Required Discussion Web Pages in Psychology Courses and Student Outcomes

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We conducted 2 studies that investigated student outcomes when using discussion Web pages in psychology classes. In Study 1, we assigned 213 students enrolled in Introduction to Psychology courses to either a mandatory or an optional Web page discussion condition. Students used the discussion Web page significantly more often and performed significantly better in the class when it was a required course activity compared to when participation was optional. In Study 2, we required 211 additional students enrolled in multiple introductory and upper level psychology courses to contribute to Web page discussions. We found positive relations between Web discussion frequency, average word count, total word count, and total course points earned. Instructors may consider implementing required Web discussion pages in their classes to enhance learning.

Technology provides many exciting, new possibilities for course design and material integration. The Internet has significantly changed the presentation of learning material and how students interact as part of the learning experience, apart from the traditional classroom environment. One important technology for instructors to consider is the incorporation of discussion Web pages into curriculum. Online discussions allow students to share thoughts and experiences outside the physical classroom. This innovation is especially useful to students who may be somewhat reluctant to participate during class time, and online discussion can extend discussions when time constraints and large class size are concerns.

Tiene (2000) investigated the use of online discussions and found that most students reported positive reactions to online discussions, rating them as convenient and reporting that they enjoyed the experience. One advantage to online discussions was the ability to carefully prepare responses and ideas in writing through online interactions. Jiang and Ting (2000) found that in 19 Web-based courses, grade for online discussion and requirements for online discussion were positively related to students' perceived learning. Students believed they experienced more learning in courses that emphasized online discussion. In another investigation, students studying a third-year e-commerce subject in Australia participated in online discussions and in-class discussion (Ellis, Calvo, Levy, & Tan, 2004). Investigators used qualitative and quantitative methods to investigate the quality of experiences through discussion in these two forms. Overall, quality of the students' experience of learning through discussion was positively related to their performance. The researchers concluded that online and face-to-face discussion benefit learning experiences in qualitatively different ways.

Professors can use online discussions effectively in statistics and research methods classes. Wang, Newlin, and Tucker (2001) researched an Internet-based section of a statistical methods in psychology class that included electronic chat room discussions. Overall, student participation in online discussion was positively correlated with final class grade; students who contributed more

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comments online earned better grades in the class. Specifically, online student responses to problems or examples provided in lecture as early as week three in the semester were correlated with final course grade. Wang et al. (2001) suggested that these online postings can help instructors identify students who need help early in the academic term.

Many universities are now providing online educational experiences for students. Online instruction can promote student-centered learning, due to the interaction potential of learners in cyberspace without the constraints of being physically present in a classroom at set times, but online instruction may not always promote student-centered learning. In their sample, Davies and Graff (2005) found evidence that greater online interaction did not lead to significantly higher student grades. However, students who failed the classes interacted online less than those who passed the classes. Sain and Brigham (2003-2004) studied student satisfaction and performance using a threaded discussion component in psychology classes. Students read and responded to a weekly psychology question during the term. Researchers randomly assigned half of the class sections to use an online threaded discussion page to answer the question, and the other half completed the assignment on paper. Participants who completed the assignment using the traditional method of writing responses on paper reported greater satisfaction with the class, reported spending more time with the assignment, and wrote significantly more sentences compared to students who used the online procedure.

Relatively few studies have investigated the benefits of using discussion Web pages, although the use of the innovative technology and interest in this area are increasing. The results of past studies are not consistent with respect to how discussion Web pages can enhance instructional experiences and course outcomes. Past research has not considered the issue of optional or required online discussion Web page participation, and the relation between discussion Web page contributions and course outcomes in introductory and advanced psychology classes is unclear. To further explore these topics and describe what professors can expect when they implement online discussion forums, we investigated the use of Web page discussion in two studies. Study 1 investigated required or optional Web discussion page contributions. Study 2 investigated the relationships between Web discussion page contributions and course performance.

