Articles with Statistical Analytics

Pertaining to Online Education

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EDTC810 – Spring 2019
Assessment 1

Articles with Statistical Analytics Pertaining to Online Education

Online learning is a growing area of K-12 and higher education, thus, it is an important and relevant topic for all educational administrators and institutions to study and research. The *National Center for Education Statistics* explains that online learning modalities provide learners with a convenient and valuable venue for those who are in need of flexible learning environments to suit the needs of their work and family responsibilities and constraints (Characteristics of Postsecondary Students, 2016).

Forty-one percent of full time students in higher education were employed in October 2014, while eight percent of part-time students were in employed in the same time period (Characteristics of Postsecondary Students, 2016). Arizona State University reported a large increase in enrollments for their online programs. The institution reported a 60 percent increase in online enrollments from 2016 to the 2018 academic year. (The Changing Face of the American Student, 2018). Understanding all facets and components of online learning will provide valuable information on improving the design and delivery of online courses and programs.

Statistics can provide helpful information on various areas of online learning composed of various data sets; these data points can include information from student and faculty surveys, usage, student learning outcomes, and more. Salkind (2017) explains that various data points can be analyzed together to determine the relationship among the variables. P-values are used in statistical analysis to determine whether or not a hypothesis, expected scenario or observed behavior happened by chance or not. Salkind (2017) states that p-values less than .05 suggests that the relationship is not likely to have occurred by chance alone.

The following sections will analyze two articles, one from the media and the other from a scholarly article. Each article pertains to one of many possible topics related to online learning in K-12 and higher education. The first article from the media will review the statistical information gathered from instructors' level of feedback to online discussion forums and how they relate to their perceptions of their students' gender. The review of the second scholarly article will discuss the statistical analysis on a topic of the effectiveness of online electronic feedback in online learning environments.

Race and Gender Bias in Online Courses

Inside Higher Ed is a popular organization which regularly share news articles on various topics related to higher education. In an article titled "Race and Gender Bias in Online Courses," Jaschik (2018) shares research conducted which shows that although many speculate that students are assessed on their contributions in online courses, data shows that they are judged on their race or gender (see Appendix A). Jaschik (2018) references a study, by the "Center for Education Policy Analysis" which provides the descriptive statistics of the study. This reference provides the mean and standard deviations for all variables of the study.

Jaschik (2018) states that this study was comprised of 124 massive open online courses (MOOCs) where fictitious names were added to the courses by the conductor of the research. The names of the students were created with names which are likely to be identified, by the instructors, as white, black, Indian, or Chinese and as either male or female in each of the categories.

It was found that instructors in the study were 94 percent more likely to respond to discussion forum posts from students whose names would identify them as white males. As MOOCs typically enroll a large number of students in each course, the study found that, overall,

the instructors responded to 7 percent of all posts in the discussion forums. Surprisingly, 12 percent of white males' postings were responded by the instructors.

The conclusion of the article is that evidence exists and suggests that instructors are likely to discriminate in online course discussion forums. Online instructors are likely to respond differently to students with a specific and identifiable race and gender. The study found that these results apply to all disciplines of studies with no variation in results. Jaschik (2018) suggests that protocols of anonymity (removing names and pictures from students' online discussion board postings) should be utilized in online courses to reduce the likelihood of discrimination and bias.

Although Jaschik (2018) provides some general data in the article, it would be more helpful to readers if more detailed information was included from the referenced study by the "Center for Education Policy Analysis." Specifically, data showing instructors' responses for each of the races and genders would provide a detailed breakdown of how each category of students related to each other. The referenced study adequately included descriptive statistics and the relationship of variables of the study. Another weakness of the study is that this research only included MOOCs in the sample population and data collection. MOOCs are a separate and distinct breed of online courses. It would be helpful to conduct research on traditional online course environments where each individual course has a limited number of enrollments where it is more feasible and logistically possible for instructors to reply to a larger portion of the population of students. Due to the scope and size of MOOCs, instructors have a more difficult time responding to the large number of enrolled students.

Student and Faculty Perceptions of E-Feedback

In a scholarly and peer reviewed article titled "Student and Faculty Perception of E-Feedback," research analyzed the perceptions of instructors and students pertaining to the use of track changes, annotations and highlighted content as online feedback tools (see Appendix B). McCabe et al. (2011), included two parts for this research in order to include the perceptions of both students and instructors. The first part of the study involved students' ratings of electronic procedures for online assignments as well as their ratings of technological skills needed for interaction with these tools. The second part of the study involved a sample of Psychology faculty and analyzed their perceptions of the electronic feedback tools.

