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TOWARD A MODEL OF STUDENT RESPONSE TO FEEDBACK

Anastasiya A. Lipnevich, David A. G. Berg and Jeffrey K. Smith

INTRODUCTION

"This C can't be right. I'm an A student."

If you are a teacher at almost any level, you will have heard this protest. But you have probably never heard, "This A can't be right. I'm a C student." There have certainly been situations where students have felt this, but they hardly ever express this sentiment. The simple complaint that one has received a grade that is lower than expected yields a wealth of information. As teachers, it tells us that:

1) The student has a strong sense of self-efficacy. The student is willing to hold on to that sense in the face of evidence to the contrary;
2) The student may have some difficulties in assessing his or her own abilities, or the quality of his or her work;
3) The student is upset. The negative affect associated with the grade may make it difficult for the student to effectively process any other aspect of this instructional setting; and
4) There is a disconnect that needs resolution.

In life, we receive feedback in many different settings (Kluger & DeNisi, 1996). We bake a pie that does not come out right; we pursue a relationship and get a positive response; or we submit a written piece of work and hear that our ideas have been well received. In some settings, we eagerly await the feedback; in others, we dread it. Some of us may generally like getting feedback, whereas others may not. Memories of our own student days allow us as teachers to empathise with our students' feelings about receiving feedback. Teacher feedback about student performance on a task is a powerful trigger of student emotions, which, in turn, have the potential to affect student engagement with the feedback, and ultimately, influence student achievement (Linnenbrink & Pintrich, 2002; Lipnevich & Smith, 2009b). This chapter focuses on how feedback, in the form of grades, comments, scores, or praise/criticism may relate to how students respond to feedback (emotionally, cognitively, and behaviorally),

and what they do with that feedback. We examine some of seminal research in the field, synthesize recent work done on the topic, and then present a tentative model for understanding how learners respond to formative feedback.

There have been numerous meta-analyses on the efficacy of formative feedback in student learning (Bangert-Drowns, Kulik, Kulik, & Morgan, 1991; Crooks, 1988; Hattie & Timperley, 2007; Kingston & Nash, 2011; Kluger & DeNisi, 1996; Shute, 2008). What we find in this meta-analytic work is that formative feedback is effective most of the time, and that certain characteristics of feedback are more effective than others. Our focus here is on a much narrower, but important, aspect of the feedback/learning process. We are interested in the inner workings of formative feedback, in particular the specific ways by which feedback influences what students do with the feedback and how it may affect their academic outcomes.

We begin this chapter by examining three seminal articles on formative feedback, two that present models that have been highly influential in the field (Hattie & Timperley, 2007; Kluger & DeNisi, 1996), and a third that presents a concrete set of recommendations for formative feedback based on a review of the research literature (Shute, 2008). We then examine a number of studies that look at the impact of formative feedback in experimental and quasi-experimental settings. The findings speak to the issue of the importance of how feedback is received by learners. In the final section, we propose a model of feedback that focuses on the relationship between the nature of the feedback and how students respond to it, and show how it relates to classroom practice and outcomes.

UNFOLDING FORMATIVE FEEDBACK

Ever since Scriven (1967) differentiated formative and summative evaluation, and Bloom (1970) applied the distinction to assessment, there have been various terms for the notion of feedback, formative assessment, and assessment for learning. Shute (2008) uses the phrase "formative feedback," defining it as "information communicated to the learner that is intended to modify his or her thinking or behavior for the purpose of improving learning" (p. 154). We use this term and definition in this chapter.

The essential role of feedback in day-to-day instruction has been studied extensively over the past 30 years. Several meta-analyses and compendiums of reviewed literature have all come to a consistent conclusion: feedback works (Black & Wiliam 1998; Crooks 1988; Hattie & Timperley 2007; Shute, 2008). However, there are subtleties about *how and when* feedback works that are sometimes lost in the more general finding of feedback's overall effectiveness. In fact, some meta-analytic work suggests that feedback may negatively affect performance in up to one-third of cases (e.g., Bangert-Drowns et al. 1991; Kluger & DeNisi 1996). For example, in their meta-analysis of research in formative assessment, Kingston and Nash (2011) found that formative assessment practices, including feedback, were more effective in language arts than in mathematics or science. Studies have begun to unveil the exact mechanisms of how specific types of feedback may affect performance. In this section we discuss several models that describe how formative feedback may influence achievement and review recommendations for optimal uses of formative feedback.