Study 1

In Study 1, we predicted greater student participation in Web page discussions when participation was a class requirement in introductory psychology courses as compared to conditions when participation was optional. Although this prediction seems somewhat commonsensical, we could not find any previous work specifically addressing this issue. We also predicted students in the required Web page discussion condition would earn significantly higher course grades than those in the optional Web page discussion condition. As a secondary hypothesis, we predicted a positive relation between course performance (i.e., earned course grade) and contributions to a discussion Web page throughout the academic term.

Method

Participants

Two hundred thirteen undergraduate students enrolled in five separate Introductory Psychology courses taught by two different instructors from two different colleges participated. Students attended either a small, private college (n = 129) or a large, Midwestern university (n = 84) and represented a wide variety of academic majors. The average age of students was 18.8 years (SD = 1.71, range = 17-34). The majority of students were women (70.1%).

Materials

We, the course instructors, created an identical threaded course discussion Web page using Microsoft FrontPage for each of our courses. Students could access this discussion page using any Web browser. We also developed a technology survey that we administered at the end of the term. The survey asked questions about technology usage over the course of the class, including frequency of visiting the course Web page, using the course discussion Web page, accessing the course notes Web page, visiting the course textbook Web site, and checking e-mail. We also included questions about comfort level with technology on the survey, including comfort level with computers, the Internet, and discussion Web pages. Students completed comfort level ratings on a 5-point Likert scale (1 = *very uncomfortable*, 2 = *uncomfortable*, 3 = *neutral*, 4 = *comfortable*, 5 = *very comfortable*). In addition, we included questions that asked whether students believed the use of technology increased their learning in this course and their anticipated course grade. Other demographic questions included sex, academic class, and age.

Procedure

The investigation took place over two academic quarters. During fall quarter, the first instructor (TFP II) taught two Introductory Psychology courses ($n = 50, 33$) in which student contribution to a discussion Web page was optional, and the second instructor (TFP) taught one Introductory Psychology course ($n = 47$) in which he required at least one significant contribution to a discussion Web page every two weeks. During the subsequent winter quarter, the first instructor taught one Introductory Psychology course ($n = 46$) in which he required at least one significant contribution to a discussion Web page every two weeks, and the second instructor taught one Introductory Psychology course ($n = 37$) in which student contribution to a discussion Web page was optional. Classes at both institutions met for 10-week periods; thus we expected at least 5 contributions in the required condition. We recorded discussion Web page contribution data and distributed a class survey at the conclusion of each term.

Results and Discussion

Students reported using the discussion Web page significantly more often each week, $t(195) = 13.2$, $p < .001$, $d = 1.77$, when enrolled in courses where it was a requirement ($M = 1.10$, $SD = .77$) compared to students enrolled in courses where participation was optional ($M = .08$, $SD = .28$). Only 10 of 120 students contributed to the course discussion Web page in the optional condition. Students enrolled in the required discussion Web page submission condition reported contributing more than the mandatory minimum of once every two weeks, indicating increased student involvement with the technology. We compared the final course grade from the first instructor's (TFP II) Introductory Psychology sections and found that the students in the required Web discussion condition earned significantly higher grades in the course compared to students enrolled in the optional Web discussion condition, $t(128) = 1.99$, $p = .04$, $d = .35$, Ms = 81.24% ($SD = 8.54$) and 77.93% ($SD = 10.10$), respectively. These results suggest that taking part in Web discussions help students learn, but professors must require discussion Web page participation for this increased student learning to occur.

