

The Effects of Electronic Feedback on Student Performance

Beth Dietz-Uhler
Department of Psychology
uhlerbd@muohio.edu

Janet Hurn
Department of Physics
Miami University
Middletown, OH 45042
513-727-3200
hurnje@muohio.edu

Introduction

Prior research (e.g., Wilson, 2006; Wilson & Taylor, 2001) suggests that immediacy behaviors of instructors are associated with increased grades and satisfaction with both the course and the instructor. Immediacy behaviors are both verbal and nonverbal. Examples of nonverbal immediacy behaviors include looking at the class while talking, not talking in a monotone voice, moving around the classroom while teaching, and having a relaxed body posture while talking. Examples of verbal immediacy behaviors include calling students by name, asking students how they feel about things, and using collective pronouns to refer to the class (Immediacy in the Classroom: Research and Practical Implications, 2010).

The importance of immediacy behaviors in the classroom cannot be overstated. The use of immediacy behaviors in the classroom has been shown to increase student satisfaction and even student grades (Wilson, 2006; Wilson & Taylor, 2001). There is ample research (see Immediacy in the Classroom: Research and Practical Implications, 2010, for a review) showing that immediacy behaviors in the classroom are associated with improved affective and cognitive learning, perceived instructor competence, student motivation, and attendance and participation. As such, instructors should be encouraged to display these immediacy behaviors in the classroom.

Although the effectiveness of immediacy behaviors in the classroom has been well documented, it is not clear how online instructors can make use of these in-class immediacy behaviors. Behaviors such as asking students how they feel about things and referring to the class with collective pronouns can easily be translated to an online environment. But most immediacy behaviors, such as looking at the class when talking and moving around the classroom when teaching are not transferable to online settings. So, the question becomes, how can online instructors take advantage of the effectiveness of immediacy behaviors in online, asynchronous, distance learning classes.

There is a fairly substantial literature on the effectiveness of out-of-class communication. Out-of-class communication between instructor and student has been associated with student retention (Milem & Berger, 1997), academic performance (Terenzini, Pascarella, & Bliming, 1996), and positive affect for learning (Pascarella & Terenzini, 1991), for example. In an interesting study on the effectiveness of email from a professor on student motivation and attitudes, Legg and Wilson (2009) sent a welcoming email to some students and no email to other students prior

to the start of class. They argued that developing rapport with students (an immediacy behavior) will affect their motivation, attitudes, and grades. The results of their study showed that an email sent prior to the start of class significantly enhanced student motivation and their attitude toward the course and the instructor. The email did not impact their performance in the course.

The purpose of the current research is to examine the effectiveness of electronic feedback on student performance in online and hybrid courses. Specifically, we sent personalized emails to students about their performance (on an exam or activity) relative to the class average. When a student performed lower than the class average, the emails expressed concern, offered assistance, or directed the student to resources that might be of help to them. When a student performed better than the class average, the emails encouraged the student to continue to exert the effort needed to perform at that level or better. Personalized feedback was sent to students following the second exam or quiz. Students did not receive electronic feedback from their instructors following the third exam or quiz. The personalized emails served as a proxy for immediacy behaviors that one might find in a traditional classroom. We anticipated that exam or quiz scores following personalized electronic feedback would be significantly greater than those not followed by electronic feedback.

Method

Participants. Participants were 49 students enrolled in either online and hybrid psychology courses or hybrid physics courses. There were 15 students in the online psychology course, 11 in the hybrid psychology course, and 23 students in two sections of a hybrid physics course.

Procedure. In the psychology courses, students received an email from the instructor following the second exam. Students who scored above the mean received positive feedback from the instructor: “I noticed that you scored above the mean (76.5%) for the exam. Whatever you are doing to prepare for the exams, keep doing it because it is working.” Students who scored below the mean received encouraging feedback from the instructor: “I noticed that you scored below the mean (76.5%) for the exam. I want to remind you about the resources in our Blackboard site, particularly the “Effective Study Skills” link in the Course Information tab. If there is anything I can do to help you improve on the next exam, then please let me know.” Students did not receive any other feedback on the first, third, or fourth exams.