Feedback Intervention Theory

In their review of the literature, Kluger and DeNisi (1996) found that in roughly one-third of the studies they examined, feedback had a negative impact on subsequent

performance. In an effort to understand why feedback appeared to be effective in some settings and not in others, the authors developed what they call Feedback Intervention Theory (FIT) (Kluger & DeNisi, 1996, 1998). Their model focuses on feedback that provides information about the discrepancy between the individual's current level of performance and the desired standard of performance. Having understood the discrepancy between current and desired performance, the individual can: (a) choose to work harder, (b) lower the standard, (c) reject the feedback altogether, or (d) abandon their efforts to achieve the standard. Option selection depends upon how committed individuals are to the goal, whether the goal is clear, and how likely success will be if more effort is applied.

In FIT theory, when an individual receives feedback indicating that a goal has not been met, attention can be focused at one of three levels (broadly speaking): (a) the details of how to do the task, (b) the task as a whole, and (c) processes that the individual engages in doing the task (meta-task processes). Kluger and DeNisi (1996) argue that individuals typically process feedback at the task level, but that the feedback can influence the level at which the task is received and attended to. They note that if a task is well understood by the individual, receiving feedback containing details on how to perform the task can be detrimental to performance as such details draw attention away from the actual performance of the task (Kluger & DeNisi, 1998).

The FIT model provides meaningful insight into the processes that underlie how feedback influences performance; the impact of Kluger and DeNisi's work can be seen in much of the theoretical work that followed it (e.g., Hattie & Timperley's [2007] model). The FIT model is explicit and testable (Krenn, Wurth, & Hergovich, 2013), but the influence of a more industrial/organizational perspective on feedback (as compared to one directly related to issues of schooling) is obvious. There is a strong focus, for example, on feedback that lets individuals know if they are doing a particular task at a sufficient level. The assumption is that the individual knows how to do the task; hence, the purpose of the feedback concerns whether performance is up to expectation. But this is not often the case in educational settings. In classroom instruction, one is typically interested in the development of new skills, not the demonstration or repetition of ones that have already been mastered. Also, the FIT model does not place strong emphasis on the context in which the feedback is received, nor characteristics of the individual receiving the feedback, either in general, or in relation to the subject area and nature of the task under consideration. So, although one can consider FIT an excellent jumping-off point, there is room left for theoretical developments in the domain of instruction and learning.

Hattie and Timperley's Model

The next model ~~herein~~ considered is the work of Hattie and Timperley (2007). The influence of this seminal work is testified to by the fact that it had received well over 3,000 citations by the time of this writing. Hattie and Timperley take the same basic starting point as Kluger and DeNisi (1996), noting the main purpose of feedback is to close the gap between where an individual currently is and where he or she should be. Hattie and Timperley break this notion down into three issues: (a) the student's current status, (b) the desired status, and (c) the steps necessary to close the gap. Similarly to Kluger and DeNisi, they argue that students can increase their efforts, lower their expectations, or abandon their goals in response to less-than-ideal feedback. The researchers also add that the student can employ more effective strategies under the direct influence of the teacher, who may modify goals and help students to use better

strategies to achieve the goal. With the concepts of goals, current status, and routes to close the gap in hand, Hattie and Timperley argue that each of these concepts can work at four different levels: (a) the task, (b) the processes that produce successful performance on the task, (c) self-regulation, and (d) the self. Thus, one might reasonably see the Hattie and Timperley typology of feedback as an elaboration of the Kluger and DeNisi model that is particularly well suited to the exigencies of the classroom setting.

Per Hattie and Timperley (2007), feedback at the level of the task can be as simple as informing the student as to whether an answer was correct or not (verification feedback), up to discussing why a right answer in a multiple-choice item was right and why the wrong answers were wrong. One also needs to take into consideration the nature and complexity level of the work on which feedback is being given. Knowledge level feedback at the correct/incorrect level is typically not generalizable beyond the specifics of the piece of information (e.g., knowing when WWI began will not help a student know when the War of the Roses ended). On the other hand, knowing if you managed to hit a golf ball straight can be very helpful in future attempts, so there are plentiful exceptions to the notion that verification feedback is limited in applicability.