The optional and required discussion Web page contribution conditions reported similar, high levels of comfort using technology in general, $t(158) = .30$, *ns*, Ms = 4.27 and 4.30, respectively, and comfort using the Internet, $t(158) = .91$, *ns*, Ms = 4.35 and 4.45, respectively. The required discussion Web page contribution group reported a significantly greater comfort level with discussion Web pages compared to the optional group, $t(158) = 5.69$, $p < .001$, $d = .89$, Ms = 3.88 ($SD = .84$) and 3.20 ($SD = .69$), respectively. These differences may reflect an increased

familiarity with using discussion Web pages throughout the term. Overall, students were positive about the inclusion of technology in courses and indicated that the inclusion of technology in the course increased their learning, $\chi^2(1, N = 160) = 75.6, p < .001$; 84.4% agreed and 15.6% disagreed.

Because students completed the survey before the class final exam and assignment of final course grades, we asked students to indicate their anticipated course grade: A, B, C, D, or F. Survey responses were anonymous, so we could not analyze actual Web page contribution and course grades with the other survey response data. However, we converted anticipated grade to a point value (A = 4, B = 3, C = 2, D = 1, F = 0). In the required contribution condition, anticipated grade was not correlated with reported Web discussion page use, $r(76) = .08$, *ns*.

Separate from the student survey responses, the actual frequency of Web page discussion contributions, total word count of the contributions, and average word count per contribution were correlated with final course point total (minus points awarded for the Web discussion contribution requirement) for the second instructor's (TFP) required contribution class. Unfortunately, a server error deleted the data for the first instructor's (TFP II) classes after the course was completed and before we could analyze the data. For the second instructor's class, the mean frequency of Web page discussion contributions was 3.45 ($SD = 2.59$), the mean total word count of the contributions was 151.15 ($SD = 123.59$), and the mean average word count per contribution was 36.02 ($SD = 23.92$). There was a correlation between final course point total and frequency of Web page discussion contributions, $r(45) = .53, p < .001$; final course point total and total word count of Web page discussion contributions, $r(45) = .55, p < .001$; and final course point total and average word count of Web page discussion contributions, $r(45) = .43, p = .003$.

Study 2

We designed Study 2 to replicate the relations between Web discussion page contributions and course performance found in the Introductory Psychology course required condition sample in Study 1 and to extend the findings to upper level psychology courses. Past research (see Introduction) has yielded contradictory findings with respect to the relation between student participation in online discussion boards and course outcomes. In Study 2, we tested our hypotheses that course point total earned would be positively related to the number of Web discussion contributions posted during the term, the total word count, and the average word count of submissions in introductory and advanced psychology courses.

Method

Participants

Two hundred eleven undergraduate students enrolled in four separate Introductory Psychology courses ($n = 47, 35, 32, 34$), one Cross-Cultural Psychology course ($n = 15$), one Advanced Social Psychology course ($n = 15$), and one Psychology of Prejudice course ($n = 33$) taught by two different instructors from two different colleges participated in this research. TFP taught one section of Introductory Psychology ($n = 47$) and TFP II taught all other sections ($n = 164$ students). Although we did not collect direct information about age and ethnicity of the students who participated, we observed that the vast majority was traditional college-aged and Caucasian.

Materials

As in Study 1, each instructor created an identical threaded course discussion Web page using Microsoft FrontPage; students could access this discussion page using any Internet connection at school or at home. As in the required condition of Study 1, we instructed students to complete at least one significant contribution to a discussion Web

page every week for advanced courses (Cross-Cultural, Advanced Social, Prejudice) or once every two weeks for introductory courses with no minimum word count. We also invited students to contribute to the Web discussions as much as they desired, but without additional class credit. Instructors recorded the total number of posting contributions, the total number of words written, and the average word count per contribution for each student at the end of the term. We used the total number of points earned in each class, subtracting out any points earned for Web page discussions, in analyses.

Procedure

The investigation took place over multiple academic quarters from 2003-2005. Classes at both institutions met for 10-week periods; thus, instructors required 10 contributions per student in the advanced courses and 5 contributions per student in the introductory courses. We recorded actual discussion Web page contribution data after the class was completed.