In the physics course, students received positive feedback if they scored above the mean for a quiz: “I noticed that you scored above the class average on the last quiz. That is fantastic. Keep up the hard work. Continue utilizing the successful study practices you are already using. Keep in mind that for the next test, you will have twice the questions in the same amount of time so keep studying.” Students who scored below the mean received encouraging feedback: “I noticed that although you had a good score on the quiz, you scored below the class average. Some suggestions I have for the next test is to come to class regularly, do the Webassign problems several times, and choose more book problems to look over. Please come to office hours if there is anything I can help you with. Keep in mind that for the next test, you will have twice the questions in the same amount of time so keep studying.” Students received this email after the second quiz only.

We recorded the type of feedback (positive, encouraging) students received, as well as their exam or quiz grades on the second (no feedback) and third (feedback) exam or quiz. We compared

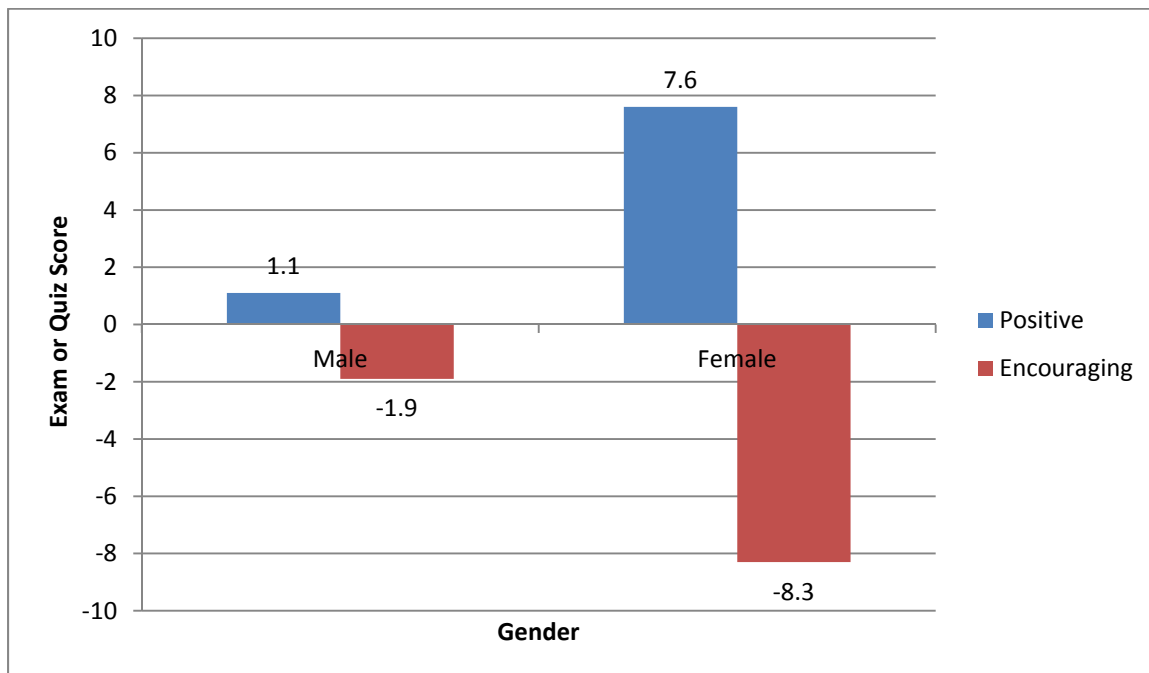
the effects of feedback (positive, encouraging) on their exam or quiz scores (no feedback, feedback). We anticipated that exam and quiz scores would improve after receiving electronic feedback, regardless of the type of feedback. We also examined the effects of gender (male, female) and type of class (psychology, physics) on exam and quiz scores.

