International Journal for the Scholarship of Teaching and Learning

Volume 9 | Number 1 Article 7

January 2015

Does Mechanism Matter? Student Recall of Electronic versus Handwritten Feedback

Megan E. Osterbur
Xavier University of Louisiana, megan.osterbur@gmail.com

Elizabeth Yost Hammer
Xavier University of Louisiana, eyhammer@xula.edu

Elliott Hammer
Xavier University of Louisiana, ehammer@xula.edu

Recommended Citation
Osterbur, Megan E.; Hammer, Elizabeth Yost; and Hammer, Elliott (2015) "Does Mechanism Matter? Student Recall of Electronic versus Handwritten Feedback," *International Journal for the Scholarship of Teaching and Learning*: Vol. 9: No. 1, Article 7.
Available at: https://doi.org/10.20429/ijsotl.2015.090107

Does Mechanism Matter? Student Recall of Electronic versus Handwritten Feedback

Abstract
Student consumption and recall of feedback are necessary preconditions of successful formative assessment. Drawing on Sadler's (1998) definition of formative assessment as that which is intended to accelerate learning and improve performance through the providing of feedback, we examine how the mechanism of transmission may impact student retention of feedback content. We proceed from the premise that such retention is necessary for feedback to function as a component of formative assessment. Although researchers have written extensively on best practices in feedback content (e.g., Nicol & Macfarlane-Dick, 2006) and student and instructor attitudes toward electronic feedback versus handwritten feedback (e.g., Thomson, 2008), comparatively little research addresses whether the form of feedback influences student consumption and retention. Our research found that whereas students who preferred or received handwritten feedback recall more feedback (quantity), those who actually *received* electronic feedback recall comments more accurately (quality). We encourage instructors to working with either format to adhere to accepted standards for good feedback practice.

Keywords
electronic feedback, feedback mechanisms, formative assessment, handwritten feedback, student learning

Does Mechanism Matter? Student Recall of Electronic versus Handwritten Feedback

As higher education has increasingly embraced online learning and integrated technology into course deliverables for traditional classroom courses, assessing the impact of electronic tools on learning outcomes has become essential. Of particular interest has been how such e-learning tools mitigate the relationship between learner and educator as well as how such tools can be used to best facilitate learning. Prior research has often focused on student preferences regarding assessment transmission (Bridge & Appleyard, 2008; Brodie & Lock, 2009; Thomson, 2008); the current research moves forward to examine student retention of feedback based on whether it takes the form of e-feedback or handwritten paper-based assessment in a traditional classroom context. The value here is in directly assessing the extent to which students consume feedback, rather than assuming that student preferences regarding feedback mechanism will necessarily lead to more considered consumption.

Feedback, which includes grades and comments provided by an instructor to a learner, is central to higher education, as quality feedback facilitates effective student learning (Bransford et al., 2000; Carless et al., 2011; Chickering & Ehrmann, 2008; Chickering & Gamson, 1991; Espasa & Meneses, 2010; Gikani et al., 2011). The "first two broad functions of feedback are to provide the teacher's assessment of the student response, maybe as a grade, with a rationale that indicates how the judgment took the strengths and weaknesses of the response into account. The second function is to provide advice or suggestions as to how a better response could have been constructed" (Sadler, 2009, p. 3). Defined as an evaluation of learner achievement or progress toward a learning objective, assessment thus forms the core of feedback content (Gikani et al., 2011; Reeves & Hedberg, 2009). Further, researchers (e.g., Challis, 2005; Oosterhof et al., 2008) often subdivide assessment into two fundamental types, summative and formative.

A common form of summative assessment is the grade an instructor assigns a student to indicate the extent to which the

https://doi.org/10.20429/ijsotl.2015.090107

student has achieved a learning objective associated with a particular assignment, module, semester, or the end of some other instructional unit (Challis 2005; Gikandi et al., 2011; Hargreaves, 2008). In contrast, the purpose of formative assessment is to improve student learning and future student performance on a learning objective that is not considered complete at the time of the assessment (Nicol & Milligan, 2006; Sadler, 1998). Formative assessment is "specifically intended to provide feedback on performance to improve and accelerate learning" (Sadler, 1998, p. 77). Formative feedback is an essential course deliverable with which students can evaluate their conception of course goals and standards and become empowered as self-regulated learners (Nicol & Macfarlane-Dick, 2006; Pintrich & Zusho, 2002).