Results and Discussion

We correlated the frequency of Web page discussion contributions, total word count of the contributions, and average word count per contribution with final course point total (minus points awarded for Web contributions) for each individual class. The mean frequency of Web page discussion contributions, the mean total word count of the contributions, and the mean average word count per contribution for each class appear in Table 1. The correlations between frequency of discussion page postings and course grade ranged from .38 (p = .02) to .74 ($p < .001$) for the various classes. The correlations between total number of words written and course grade ranged from .29 ($p = .09$) to .65 ($p < .001$) for the various classes. The correlations between average number of words written in each posting and course grade ranged from .04 ($p = ns$) to .43 ($p < .001$) for the various classes. We present correlations for each class in Table 2. In addition, students in advanced courses wrote significantly more words per contribution (M = 124.68, SD = 38.91) than students in the introductory courses (M=59.53, SD=36.27), $t(176) = 8.86, p < .001, d = 1.73$.

Table 1
Study 2: Mean Discussion Web Page Contribution Statistics

Class	Frequency	Average Words	Total Words
Introduction to Psychology	3.45 (2.59)	36.02 (23.92)	151.15 (123.59)
Introduction to Psychology	4.51 (1.52)	72.60 (31.62)	335.11 (169.41)
Introduction to Psychology	3.56 (2.23)	59.56 (34.90)	264.50 (202.78)
Introduction to Psychology	4.62 (2.22)	78.56 (39.34)	396.85 (241.79)
Cross-Cultural Psychology	8.47 (2.67)	126.04 (46.80)	1094.0 (595.69)
Advanced Social Psychology	9.67 (1.29)	123.33 (30.71)	1181.93 (291.99)
Psychology of Prejudice	9.73 (2.59)	139.90 (47.16)	1392.06 (578.53)

Note. Instructors required five Web discussion contributions per student in the introductory courses and 10 contributions per student in the advanced courses. Standard deviations appear in parentheses.

General Discussion

In line with predictions, results revealed that students in Introductory Psychology classes used a discussion Web page significantly more often and performed significantly better when enrolled in courses where discussion Web page contribution was a requirement compared to when participation was optional. In addition, we found a significant, positive relation between online discussion page participation and course outcomes in introductory and in advanced psychology courses. Students were positive about the inclusion of technology in courses and reported that the inclusion of technology increased their learning. These results show a clear and consistent relation between Web page contributions and course outcomes.

The relations between total course points earned and Web page discussion contributions are interesting. Although students in Study 1 enrolled in the required discussion Web page conditions performed significantly better in the class than students in the optional discussion Web page conditions, the relations found in Study 2 between student Web discussion participation and course outcomes do not show that discussion page participation *caused* students to earn better grades. One explanation for these positive relations may be that students thought more about course material, debated course theories, employed critical thinking, and therefore performed better on class tests and assignments. An alternative explanation could be that highly motivated, high-achieving students used the discussion Web page more than less motivated, low-achieving students. For these students, participation in Web-based discussions may not have changed their course performance.

Sometimes students avoid greater reflection of course content and just agree with other student posts on discussion pages instead of generating counter-arguments. Nussbaum, Hartley, Sinatra, Reynolds, and Bendixen (2004) found that the tendency for agreement may be related to personality. Students with low degrees of curiosity (openness) or assertiveness may find instructor provided discussion topics particularly useful. Christopher, Thomas, and Tallent-Runnels (2004) evaluated the thinking levels of graduate students enrolled in an online gifted education class

Table 2
Study 2: Discussion Web Page Contribution and Course Performance Correlations

Class (*N*)	Frequency	Average Words	Total Words
Introduction to Psychology (47)	.53***	.43**	.55***
Introduction to Psychology (35)	.38*	.04	.29*
Introduction to Psychology (32)	.65***	.41**	.62***
Introduction to Psychology (34)	.56***	.26	.49***
Cross-Cultural Psychology (15)	.41	.37	.50*
Advanced Social Psychology (15)	.59**	.15	.51*
Psychology of Prejudice (33)	.74***	.37**	.65***

Note. Correlations represent the relationship between class point total, minus points awarded for Web discussion, and each Web page contribution variable. * $p < .10$, ** $p < .05$, *** $p < .01$. All tests were two-tailed.

using Bloom's taxonomy. They concluded that students participating in online discussion forums were not necessarily more thoughtful with their responses to higher level prompts. Future studies may focus on understanding student personality differences and motivating traditionally moderate- and low-achieving students to actively participate in all dimensions of class requirements to determine the causal relationship between Web discussion participation and class performance.