Results

Because the exams and quizzes included different numbers of questions and the means were different, all exam and quiz scores were standardized by subtracting the exam or quiz mean from the exam or quiz score. Thus, higher numbers indicate better performance.

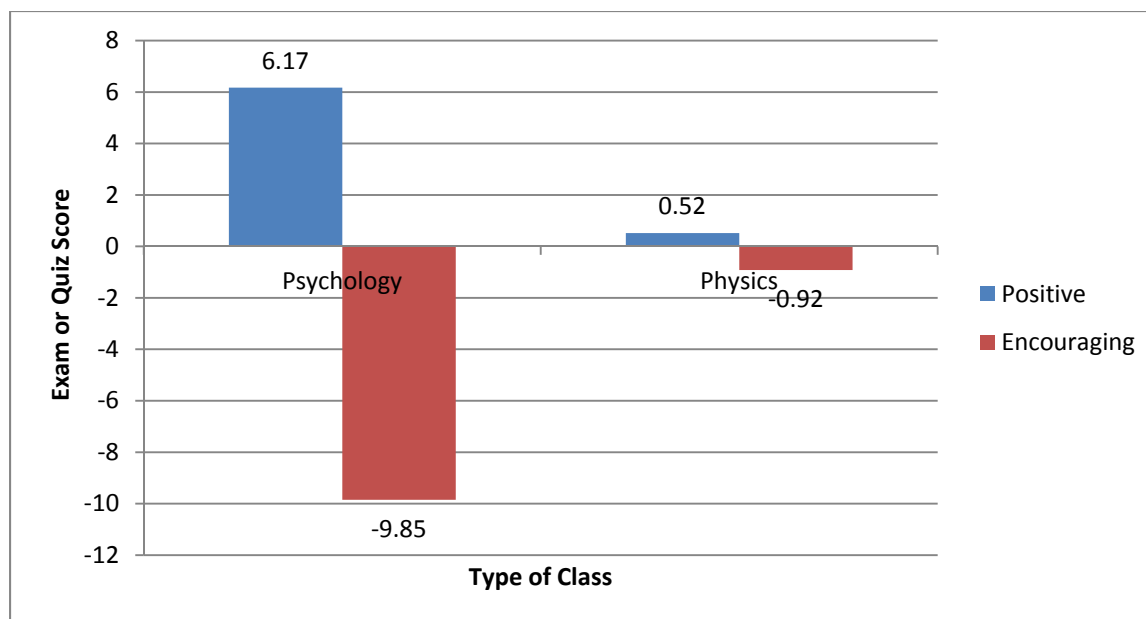
To examine the main hypothesis that feedback will improve performance, we conducted a 2 (Type of feedback: positive, encouraging) x 2 (Timing: no feedback, feedback) mixed model analysis of variance. The results showed a main effect for type of feedback, with those receiving positive feedback ($M = 3.53$, $SD = 10.17$) performing better than those receiving encouraging feedback ($M = -5.65$, $SD = 12.4$), regardless of time of exam or quiz, $F(1,47) = 11.77$, $p < .001$. In effect, good students continued to perform well, regardless of feedback. These results disconfirm our hypothesis.

To examine whether males and females responded differently to the feedback, we conducted a 2 (Type of feedback: positive, encouraging) x 2 (Timing: no feedback, feedback) x 2 (Gender: male, female) mixed model analysis of variance. The results show a significant interaction of gender and type of feedback, $F(1, 45) = 6.12$, $p < .05$. These results are displayed in the figure below. Clearly, females were more responsive, in both directions, to the feedback than males.



Finally, to examine if the type of class affected exam and quiz performance we conducted a 2 (Type of feedback: positive, encouraging) x 2 (Timing: no feedback, feedback) x 2 (Class type: physics, psychology) mixed model analysis of variance. The results, displayed in the figure below, show a significant class type by type of feedback interaction, $F(1, 45) = 8.45$, $p < .01$. The

results suggest that the feedback had a more significant effect, in both directions, on psychology students.