As instructors move away from paper copies of written work, both summative as well as formative assessment have moved toward electronic feedback delivery. Less clear in the existing literature is the extent to which the use of technology to provide feedback may impact the extent to which feedback intended to be formative may become summative in the hands of the student. Formative feedback becomes summative in this way when students review only the gradebook in a learning management system but fail to open any comments, rubric, or instructor edited version of their work, for example. That is, formative assessment cannot be exclusively the purview of the instructor but must also be engaged by the learner, ultimately promoting self-regulated learning (Espasa & Meneses, 2010). Therefore, formative assessment was the goal of the feedback in the current research.

The transition to self-regulated learning, regardless of transmission format, can only occur when clear articulation of goals is coupled with quality formative feedback (Black & William, 1998; Garcia, 1995; Nicol & Milligan, 2006; Sadler, 1989). There are accepted standards for good feedback practice that bear mentioning (adapted from SENLEF, Nicol & Milligan, 2006, Pintrich & Zusho, 2002):

1) Helps clarify what good performance is (goals, criteria, expected standards)

2) Facilitates the development of reflection and self-assessment in learning (Black & William, 1998; Sadler, 1998)
3) Delivers high quality information to students about their learning
4) Encourages teacher and peer dialogue about learning (Freeman & Lewis, 1998)
5) Encourages positive motivational beliefs and self-esteem
6) Provides opportunities to close the gap between current and desired performance
7) Provides information to teachers that can be used to shape teaching

Hatziapostolou and Paraskakis (2010, p. 111) add that formative feedback must also "be timely, constructive, motivational, personal, manageable and directly related to assessment criteria and learning outcomes."

Providing high quality feedback may facilitate learning but can only do so if learners engage with the feedback content rather than merely observing the grade. Even the highest quality feedback cannot engender changes in student performance if students do not review the content of the comments; we therefore must consider not only what constitutes good feedback but also how to transmit feedback in such a way as to ensure that students encode the content.

Adams (2011) points out the current lacuna in research examining potential disparities in feedback consumption and engagement based on electronic versus hard copy dissemination. Prior research comparing handwritten to electronic feedback is limited in that it often focuses primarily on student preferences (Bridge & Appleyard, 2008; Brodie & Lock, 2009; Thomson, 2008). Student preferences regarding feedback mechanism are inconsistent across studies, and some differences may be attributed to features of the research beyond the difference between e-feedback and traditional assessment.

In the context of distance learning, students preferred electronic feedback as easier to read and easier to reference at a later time but also expressed preference for e-feedback as a time savings over mailed submission and feedback. Despite the generally positive view of e-feedback, students in Thomson's (2008) study also expressed concern over difficulties with the e-

feedback software and/or personal computing software. Thomson herself notes that "the e-system has the potential of some formatting being 'lost in translation'…on the other hand, of course, the system removes the students' struggles with illegible handwriting" (2008, p. 5).

Bridge and Appleyard (2008) also examined preferences for e-feedback over traditional assessment in the context of distance learning and found that 55% of students preferred or strongly preferred online feedback and made comments similar to those noted by Thomson (i.e., they valued the reduced time lag between submission and feedback but also viewed e-feedback as impersonal). Further, Brodie and Loch (2009) found that students and instructors preferred handwritten comments due to their more personal and specific nature.

While preferences are important to the learning process, we should not assume that preferences are proxy for the level of attention students give to feedback. Attention to feedback is necessary for feedback to function formatively rather than merely as summative assessment. Acknowledging this, we examine student recall of feedback for both e-feedback and handwritten feedback in the traditional classroom learning environment. We explore in our study not only student preferences regarding feedback mechanism, but also the quantity and quality of their recall of specific feedback.

Method

Participants

A total of 34 male and female undergraduate students participated in this study. Thirteen were enrolled in a Political Science course (Politics of Gender and Sexuality), and 21 were enrolled in Psychology courses (10 in Advanced Research, 11 in Health Psychology). All three courses were at the 2000- or sophomore-level, though students ranged from freshmen to seniors. A wide range of majors were represented. Nineteen students received written feedback, and 15 received electronic feedback.