Feedback about the processes that produced the performance on the task relates more to promoting a deeper understanding of the task than task level feedback. Such strategies might include error detection on the part of the student. It is interesting to note on this point that there is a bit of a 'flip' between the perspective of Kluger and DeNisi (1996), and Hattie and Timperley (2007). Kluger and DeNisi talk about a focus on the task as being at a higher level than a focus on the details of the task—a focus that might actually detract from performance. On the other hand, Hattie and Timperley argue that feedback with a focus on how successful performance on the task is produced, rather than how well the student did on the task represents a higher level of cognitive focus. This, perhaps, is due to the fact that in educational settings, the goal is to get the student to master the task, and in industrial settings, the goal is more commonly focused on seeing how well or how frequently the task can be performed.

Hattie and Timperley's third level of feedback (i.e., self-regulation) fundamentally does not exist in the Kluger and DeNisi model. Self-regulation involves a set of behaviors that students might engage in when learning or when performing a task. These include goal setting, planning, progress monitoring, help-seeking, evaluation of success, and attributions of success (Zimmerman, 2000). Feedback at a self-regulatory level might concern the students' plans for revising a piece of written work or reminding them to ask whether an answer to a math problem is reasonable in a given situation.

The fourth level of feedback concerns the self and is directly related to the Kluger and DeNisi (1996) model. Praise at this level would involve statements such as, "You're such a good mathematician!" or "You're a natural writer!" It draws students' attention away from the task and toward themselves as individuals. Hattie and Timperley (2007) point out that one should differentiate between self level praise that focuses on ability and praise that focuses on effort, and note that this distinction is often missed in the literature. Hattie and Timperley note that with the exception of feedback focused on the self, the nature and level of optimal feedback will depend upon what is being learned, where the student is in the acquisition of knowledge and skills, and the context of the learning situation.

Shute's Guidelines for Formative Feedback

Shute (2008) took a more applied approach to reviewing the literature on feedback. She synthesized research on formative feedback and generated a set of guidelines on

how it should be created and delivered. Shute begins with a more elaborate definition of feedback than Kluger and DeNisi (1996) or Hattie and Timperley (2007). She identifies information concerning the gap between current and desired status as one type of feedback, and then includes two additional types of feedback: feedback that reduces the cognitive load of the student by providing needed information (e.g., a worked out example of how to approach a type of mathematics problem) and feedback that corrects misconceptions or misinterpretations.

Building on work from Bangert-Drowns et al. (1991), Shute (2008) argues that feedback provides learners with verification that their answer is correct (or not) and elaboration provides help to the learner on how to get to the correct answer. She examines the research literature concerning: (a) the impact of length and complexity of feedback, (b) the relationship between the nature and challenge of goals and learner motivation, (c) feedback as scaffolding, (d) the timing effects of feedback, (e) the influence of the ability level of the learner, (f) the learner's goal orientation (i.e., performance or learning), and (g) whether feedback was normative or self-referenced. Shute's guidelines for the optimal use of formative feedback are presented in four tables, one for things to do, one for things to avoid doing, one concerning the issue of timing, and one concerning individual differences in characteristics among learners.

With regard to things *to do*, Shute (2008) recommends (a) a focus on the task and not on the learner; (b) elaborated feedback presented in chunks that the student can handle; (c) being clear and straightforward; (d) being objective; and (e) focusing on learning goals. With regard to things not to do, she recommends: (a) not comparing students to others; (b) avoiding grades in most instances; (c) not using praise in most situations; (d) not using oral feedback; and (e) not focusing excessively on anaysing errors. With regard to issues of timing the provision of feedback, Shute recommends: (a) adjusting the timing to the situation, in particular, using immediate feedback for difficult tasks, but delayed for simple tasks; (b) using immediate feedback for procedural or motor skills; and (c) using delayed feedback to promote transfer. Her final set of recommendations concerns tailoring feedback to the needs of the individual learner: (a) stronger students can benefit from delayed and more indirect feedback whereas weaker students benefit more from immediate and specific feedback; and (b) low achieving students also appear to benefit from scaffolding and elaboration.

Finally, Shute (2008) calls for more research on individual differences among learners with regard to feedback and more work on motivational aspects of how feedback works. In particular, she calls for more work on the relationship between affect and outcomes.

Summary and Analysis

What can be seen in each of these three reviews is an attempt to move beyond questions of whether formative feedback works, and to ask when, where, and how it works. Formative feedback is no longer a blunt instrument that can be applied whenever learning needs a boost; we now have a much more nuanced and complex understanding of the role of formative feedback in instruction. But there are aspects of this work that need to be challenged and refined. To begin, there is the notion that feedback consists primarily of letting learners know where they are now and where they need to be.