In the first part of the study, 37 students enrolled in two sections of a Research Design course completed a survey which consisted of 28 items; specifically, there were 24 seven-point Likert-scale questions, three questions asking for an estimated GPA, an anticipated grade on a research paper and an anticipated final grade for the course and an open-ended question pertaining to the students' perceptions of the electronic feedback. The survey was disseminated to the students at the end of the term during class time and allowed for anonymous submissions. From the seven-point Likert scale question which asked how often they retrieved and reviewed the electronic feedback from their instructors, the research provided a mean score of 5.98 with a standard deviation of 1.38. 20 students noted they always retrieved and reviewed the feedback (with a response of "7") while none reported that they never retrieved and reviewed the electronic feedback (with a response of "1").

McCabe et al. (2011) explain that the students in the study rated the electronic feedback, with the Likert-scale, as being more convenient with a mean of 5.15 ($SD = 1.85$ and $p < .001$). The p-value indicates that it is not likely that the result was by chance. Overall, the participants noted that the electronic feedback provided them with clearer expectations for their writing

assignments (M=5.15, SD=1.80, p=.02). Again the p-value indicates that this result is not likely by chance alone. The participants also noted that the electronic feedback provided them with a better learning experience (M=4.44, SD = 1.55, p=.09). Since this p-value is greater than .05, this has a slight chance that this resulted by chance.

In the second part of the study, 91 faculty members completed a five-point Likert-scale survey about their perception of utilizing electronic feedback in their courses. The scale consisted of "1" (never), "2" (rarely), "3" (sometimes), "4" (often), and "5" (always). The most frequently utilized form of electronic feedback used by instructors was for collaborating on a manuscript revision (M=3.89, SD= 1.16). The next frequently used form of electronic feedback was for editing written work for personal use (M=3.10, SD=1.30) and next for providing constructive feedback to their students' written work (M=2.96, SD= 1.34).

McCabe et al. (2011) state that a correlational analysis was conducted in order to determine the relationships between how electronic feedback was used and the educational value of the tools. The analysis showed that there was a strong correlation between the use of electronic feedback for use with personal documents ($r(85) = .55$, $p < .001$), for collaborating on manuscripts ($r(85) = .49$, $p < .001$), and providing feedback to students' written work ($r(85) = .56$, $p < .001$).

A weakness of this study is that all student participants were part of the same course, albeit in two separate sections of the same course. Additionally, the sample size of 37 is small in determining the correlations between variables. In order to increase the sample size of student participants, the researcher would need to include courses which utilize the same electronic feedback tools as the course included in the original study. Finally, the sample size of instructors who utilize electronic feedback, as noted in the second part of the study, is adequate. It would be

helpful to the reader if disciplines of the instructors were included so that correlations can be made between the use of various electronic feedback tools and specific academic areas.

Conclusion

Distinct differences are present when comparing the article in the *Inside Higher Ed* media article and the scholarly article. Jaschik's (2018) *Inside Higher Ed* article, titled "Race and Gender Bias in Online Courses," is intended for readers, who are affiliated with teaching and learning in higher education. These articles are informational and included generalized information on a given topic and is formatted to be quick and easy to read. The author provides descriptive statistics on the likelihood of online instructors responding and interacting with students of particular races and gender. The study also found that variation did not exist when analyzing specific disciplines. The statistics provided in this article gives the reader the necessary information to determine the relevance of the topic and how bias in online courses should be considered when facilitating their own online courses.

McCabe et al.'s (2011) scholarly article, on the other hand, was constructed for a scholarly audience. Descriptive statistics were included, but p-values were also included for the readers. This provides the audience with a clear data on how specific variables are related to one another and how it supports the researcher's hypothesis. As previously mentioned, if the sample size of students was larger and various disciplines were included in the first part of the study, the statistical data would have been much more helpful in determining the effectiveness and perceptions of students' use of electronic feedback in online courses.

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Appendix A:

Race and Gender Bias in Online Courses

Link to article: https://www.insidehighered.com/news/2018/03/08/study-finds-evidence-racial-and-gender-bias-online-education

Copy of article:

INSIDE HIGHER ED

Published on *Inside Higher Ed* (https://www.insidehighered.com)

Home > Study finds evidence of racial and gender bias in online education

Study finds evidence of racial and gender bias in online education

Submitted by Scott Jaschik on March 8, 2018 - 3:00am

Many proponents of online education have speculated that the digital learning environment might be a meritocracy, where students are judged not on their race or gender, but on the comments they post.

A study being released today [1] by the Center for Education Policy Analysis at Stanford University, however, finds that bias appears to be strong in online course discussions.

The study found that instructors are 94 percent more likely to respond to discussion forum posts by white male students than by other students. The authors write that they believe their work is the first to demonstrate with a large pool that the sort of bias that concerns many educators in face-to-face instruction is also present in online education.

The study looked at discussion forums in 124 massive open online courses (all were provided on a single MOOC platform that the paper does not identify, citing confidentiality requirements). The researchers created fictional student accounts, with names that most would identify as being either white, black, Indian or Chinese, with male and female names for each racial/ethnic group.