Materials and Procedures

Each course was taught by a different instructor (the three authors of the current research), and the writing assignments varied. For the Politics of Gender and Sexuality course, students

analyzed three authors' arguments in a critical review of the assigned readings. For the Advanced Research in Psychology course, students submitted a literature review for an independent, empirical research project. Finally, for the Health Psychology course, students submitted a progress report for a semester-long health promotion project. All students submitted their papers electronically via a learning management system (Blackboard) and were randomly selected to receive their feedback either handwritten or electronically. We made an effort to keep our comment style and length of comments consistent between formats but did not attempt to make feedback consistent across instructors. Instead, we maintained our unique feedback styles while manipulating feedback mechanism. Students were not aware of the varied format of feedback, and we kept a copy of the actual feedback for data purposes.

Students were encouraged to read their feedback but were not made aware of the feedback retention survey as this would likely influence their attention to the feedback and thus skew our results. Because prior consent would influence the results, all students were given the opportunity to remove their data from the study. The institutional review board accepted these methods for testing on human subjects in this instance.

Feedback retention survey. We gave students the feedback (whether written and electronic) at one class period and then surveyed the students about the feedback at the next class meeting. For each course, there was one day between receiving feedback and completing the survey. On the survey, students received the following instructions: *Please report any and all feedback I gave you on your paper. Be as specific and detailed as possible. Use my exact words when you can.*

Students also indicated how closely they read the feedback, on a scale of 1 (not at all) to 5 (very carefully). Finally, they indicated which type of feedback they preferred (written or electronic) and why.

Debriefing. After collecting the surveys, we debriefed the students, who could opt out if they did not want their data to be used. All students agreed to allow their data to remain in the dataset.

Scoring. In a series of meetings, we each scored every survey according to the metrics below, and we resolved discrepancies by consensus.

Instructor Total. First, we discussed and reached agreement on what constituted a discrete comment. We then counted the number of discrete comments the instructor made on each student paper. For example, "you seem to be skipping over some vital data" counted as one discrete comment, whereas, "Good comparison between the articles. You need more synthesis though" counted as two.

Student Total. Following a similar process, we next went through the students' feedback retention surveys and counted the total number of comments they recalled (correctly or incorrectly).

Correctly Reported Comments. Finally, we calculated a Correctly Reported Comments by counting the number of only *correctly* recalled comments.

From these three variables, we calculated three compound variables for further analysis:

Quantity. This variable is the ratio of Student Total to Instructor Total.

Encoding. This variable is the ratio of Accurately Reported Comments to Instructor Total.

Accuracy (Quality). This variable is the ratio of Correctly Reported Comments to Student Total.

Results

Analysis Methods

We test for relationships between the aforementioned variables using chi-squared, a test of statistical significance for relationships between nominal variables. Because chi-squared is comparing the observed association between nominal variables to the expect relationship were there no relationship, the underlying premise is that chi-squared tells us the likelihood that our observed relationship is not merely by chance.

For some models it was necessary to adjust for heteroscedasticity. Heteroscedasticity occurs when the variation our dependent variable (see models below for specific dependent variables) have an unequal spread across the range of the independent variable.

Preferences

Of our 34 respondents, 22 reported preferring handwritten feedback, 10 electronic, and 2 indicated no preference. However, a significant chi square test for independence revealed that this preference varied as a function of the instructor, with one instructor's students slightly preferring electronic, whereas students in the other two classes preferred handwritten, $\chi^2(2, N = 34) = 10.18$, $p < .04$ (table 1). Another significant chi square analysis indicated that students' reported preferences were most likely to match that of the form of feedback they actually received, $\chi^2(2, N = 34) = 17.08$, $p < .01$ (table 2).

Self-Reported Attention to Feedback

When asked whether they had read their professors' feedback, 29 (88 valid percent; 1 student omitted this item) claimed to have read between neutral (3) and very carefully (5). For the remainder of our analyses we omitted a student who did not respond to this item as well as those who reported not having read their feedback at all, leaving a sample of 30 students. A significant Pearson correlation analysis indicated that the care with which students reported reading the feedback was positively associated with the Quantity, $r(28) = .31$, $p < .05$ (1-tailed). Similarly, reading care was positively correlated with Encoding, $r(28) = .33$, $p < .04$ (1-tailed), but not Student Total, Correctly Reported Comments, or Accuracy (Quality).

An independent-samples *t*-test indicated that students who prefer handwritten feedback reported reading their feedback marginally more carefully ($M = 4.20$, $SD = .89$) than did those who prefer electronic feedback ($M = 3.50$, $SD = .93$), regardless of whether they actually received handwritten feedback, $t(26) = 1.85$, $p = .08$.