Additional studies may investigate ways to encourage students to participate in online discussions. In these studies, we did not contribute to the Web page discussion to maintain consistency between conditions. Professors could easily add their own questions, reply to inquiries, and generally spur greater discussion. Indeed, Wang (2005) suggested that professors develop effective questioning skills to improve learning in online synchronous discussions, and Murphy (2004) discussed how to identify and measure student contributions to an online asynchronous discussion. Gerber, Scott, Clements, and Sarama (2005) also explained how instructors can use challenging stances on issues in online discussion boards to increase student posts of referenced theories and class readings.

Suler (2004) offered additional advice about how to structure the online environment and strategies for increasing contributions. Addressing confidentiality and bridging the gap between online and class settings are important. Researchers have also developed qualitative method protocols for evaluating online discussion postings (Marra, Moore, & Klimczak, 2004) and instructional guides and evaluation rubrics based on Bloom's taxonomy to assess online discussion levels (Christopher et al., 2004).

Although our data do not indicate why student Web discussion page contribution was related to course performance, the relations were quite strong and stable across several different classes. We recognize the likelihood that good students are the ones contributing to discussion pages the most and that discussion page contributions are not the only factor affecting course outcomes. However, students who contributed more may have increased their learning in their respective courses using this alternative medium. Professors may choose to incorporate discussion Web pages to add an additional dimension of interaction and sharing to enhance learning in introductory and advanced psychology classes.

Professors considering using Web discussion pages have a number of options available to implement the online technology. We used Microsoft Frontpage, although others may use functions available through Blackboard or other Internet management teaching software. We were familiar with FrontPage, so the initial process of setting up the discussion Web page took less than an hour. As long as there are no technological difficulties, setting up the discussion page is the only preparation time investment. Professors will have to consider whether contribution should be identified by name (or student code) and the order of the presentation of the submissions (i.e., most recent to oldest). Hewitt (2003) suggested that discussion page users have a bias to respond to recent threads and a reduced tendency to revisit older threads. Instructors may redesign and update questions regularly to avoid this problem. Instructors may contribute different levels of questions and discussion starters which can involve anywhere from a few minutes a week to many hours a week, depending on the professor's desired level of involvement and control. No two classes produce the same online discussion experience. We made the online discussions worth only about 5% of the final class grade in the various classes. Other instructors may choose to increase the weight of the online discussion component to meet the goals of the course.

What should college professors expect if they use Web discussions as part of their classes? Professors should expect that stu-

dents will not use the online opportunity to discuss course concepts unless professors require online discussions, and those professors who require online discussion may see improved student learning. Instructors should also expect that students in advanced courses will use Web discussion pages more often and will include more content in their posting than students in introductory classes. Students will also report greater comfort with technology and increased course learning in classes that implement Web discussion requirements. Those students who use the Web discussion pages more often and write more on these forums are also likely to do better in class compared to those that do not use the Web discussion pages or contribute minimal content.

In summary, if professors want students to contribute to online discussions, they must require participation. Professors should consider employing course discussion Web pages in light of the results of the current research showing that participation is linked to positive course outcomes, especially in advanced psychology courses as topics move from fact-based information to more critical analysis of information. This technology is fairly easy to implement, and it can enhance traditional classroom learning. Overall, students report that they value technology integration into college classes and believe it increases course learning outcomes.

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Notes

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