Over all, instructors responded to 7 percent of comments posted by students. But for white male students, the response rate was 12 percent.

"Our results show compelling experimental evidence that instructor discrimination exists in discussion forums of online classrooms," says the paper. "Simply attaching a name that connotes a specific race and gender to a discussion forum post changes the likelihood that an instructor will respond to that post."

The gap in instructor response rates was the same in courses in science and technology and in other subject areas.

In course discussion forums, students also respond to fellow students. Here the study found that female, white and Indian students were more likely to respond to the fictional students who were from their own group. But the impact was modest, with one exception -- white female students were significantly more likely to respond to posts by white women than were other students.

The authors of the study are Rachel Baker of the University of California, Irvine; Thomas Dee of Stanford; Brent Evans of Vanderbilt University; and June John of Stanford.

Their paper acknowledges limitations of the study. The authors note that they are uncertain about how instructors or students react to postings from people whose names are not as identifiable by race, ethnicity or gender as the names used in the study. Further, they note that because the students they created are fictional, they could not study the impact on students of the varying response rates by instructors.

They conclude by stating that their findings are important, given the increasing use of online education.

"Because online courses are typically asynchronous, these forums provide a uniquely important venue for instructor-to-student and student-to-student engagement," the paper says. "Our field experiment produced evidence that the comparative anonymity granted by asynchronous, digitally mediated interactions in online discussion forums does not eliminate bias among instructors."

Digital Learning [2]
Diversity [3]
Online Learning [4]

Links
[1] http://cepa.stanford.edu/sites/default/files/wp18-03-201803.pdf
[2] https://www.insidehighered.com/news/news-sections/digital-learning
[3] https://www.insidehighered.com/news/focus/diversity
[4] https://www.insidehighered.com/news/news-sections/online-learning

Appendix B

Student and Faculty Perceptions of E-Feedback

Link to article:
https://journals.sagepub.com/doi/10.1177/0098628311411794#articleCitationDownloadContainer

Copy of article:

Technology and Teaching

SOCIETY FOR THE TEACHING OF PSYCHOLOGY

Teaching of Psychology
38(3) 173-179
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DOI: 10.1177/0098628311411794
http://top.sagepub.com
SAGE

Student and Faculty Perceptions of E-Feedback

Jennifer McCabe[1], Alicia Doerflinger[2], and Russell Fox[2]

Abstract

This article presents student and faculty ratings of electronic editing (EE) functions (i.e., track changes, insert comments, highlighting) as used for *e-feedback* on written assignments. Students reported increased convenience, clarity of expectations, amount of feedback, and writing ability as well as substantial improvement in EE skills compared to paper-based methods. Also, ratings and use of e-feedback were positively correlated with final report grades. To further explore the role of e-feedback in psychology education, a survey indicated that faculty rated e-feedback as similar to paper-based methods for time and effort but potentially more beneficial for learning. In addition, faculty with more e-feedback experience reported higher educational value for EE skills. Advantages and disadvantages from the student and instructor perspectives are discussed.

Keywords

educational technology, writing skills, grading (educational), feedback, college students

High-quality and timely instructor feedback is one of the most powerful tools in student learning (Metcalfe & Kornell, 2007). Specific to psychology courses, research suggests that learning outcomes can be improved via multiple writing assignments, coupled with extensive feedback (e.g., Fallahi, Wood, Austad, & Fallahi, 2006; McGovern & Hogshead, 1990; Perilou, 2003). For example, Fallahi et al. (2006) demonstrated that the repeated practice of writing skills, including mechanics of the American Psychological Association referencing style (American Psychological Association [APA], 2001), resulted in significant improvements in both APA-style accuracy and general writing proficiency.

Even in light of this evidence, instructors may be reluctant to increase the quantity of writing assignments because of the time and effort required to provide substantive feedback (Kellogg & Raulerson, 2007). Thus, any strategy that might reduce (or otherwise make more tolerable) the workload of the instructor, while also improving students' perceptions of the feedback process and expanding their skill set, is clearly desirable. One such strategy, investigated here, is the use of electronic editing (EE) functions in Microsoft Word (i.e., track changes, insert comments, highlighting) to provide *e-feedback* on written assignments. To illustrate, although a paper-based grader would write a comment in the paper's margin, an e-grader would insert a comment box at a specific point in the text on the screen and then type the verbal feedback in the right-hand margin. Although a paper-based grader would use a pen to indicate how text should be changed, an e-grader would turn on the "track changes" function, which crosses out original text and replaces it with colored text entered by the instructor. And although a paper-based grader might use a color-coding system to mark specific types of errors manually with a highlighter, an e-grader would select text to be highlighted a specific color on the screen.