Discussion

A variety of research attests to the effectiveness of immediacy behaviors in improving learning for students (e.g., *Immediacy in the Classroom: Research and Practical Implications*, 2010). Yet, in online and sometimes hybrid environments, most immediacy behaviors do not translate well. Happily, an abundance of research attests to the effectiveness of out-of-class communication on student retention (Milem & Berger, 1997), academic performance (Terenzini, Pascarella, & Bliming, 1996), and positive affect for learning (Pascarella & Terenzini, 1991). The purpose of this research was to examine the effects of electronic feedback, serving as a proxy for verbal feedback, on student performance. It was expected that student performance following instructor electronic feedback would exceed performance on exams and quizzes not followed by electronic feedback.

The results of the study did not find the anticipated significant interaction between type of feedback and timing of the exam. Exam or quiz performance following feedback was not significantly different than performance not followed by feedback, regardless of the type of feedback. The results of the study showed a significant difference between the type of feedback, with positive feedback leading to more improved performance than encouraging feedback. This result suggests that the type of encouraging feedback might need to be altered so that it sounds more positive. For example, instead of indicating to students that their performance was lower than the class average, perhaps the feedback might simply suggest resources that students can make use of on the next exam or quiz.

The results did show a couple of interesting interactions with type of feedback. Specifically, female students seemed more responsive to feedback of any type, as indicated by their performance, than males. Prior research indicates that females are more sensitive than males to non-verbal forms of immediacy behaviors, such as eye contact and length of meetings (Rester & Ed-

wards, 2007). In the current research, positive feedback improved performance whereas encouraging feedback seemed to lead to worse performance. Again, it may be that the encouraging feedback needs to be changed in a manner more like the positive feedback.

There was also an interaction of type of class (psychology and physics) and the type of feedback. Psychology students responded more extremely, in both directions, to the feedback than physics students. Of course, these results might simply mirror the gender results as 78% of the physics students were males, compared to 38% of the psychology students.

The results of this study suggest several possibilities for future research. First, it would be interesting to change the type of electronic feedback that students receive. The results of this study showed that positive feedback did indeed improve performance, but encouraging feedback seemed to make it worse. It would be interesting to test the effects of different types of electronic feedback on performance. It would also be interesting to examine the effects of performance on a multitude of other variables, such as satisfaction with the course and the instructor, student motivation, student interest in the course material, and course retention, which is often a problem in online courses. If electronic feedback, as a proxy for in-class immediacy behaviors, has positive benefits beyond performance, then it seems worthwhile for instructors to provide such feedback.

References

- Immediacy in the Classroom: Research and Practical Implications. Retrieved April 17, 2010 from <http://serc.carleton.edu/NAGTWorkshops/affective/immediacy.html>.
- Legg, A.M. & Wilson, J. H. (2009). E-mail from professor enhances student motivation and attitudes. *Teaching of Psychology*, 36, 205-211.
- Milem, J. F. & Berger, J. B. (1997). A modified model of college student persistence: Exploring the relationship between Astin's theory of involvement and Tinto's theory of student departure. *Journal of College Student Development*, 38, 387-400.
- Rester, C. H. & Edwards, R. (2007). Effects of sex and setting on students' interpretation of teachers' excessive use of immediacy. *Communication Education*, 56, 34-53.
- Terenzini, P. T., Pascarella, E. T., & Blimling, G. S. (1996). Students' out-of-class experiences and their influence on learning and cognitive development: A literature review. *Journal of College Student Development*, 37, 149-162.
- Wilson, J. H. (2006). Predicting student attitude and grades from perceptions of instructors' attitudes. *Teaching of Psychology*, 33, 91-94.
- Wilson, J. H. & Taylor, K. W. (2001). Professor immediacy behaviors associated with liking of students. *Teaching of Psychology*, 28, 136-138.