing group.

Perceived quality of collaboration: Two items measured students' perceived quality of collaboration ("Reading or revising my document by someone else made this document worse", "My reading or revising of another document made this document worse") and did not correlate significantly. The two items differed significantly, $F(1, 113) = 98.56$, $p < 0.001$, partial $\eta 2 = 0.47$. Students felt that while they did not exacerbate the document they read or edited (Mean: 2.27, SD: 1.26), others made their document worse when reading, suggesting or editing it (Mean: 3.98, SD: 1.28). There was neither condition nor quality of collaboration by condition interaction effects (both p's > 0.1). Another item measured students' attitude toward collaboration ("I think that a document written collaboratively is better than a document written alone"). Participants in all groups believed that collaboration results in better documents (Mean: 4.17, SD: 0.70).

Perceived learning and perceived document quality: The correlations between perceived learning and perceived quality of the final version of the document were significant (r = .44 for cognitive aspect and r = .34 for socio-emotional aspect, both p's < 0.001), and did not differ significantly one from the other (t(115) = 1.44, p > 0.9). Perceived quality before revision, after revision and the interaction between the two were entered into a multivariate regression analysis as predictors of perceived learning. The regression was significant for both the cognitive aspect F(3,114) = 14.40, p < 0.001, R2 = .28, and the socio-emotional aspect of perceived learning F(3,114) = 7.07, p < 0.001, R2 = .16. Perceived document quality before and after revision predicted cognitive and social-emotional aspects of perceived learning. Table 4 shows standardized coefficients for perceived quality before and after revision, and for the interaction. Interestingly, perceived quality of the draft predicted the cognitive aspect (and marginally the socio-emotional aspect), while perceived quality of the final version predicted only the socio-emotional aspect. These results strengthen Caspi and Blau's (2008) hypothesis that the two aspects of perceived learning are, at least to some degree, independent.

Table 4. Comparing Standardized Coefficients

	Cognitive aspect	Socio-emotional aspect
Perceived quality of draft	.39**	.20
Perceived quality of final version	.28^{+}	.33*
Interaction	.27**	.24*

$^{+}$ $p = 0.06$; * $p < 0.05$; ** $p < 0.01$

In summary, most hypotheses were supported. The findings indicated the perceived importance of collaboration: The quality of a revised document was seen as higher only after collaborative learning. Some support for the role of psychological ownership was found: Editing resulted in lower levels of psychological ownership whereas Publishing resulted in high levels. Interestingly, suggesting improvement did not lower the sense of psychological ownership. Nevertheless, the role of psychological ownership in collaborative learning is not fully uncovered.

Participants in all groups believed that collaboration improves the document quality. However, evaluation of the contribution of collaboration was asymmetrical - students felt that while they did not exacerbate the document they read or edited, others worsen their document when reading, suggesting or editing it. We therefore suggest that collaborative learning may be improved by encouraging collaboration mainly through suggesting and receiving improvements and less by editing each others' writing.

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