We undertook these studies to explore student and faculty perceptions about e-feedback in the context of undergraduate psychology courses. In Study 1, we examined student ratings of a fully electronic procedure for assignments in a Research Design course, along with ratings of EE skill development. We argue that requiring students to learn the technological skills necessary for accessing and responding to e-feedback is a valuable educational goal for undergraduate psychology students, given the increasing prevalence of EE in psychology and related fields. To support this argument, we conducted Study 2 to investigate how a broader sample of psychology faculty use, and perceive the educational value of, EE functions.

Study 1

Over one semester of a Research Design course, assignments were submitted, downloaded, and graded using the online course management software WebCT. Specific feedback on students' work was given using the previously discussed EE functions. Although little or no published research has assessed

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e-feedback procedures in psychology courses, Palmer (2005–2006) implemented such a system for an engineering course. Most students reported easy access to their grades and increased speed of feedback compared to paper-based grading. In addition, qualitative feedback from students was overwhelmingly positive (also see Bridge & Appleyard, 2008; McVey, 2008; for specific instructions on how to implement an electronic system, see Ryan-Thompson, 2005).

To assess student opinions about our e-feedback system, we administered a survey at the conclusion of the semester. We hypothesized that students overall would respond positively to the system, and specifically that they would self-report significant improvement in their EE skill level. In addition, we examined whether their ratings and use of the system would be correlated with final research report grades.

Method

Participants. Participants were 40 students enrolled in one of two sections of a Research Design course at Marietta College, where approval for conducting the study was granted by the Human Subjects Committee. The majority of participants were sophomores and juniors. All students had previously completed a course with a WebCT component. The course and lab materials were identical for all students, and the same grading rubrics were used for each written assignment to standardize expectations and objective criteria. In addition, each student was graded by the same instructor throughout the semester.

The participants' mean self-reported GPA was 3.21 (SD = 0.50) on a 4-point scale, with no difference between instructors, $t(37) = 0.21$, $p = .84$. The mean proportion of points earned toward the final course grade was 0.81 ($SD = 0.04$; i.e., 81%, corresponding to a B–), the mean for the final APA-style research report was 0.81 ($SD = 0.02$), and the mean for the final report after omitting the three students who did not submit a paper was 0.88 ($SD = 0.07$), none of which differed between instructors ($ps > .05$). The two instructors' students were also similar in terms of performance on the midterm and final exams in the course ($ps > .05$).

Materials. The E-Feedback Survey included 28 items. Items 1 through 24 were presented in a 7-point Likert-type scale format, with higher numbers indicating a more positive opinion or higher level of agreement with the question or statement. On each item, a rating of 4 corresponded to the neutral response. The next 3 items asked for estimated GPA, anticipated grade on final research report, and anticipated grade in the course. The final item consisted of the open-ended statement, "List the pros and cons of the electronic submission, feedback, and grading system."

Procedure. During the first laboratory session, students were told that they would submit and retrieve all assignments electronically throughout the semester and that the instructors would be utilizing a fully electronic system for providing e-feedback and grades on written assignments. A total of 13 lab assignments were submitted on a weekly basis, the majority of which required APA-style writing about the original research studies they were conducting in teams. A major culminating outcome of the course was a complete APA-style research report.

The procedure for the e-feedback system was as follows. Students submitted their assignments as Microsoft Word 2003 documents, via WebCT. The instructor then downloaded each assignment and used EE functions in Word to provide feedback. The *highlighting* function was used to note instances of errors with regard to APA style (yellow), spelling or grammar (pink), clarity (green), and accuracy (blue), the *insert comments* function was used to provide more substantive feedback in the margins of the assignment, and the *track changes* function was used to indicate places where the instructor made a direct change in the paper (displayed in colored font). Next, the instructor saved the file that contained the original assignment and the feedback, uploaded the file to WebCT, and assigned a numerical grade. Finally, students downloaded the graded file and revised the assignment using the feedback provided. For each subsequent assignment, they were required to submit a "clean" version, such that no evidence of e-feedback from the last draft remained. All original and graded assignments were retained in WebCT and could be accessed at any time by the instructor or the student.

The survey was administered during class at the end of the semester. Students had the option of completing the survey anonymously or signing a consent form to allow researchers to obtain course and research report grades for the purpose of the research study. All but two students allowed access to these objective course performance measures.

Results and Discussion

Preliminary analyses. Independent-samples t tests conducted on all survey items showed nonsignificant differences between instructors (all $ps > .05$), except for a marginally significant difference for the item assessing whether e-feedback was more frustrating compared to traditional paper-based grading and feedback methods, $t(37) = 2.08$, $p = .04$. With regard to the latter finding, both instructors' means for this item were numerically lower than the neutral 4 response, indicating that students overall disagreed with, or felt neutral about, the statement that e-feedback was more frustrating ($M = 2.63$, $SD = 1.80$ for Instructor 1; $M = 3.75$, $SD = 1.55$ for Instructor 2).

Because of the overall similarity in student survey responses between instructors, and in both self-reported GPA and the course performance measures reported above, we combined data across instructors in all subsequent analyses.