Feedback Preferences and Students' Recall

An independent-samples *t*-test revealed that students who prefer handwritten feedback ($M = .33$, $SD = .28$) reported a higher proportion of the total feedback (Quantity) than did those who prefer electronic feedback ($M = .17$, $SD = .08$), $t(24) = 2.46$, $p = .02$ (adjusted for heteroscedasticity). Another independent samples *t*-test revealed that students who prefer handwritten feedback ($M = .28$, $SD = .29$) had a marginally higher Encoding than those who prefer electronic feedback ($M =$

.14, *SD* = .05), *t*(22) = 2.02, *p* < .06 (adjusted for heteroscedasticity).

Effects of Feedback Received

An independent-samples *t*-test revealed that students who received electronic feedback (*M* = .77, *SD* = .23) were marginally less accurate in their recall of the feedback they received (that is, they had a higher Encoding) than were those who received handwritten feedback (*M* = .91, *SD* = .14), *t*(27) = -2.04, *p* < .06 (adjusted for heteroscedasticity). Another independent-samples *t*-test indicated that students who received handwritten feedback (*M* = .35, *SD* = .29) had a higher Quantity score than those who received electronic feedback (*M* = .18, *SD* = .09), *t*(20) = 2.26, *p* < .04 (adjusted for heteroscedasticity). This result may indicate a perception of more feedback received in handwritten form, as it includes comments remembered but not actually received.

Discussion

The present study examines the relationship between mode of feedback on student papers and attention to such feedback, as well as the impact of that feedback. Results showed that although students generally prefer handwritten to electronic feedback, they tend to prefer the mode of feedback that they actually received from their professors. Not surprisingly, the more carefully students read the feedback, the more they encoded the feedback (as measured by the ratio of Accurately Reported Comments to Instructor Total). Further, students who received (or preferred) electronic feedback were more accurate in recalling comments received from the instructor, which may indicate students more successfully attend to electronic feedback. However, those who received (or preferred) handwritten feedback recalled a higher quantity of comments overall (including inaccurate ones) than did those who received electronic feedback.

Although electronic feedback was slightly more accurately encoded in our sample, it appears that format *per se* does not greatly impact student consumption or retention. In fact, in line with the work of Gibbs (2002) and Adams (2011), careful reading appears to be the key component to retention of feedback, regardless of format. Therefore, instructors should

take advantage of the strengths of either format to ensure that students attend to feedback. For instance, students are more likely to respond to feedback if it includes descriptive information that specifies the relationship between student performance and established assessment criteria (Nicol & Milligan, 2006).

In our sample, students tended to prefer whatever feedback they received, regardless of mechanism. Recall that student preferences regarding feedback mechanism have been inconsistent across studies. Some students preferred electronic feedback because they saw it as easier to read and to reference at a later time, while other students expressed concern over difficulties with the e-feedback software and/or personal computing software (Thomson, 2008). Bridge and Appleyard (2008) found that students generally preferred online feedback for similar reasons, whereas Brodie and Loch (2009) found that students preferred more personal handwritten comments. Our research suggests that preferences do not play a vital role in formative assessment. Instead, instructors should be consistent with their feedback mechanisms. Students are more likely to embrace e-feedback when it is used consistently across all or nearly all course units (Adams, 2011; Siebert, 2009). This allows students to gain a sense of familiarity with the expectations and gain the level of digital competency need to encode the feedback.

As is common in pedagogical research, our study has some notable limitations. We ended up with a small sample size for each of the format groups. This was partially a result of some students missing the day we handed out the feedback and others missing the day we handed out the survey. Once we debriefed the class, we could not collect additional data. The small sample size makes the variability in instructors' feedback and assignments problematic in terms of interpreting our data. However, we argue that future researchers should maintain this variability in that it increases generalizability across disciplines and instructors.

In the present study, we attempted to go beyond measuring student attitudes about feedback to examine student retention of feedback based on whether it is in electronic or handwritten format. Although we did not uncover dramatic

differences between these two formats, we did find support for sticking with a single format so that students know what to expect. We therefore encourage instructors to work with whatever format fits their teaching style while closely attending to the accepted standards for good feedback practice. In addition we encourage future researchers to overcome some of our limitations in this study and continue to explore this area. Technological tools for assessment are growing exponentially, and it will benefit all instructors to examine their effects on learning.