As confirmation that students were actually using the e-feedback provided to them, they were asked how frequently they retrieved and reviewed the instructor's feedback using WebCT. The mean for this question was 5.95 ($SD = 1.38$), with 20 students reporting they *always* (i.e., 7) retrieved the e-feedback. None indicated that they *never* (i.e., 1) accessed the

Table 1. Descriptive Statistics for Student Survey Items

Survey Item	*M*	*SD*
Change from preclass to postclass ratings[a]		
How much computer experience have you had?		
0.51**		
0.82		
What was/is your comfort level with computers?		
0.92**		
0.87		
How much experience had/have you had with Microsoft Word?		
0.03		
0.54		
How much experience had/have you had with editing functions in Microsoft Word, such as "track changes," "insert comment," and highlighting?		
2.62**		
1.79		
Compared to traditional paper-based grading and feedback methods, the use of electronic submissions, feedback, and grading for lab assignments . . .		
. . . was more convenient.		
5.15**		
1.85		
. . . resulted in clearer expectations for my writing.		
4.70*		
1.80		
. . . resulted in receiving more substantive comments and feedback.		
4.98**		
1.56		
. . . resulted in more improvement in my writing.		
4.79**		
1.52		

(continued)

e-feedback, suggesting that this is a reasonably user-friendly system that students are willing and able to utilize.

Self-reports of preclass to postclass changes. Four items on the survey were asked twice, once in relation to participants' opinions prior to starting the course (i.e., *preclass*) and once in relation to their opinions at the conclusion of the course (i.e., *postclass*; see Table 1). For level of computer experience, the preclass rating ($M = 5.54$, $SD = 1.27$) was significantly lower than the postclass ($M = 6.05$, $SD = 0.97$) rating, $F(1, 38) = 15.14$, $p < .001$. The same pattern was found for level of comfort with computers (for purposes of troubleshooting and learning new programs and functions), with lower preclass ratings ($M = 4.79$, $SD = 1.51$) compared to postclass ratings ($M = 5.72$, $SD = 1.07$), $F(1, 38) = 43.89$, $p < .001$. Students did not differ, however, in their preclass ($M = 6.33$, $SD = 1.06$) to postclass ($M = 6.36$, $SD = 0.99$) ratings of their level of experience with Microsoft Word, $F(1, 38) = 0.09$, $p = .77$.

Perhaps most important for the purpose of this study, and consistent with our hypothesis, students did report significantly higher levels of experience with EE functions in Microsoft Word in their postclass ($M = 5.08$, $SD = 1.51$) compared to preclass ($M = 2.46$, $SD = 1.59$) ratings, $F(1, 38) = 83.62$, $p < .001$. It is particularly striking that although the preclass ratings for EE functions were toward the lower end of the Likert-type scale, the postclass ratings were well above the neutral point.

Ratings of the e-feedback system. All results reported below are based on one-sample *t* tests comparing mean student ratings on each item to the neutral response of 4.

Seven survey items began with the phrase, "Compared to traditional paper-based grading and feedback methods . . ." (see Table 1). On these items, students rated the e-feedback system as being more convenient ($M = 5.15$, $SD = 1.85$), $t(39) = 3.94$, $p < .001$, as resulting in clearer expectations for their writing ($M = 4.70$, $SD = 1.80$), $t(39) = 2.46$, $p = .02$, as resulting in more substantive comments and feedback on their assignments ($M = 4.98$, $SD = 1.56$), $t(39) = 3.95$, $p < .001$, and as resulting in more improvement in their writing ($M = 4.79$, $SD = 1.52$), $t(38) = 3.26$, $p = .002$. In addition, students disagreed that the e-feedback system was more frustrating than traditional feedback methods ($M = 3.21$, $SD = 1.75$), $t(38) = -2.84$, $p = .007$. However, ratings were not different from neutral for the items assessing whether the system helped them improve their computer skills ($M = 4.38$, $SD = 1.82$), $t(38) = 1.32$, $p = .19$, and whether it resulted in a better learning experience ($M = 4.44$, $SD = 1.55$), $t(38) = 1.75$, $p = .09$. Regarding the latter finding, we note that the mean was numerically higher than the neutral response and that there was a trend toward significance. It is unclear why students would report greater writing improvement using e-feedback but not a better learning experience overall.

When asked whether they would recommend using the e-feedback system in future Research Design courses, students responded positively ($M = 5.33$, $SD = 1.69$), $t(38) = 4.92$, $p < .001$, as they also did when asked if more instructors should use the system ($M = 4.97$, $SD = 1.81$), $t(38) = 3.36$, $p = .002$ (see Table 1).

Correlational analyses. In a preliminary analysis, we established that neither course exam average nor self-reported GPA was correlated with any of the survey questions (all *p*s > .05). This suggests that our results were not simply driven by the academically stronger students providing higher ratings on the survey. To further reduce the likelihood of this alternative interpretation, we report partial correlations below, after controlling for course exam average.

Several survey items were significantly correlated with the major course performance outcome of interest, that is, the final APA-style research report, measured as a proportion of maximum points earned.[1] Report grades were significantly correlated with ratings of the extent to which e-feedback, compared to paper-based methods, resulted in more convenience, $r(31) = .41$, $p = .02$, more improvement in writing, $r(31) = .47$, $p = .006$, improved computer skills, $r(31) = .38$, $p = .03$, and a better learning experience, $r(31) = .38$,

$p = .03$. In addition, there was a significant correlation between report grades and self-reported frequency of retrieving electronic feedback, $r(35) = .49$, $p = .004$.

To summarize, students who earned higher grades on the report also reported higher agreement with statements regarding convenience, improvements in writing and computer skills, and a better learning experience overall using the e-feedback system, even after controlling for a separate measure of course performance. Not surprisingly, students who retrieved and reviewed their electronic feedback more frequently tended to earn higher grades.

Qualitative feedback. Students were asked to list the advantages and disadvantages of the e-feedback system at the end of the survey. Responses mostly replicated the findings from the quantitative analyses and from Palmer (2005–2006). There were overall more positive than negative comments, the most frequent of which focused on ink and paper savings ($n = 12$), speed ($n = 10$), clarity and legibility of feedback (compared to handwriting; $n = 9$), convenience ($n = 8$), and higher quality and quantity of feedback from the instructor ($n = 8$).

The most commonly reported disadvantages were technical difficulties ($n = 5$), the dislike of reading feedback on a computer screen ($n = 4$), lower clarity of comments and suggestions ($n = 4$), formatting problems (e.g., editing and removal of "track changes" in the electronic document; $n = 4$), and feeling that the feedback was less personal ($n = 3$). The comment about less clear feedback is difficult to interpret considering that the inverse was listed by twice as many students as an advantage. Regarding the preference for reading a hard copy, perhaps students were not aware that they could print a paper version of their assignment that would also show instructor comments. This could be clarified in future classes.

Study 2

To more broadly investigate how e-feedback is used in psychology education, we conducted an online survey for faculty members at undergraduate institutions. We were particularly interested in faculty perceptions of e-feedback, with regard to instructor time and effort, student learning, and overall educational value. Furthermore, we sought information about the ways faculty members use EE functions and also the academic journals that use EE, to support our contention that these technological skills are useful for psychology students.

Method

Participants. After approval from the Goucher College Institutional Review Board, faculty participants were recruited via several listserver announcements as well as personal e-mail communications. Of the 117 faculty respondents who completed the survey, 26 were omitted to constrain the data only to faculty in psychology departments, resulting in a final N of 91.

Participants varied greatly in their teaching experience, with a range of 1 to 39 years ($M = 13.42$, $SD = 10.05$). Because this variable was not correlated with any survey items (all $ps > .05$), it is not discussed further.

A variety of institution types was also represented in the sample: 15% were faculty at a 2-year college, 20% at a 4-year private college, 10% at a 4-year public college, 12% at a 4-year private university, and 43% at a 4-year public university. As a preliminary exploration of group differences, we organized the participants into three categories, representing 2-year colleges, 4-year colleges, and 4-year universities. There were no significant differences among institution types for most of the survey items (all $ps > .10$). The exceptions were that 4-year university faculty reported more frequent use of EE to edit documents for personal use and to collaborate on manuscript revisions, compared to 2-year college faculty ($ps < .05$). Other than these two findings, which were not related to the goals of our study, faculty from different types of institutions do not appear to use, or perceive the use of, EE functions differently; thus, this demographic variable is not discussed further.

Materials and procedure. The Electronic Editing survey was administered via the online survey software SurveyMonkey for a period of 3 weeks.[2] The survey contained four demographic questions (i.e., status as faculty member at undergraduate institution, years of teaching experience, institution type, department), five items to rate frequency of use of EE functions in various contexts on a 5-point Likert-type scale, and one item asking whether the instructor requires students to use EE for assignments. There were also three open-ended qualitative items seeking information about the types of courses and assignments EE is used for as well as advantages and disadvantages. Next were three 5-point scale items, the first two asking how EE compares to paper-based grading and feedback with regard to instructor time or effort and student learning and the third item asking faculty to rate the value of EE skills for psychology students. The final item on the survey asked for a list of academic journals that require the use EE for manuscript editing.

After providing electronic consent, participants self-paced the survey, which required about 5 minutes to complete.

Results and Discussion

Frequency of using electronic editing. Five survey items asked faculty to report their frequency of EE use in various contexts. Participants responded on a 5-point scale, with 1 corresponding to *never*, 2 corresponding to *rarely*, 3 corresponding to *sometimes*, 4 corresponding to *often*, and 5 corresponding to *always* (see Table 2 for frequency data).