References

Adams, J. (2011, May). *Overcoming Barriers to Electronic Feedback*. Presented at the spring teaching learning and assessment conference of the Staff and Educational Development Association, Edinburgh.

Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education, 5,* 7-74.

Bransford, J.D., Brown, A.L., & Cocking, R. R. (2000). How people learn: Brain, mind, experience, and school (expanded ed.). Washington, DC: National Academy Press.

Bridge, P., & Appleyard, R. (2008). A comparison of electronic and paper-based assignment submission and feedback. *British Journal of Educational Technology*, *39,* 644-650.

Brodie, L., & Loch, B. (2009, December). *Annotations with a tablet PC or typed feedback: Does it make a difference?* Paper presented at the 20th Australasian Association for Engineering Education conference, Adelaide, Australia. Retrieved from http://eprints.usq.edu.au/6409/1/Brodie_Loch_AaeE_2009_PV.pdf

Carless, D., Salter, D., Yang, M. & Lam, J. (2011). Developing sustainable feedback practices. Studies in Higher Education, 36, 395-407.

Challis, D. (2005). Committing to quality learning through adaptive online assessment. *Assessment and Evaluation in Higher Education, 30,* 519-527.

Chickering A. W., & Gamson, Z. F. (1991). Applying the Seven Principles to Good Practice in Undergraduate Education. San Francisco: Jossey-Bass.

Espasa, A., & Meneses, J. (2010). Analysing feedback processes in an online teaching and learning environment: An exploratory study. *Higher Education, 59,* 277-292. doi: 10.1007/s10734-009-9247-4

Gibbs, G. (2002). *Evaluation of the impact of formative assessment on student learning behavior.* Learning communities and assessment cultures: Connecting research with practice. Paper presented at the European

Association for Research into Learning and Instruction, Newcastle, England.

Gikandi, J. W., Morrow, D., & Davis, N. E. (2011). Online formative assessment in higher education: A review of the literature. *Computers & Education, 57,* 2333-2351. doi: 10.1016/j.compendu.2011.06.004

Hargreaves, E. (2008). Assessment. In C. McCullock & D. Cook (Eds.), *The Routledge International Encyclopedia of Education* (pp. 37-38). New York: Routledge.

Nicol, D. J., & Macfarlane-Dick, D. (2006). Formative assessment and self-regulated learning: A model and seven principles of good feedback practice. *Studies in Higher Education, 31,* 199-218. doi: 10.1080/03075070600572090

Nicol, D., & Milligan, C. (2006). Rethinking technology-supported assessment practices in relation to the seven principles of good feedback practice. In C. Bryan & K. Clegg (Eds.), *Innovative Assessment in Higher Education* (pp. 64-78). New York: Routledge.

Oosterhof, A. Contad, R. M, & Ely, D. P. (2008). *Assessing Learners Online.* New Jersey: Pearson.

Pintrich, P.R. & Zusho, A. (2002). Student Motivation and Self-Regulated Learning in the College Classroom, in J.C. Smart & W.G. Tierney (Eds.), *Higher Education: Handbook of Theory and Research.* (pp. 731-810). New York: Agathon Press.

Reeves, T. C., & Hedberg, J. G. (2009). Evaluation strategies for open and distributed learning environments. In C. Spratt & P. Lajbcygier (Eds.), E-learning technologies and evidence based assessment approaches (pp. 234-253). New York: Information Science Reference.

Sadler, D. R. (1989). Formative assessment and the design of instructional systems. *Instructional Science, 18,* 119-144.

Sadler, D. R. (1998). Formative assessment: Revisiting the territory. *Assessment in Education, 5,* 77-84.

Sadler, D. R. (2009). Indeterminacy in the use of preset criteria for assessment and grading in higher education. *Assessment and Evaluation in Higher Education, 34,* 159-179. doi: 10.1080/02602930801956059

Sadler, D. R. (2010). Beyond feedback: Developing student capability in complex appraisal. *Assessment & Evaluation in Higher Education, 35,* 535-550. doi: 10.1080/02602930903541015

Thomson, A. (2008). *Paper or screen? An investigation into paper based and electronic feedback on two Open University courses* (Document ID KN12415). Retrieved from OU Knowledge Network website: http://kn.open.ac.uk/public/document.cfm?docid=12415