Overall, the most frequently reported use of EE was when collaborating on manuscript revisions with coauthors ($M = 3.89$, $SD = 1.16$), followed by editing a document for personal use ($M = 3.10$, $SD = 1.30$), providing feedback on undergraduate student assignments ($M = 2.96$, $SD = 1.34$), submitting manuscript corrections or revisions to publishers ($M = 2.72$, $SD = 1.51$), and grading undergraduate student assignments ($M = 2.63$, $SD = 1.36$).

Table 2. Number and Percentage of Faculty Respondents in Each Category of Frequency for Using Electronic Editing Functions in Various Contexts

	Never		Rarely		Sometimes		Often		Always	
Survey Item	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Rate how frequently you use electronic editing functions in Microsoft Word when . . .										
. . . editing a document for your personal use.	17	19	11	12	19	21	34	37	10	11
. . . collaborating on manuscript revisions with co-authors.	6	7	6	7	12	13	35	39	32	35
. . . submitting manuscript corrections/revisions to publishers.	29	33	12	14	14	16	18	21	14	16
. . . providing feedback on undergraduate student assignments.	20	22	13	14	19	21	29	32	10	11
. . . grading undergraduate student assignments.	26	31	13	16	16	19	22	27	6	7

These results suggest that many psychology instructors utilize EE functions for a variety of purposes. However, a substantial minority reported never using EE functions, and only 13% reported that they require students to use EE in their courses.

Ratings of electronic editing. When asked how the use of EE functions for e-feedback compares to paper-based methods, participants who had used EE previously responded on a 5-point scale, with a neutral response of 3 indicating equivalence between the two methods and higher ratings indicating stronger endorsement of e-feedback.

The mean rating for how the two methods compare with regard to instructor time and effort was 2.89 ($SD = 1.24$, $Mdn = 3$), which was not significantly different from the neutral response, $t(63) = 0.71$, $p = .48$. The mean rating for how the methods compare with respect to student learning was 3.43 ($SD = 0.87$, $Mdn = 3$), which was significantly higher than neutral, $t(60) = 3.85$, $p < .001$. Thus, instructors overall perceived more potential for student learning when using e-feedback but equivalent instructor time and effort when compared to traditional feedback methods.

One critical survey item asked about the perceived value of EE skills in undergraduate psychology education. Ratings were given on 5-point scale from *not valuable* to *extremely valuable* and had a mean of 3.36 ($SD = 1.07$, $Mdn = 3$, corresponding to *somewhat valuable*). We suspected, however, that ratings of educational value would be related to degree of EE experience. Indeed, an interesting pattern emerged when we compared faculty who reported *never* or *rarely* versus *sometimes*, *often*, or *always* using EE functions for student feedback. Faculty who used EE more frequently rated the educational value of EE significantly higher ($M = 3.78$, $SD = 0.94$, $n = 58$) than those who used it less frequently ($M = 2.52$, $SD = 0.78$, $n = 29$), $F(1, 85) = 38.67$, $p < .001$.

To further explore this relationship between degree of EE use and ratings of educational value, a correlational analysis showed strong positive correlations of the value of learning EE variable with the frequency of using EE to edit personal documents, $r(85) = .55$, $p < .001$, collaborate on manuscript revisions with coauthors, $r(85) = .46$, $p < .001$, submit manuscript corrections and revisions to publishers, $r(81) = .49$, $p < .001$, provide feedback on undergraduate student assignments, $r(85) = .56$, $p < .001$, and grade assignments, $r(77) = .61$, $p < .001$. In addition, faculty who rated the value of EE skills more highly also tended to rate e-feedback as requiring less instructor time and effort, $r(62) = .31$, $p = .01$, and as better for student learning, $r(59) = .31$, $p = .01$, compared to paper-based feedback. In sum, faculty members with more EE experience also provided more favorable ratings of EE and rated it as a more important skill for undergraduates.

Qualitative feedback. When asked about the course or courses in which EE functions are used for feedback and/or grading, the most common response by far was Research Methods ($n = 15$), followed by Introduction to Psychology ($n = 5$), Cognitive Psychology ($n = 4$), and Social Psychology ($n = 4$). In total, 18 different courses were listed by respondents.

In regard to the types of assignments for which faculty use EE functions, the most frequent response was APA-style research reports ($n = 26$), followed by a category containing specific examples of shorter assignments (i.e., article summaries, reaction papers, essays; $n = 18$), then term papers ($n = 11$), and then theses ($n = 7$).

The most frequent advantages listed by faculty were having an electronic record of all student submissions and instructor feedback ($n = 25$), the increased clarity and legibility of feedback (compared to handwriting; $n = 24$), savings of paper and ink (with many mentions of environmental impact; $n = 20$), increased speed and efficiency ($n = 18$), and more detailed and higher quality feedback ($n = 9$). Regarding speed, many noted that feedback can be typed in faster than handwriting comments and can be sent to students immediately. Commonly mentioned disadvantages included the need for a computer to do grading (with consequences for convenience; $n = 11$), the concern that e-feedback could lead to lower effort on the student's part when revising assignments ($n = 9$), a dislike of reading assignments on a computer screen ($n = 9$), increased time demands ($n = 8$), and student confusion and frustration because of unfamiliarity with EE ($n = 8$).

General Discussion

Taken together, the results of student and faculty ratings of e-feedback, using EE functions in Microsoft Word, support the

continued implementation and examination of the benefits of such a system for written assignments. Study 1 reported student perceptions of a fully electronic system in a Research Design course, which were overall positive and also correlated with grades on the culminating APA-style research report. Consistent with our decision to utilize and evaluate e-feedback functions in this way, Study 2 reported that e-feedback is most commonly used in Research Methods courses and specifically for research reports requiring the application of APA style. Faculty respondents were neutral with regard to e-feedback requiring less time and effort but overall indicated that students may learn more from e-feedback, compared to paper-based methods. In addition, faculty with higher levels of e-feedback experience tended to provide stronger endorsements of e-feedback. Therefore, based on our examination of student and instructor perspectives, we contend that e-feedback procedures have great potential, most obviously for courses requiring research writing, but also for other types of courses and assignments.

As with any newer technology-based teaching strategy, there are advantages and disadvantages to consider. Interestingly, there was substantial overlap between student and faculty responses. Four of the five most commonly listed advantages were similar between the two groups, namely that e-feedback procedures increase clarity of feedback compared to handwriting, save paper and ink resources, and result in faster and also better, more detailed feedback. Only two of the five most common disadvantages showed overlap, specifically that e-feedback requires reading assignments on a computer and that students' unfamiliarity with EE can make it a challenging, confusing, and/or frustrating experience. For the latter disadvantage, our data from Study 1 support the contention that students were not familiar with EE functions at the start of the semester. However, the fact that students self-reported such large changes in EE skill level after completing multiple assignments requiring e-feedback suggests that experience with the functions can help remedy this purported disadvantage.

In fact, EE skill development can be viewed as a worthy educational goal in and of itself, a viewpoint generally supported by Study 2 faculty respondents and particularly strongly endorsed by those faculty who had previously used EE for e-feedback. EE skills are especially valuable given that APA-style research writing requires the use of a word processing program (such as Word) and also given the prevalence of EE functions in the manuscript writing and revision cycle. Indeed, faculty respondents in Study 2 listed 21 different academic journals that utilize EE during the publication process.[3]

In terms of modifications to the e-feedback system, we have several recommendations. First, to address our (and several faculty respondents') concern that there was temptation for instructors to edit in too much detail, we advocate for the sparing use of track changes because it allows for students to passively click the "accept change" button to insert the instructor's text in place of their own instead of determining how to correct the error themselves. The insert comments feature is much more beneficial, in our opinion, as it allows for the placement of instructor feedback in the margins of the document, just as one would with a paper copy, but does not modify the original text. We also strongly suggest implementing at least one quiz or graded assignment early in the semester to teach students about EE functions. Perhaps they could electronically correct a manuscript filled with errors or participate in electronic peer review.

Although correlational in nature, our data show that many students and faculty believe the use of e-feedback may be associated with improved learning outcomes on written assignments. And considering the critical role of feedback in learning (e.g., Metcalfe & Kornell, 2007), students' perceptions of e-feedback as faster, more detailed, and of higher quality compared to paper-based feedback are consistent with the hypothesis that e-feedback could provide educational benefits. As further support for the system, faculty did not report that using e-feedback increased time and effort and in fact listed many valuable advantages from an instructional point of view. The findings from these studies suggest a fruitful avenue for future research to test a more stringent causal hypothesis, namely, that students randomly assigned to an e-feedback system would outperform students assigned to paper-based feedback.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

Notes

1. The three students who did not submit a final paper were removed from these analyses.
2. We gratefully acknowledge Beth Kirsner for her assistance in survey design.
3. Journals reported by faculty respondents to utilize electronic editing functions were *Behavioral Neuroscience*, *Behavioral Pharmacology*, *Brain and Cognition*, *Developmental Review*, *History of Psychology*, *International Journal of Comparative Psychology*, *Journal of Child and Adolescent Abnormal Psychology*, *Journal of College Student Development*, *Journal of Economic Psychology*, *Journal of General Education*, *Journal of General Psychology*, *Journal of Physiology and Behavior*, *Memory and Cognition*, *Neuropsychologia*, *Neuropsychology*, *Personality and Social Psychology Bulletin*, *Psi Chi Journal of Undergraduate Research*, *PsycCritiques*, *Psychology and Health*, *Psychonomic Bulletin & Review*, and *Teaching of Psychology*.

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