Consider feedback in the development of writing skills. Unless one is working at a very micro level with a learning objective (e.g., proper use of the semicolon or developing good opening sentences), there is no real notion of what a goal is, nor a very definite notion of where the student is today. The whole process can be a movable feast,

and the teacher needs to work within such a setting. If a student is writing about a topic he or she is very familiar with, and if the student is feeling venturesome, then an exciting and insightful piece might evolve. But if the student is not highly motivated, something less proficient will be seen. So what is the role of the teacher here? Is it to provide information on how good this piece is and how the piece could be improved? Is it to provide feedback that will facilitate the next piece of writing? Or to provide feedback as scaffolding the motivational zone of proximal development (Brophy, 2008)? If the underlying lesson concerned building paragraphs, but the student presents a stunningly good description of his grandfather, does the teacher ignore the lesson for the teachable moment of exploring the quality writing that the student has done?

Thus, given the complexity of learning goals and options, a sufficient formative feedback model must effectively address what goes on in schools. As Shute (2008) points out, learners vary and a model that does not take into account the manifold variations one encounters in students will be severely limited. One area of limitation that is not addressed extensively in the work reviewed here is how the learner receives the formative feedback. Student reactions (e.g., welcoming, resistance) can make all the difference in the world with regard to the efficacy of the feedback.

A CLOSE LOOK AT SOME RECENT WORK ON FORMATIVE FEEDBACK ON WRITING

There is a general consensus in the field that in order to be effective, feedback must encourage active processing of information on the part of the learner (Hattie & Timperley, 2007; Shute, 2008). In our research (Lipnevich, McCallen, Miles, & Smith, 2014; Lipnevich & Smith, 2009a, 2009b), we found that if students did not successfully engage with the feedback that they received, feedback would not enhance student learning. We examined differential effects of feedback on university students' performance, demonstrating that detailed comments, specific to an individual's work, were highly conducive to improvement on a writing task (Lipnevich & Smith, 2009a, 2009b). In the study, students participated in an essay writing and revision task. They were randomly assigned to one of three conditions: no feedback, detailed feedback from the instructor, or detailed feedback allegedly from a computer, but which was actually delivered by the experimenter, masked as computer-generated. Each of these three conditions was crossed with two factors: praise (receiving praise or not) and grade (receiving a preliminary grade or not). We found that detailed descriptive feedback was most effective when delivered without praise or grades. Interestingly, we also found that students who perceived the detailed feedback as coming from an instructor regarded it as more helpful than those who perceived the feedback as coming from a computer. Additionally, if praise was delivered along with grades, the negative impact of grades was ameliorated. It should be noted that in this study, students received their feedback in a scheduled class session as a part of the course they were taking, and were given the opportunity to increase their score by working on their draft based on the feedback received. Thus, the motivation to engage with the feedback was high.

In follow-up focus group discussions with students who participated in the experiment (Lipnevich & Smith, 2009b), students unanimously concurred that detailed comments were the more effective form of feedback. Grades were seen as potential obstacles to improvement, particularly by students who believed they received them from the instructor. Students who received high marks on the first draft of their work often said that they had little motivation to modify their draft, and some even indicated

that they were afraid that changes might result in lower grades. Students who received low initial grades were often greatly demoralized by seeing their marks. Students considered praise pleasant but the least influential form of feedback, useful only for balancing the demotivating effect of grades. Taken together, these findings present strong evidence that providing university students with individualized, descriptive feedback specific to their work, and allowing them to make revisions based on that information, leads to significant improvement in writing performance.

These findings led us to consider the key player in the feedback scenario: the teacher providing the feedback. Unarguably, educators play a crucial role in providing effective feedback to improve student writing. Teachers value the practice of giving feedback (Brown, Harris, & Harnett, 2012; Hyland & Hyland, 2001) and actively use feedback in the process of teaching writing to students (Matsumura, Patthey-Chavez, Valdes, & Garnier, 2002), realizing that the quality of feedback messages influences the extent of students' writing improvement (Reid, Drake, & Beckett, 2011; Ruiz-Primo & Furtak, 2007; Wiliam, Lee, Harrison, & Black, 2004). Kingston and Nash (2011) noted that the quality of feedback and the way it is used matters greatly and that the implementation of feedback is often "left to the discretion of the teachers implementing formative assessment" (p. 34). Hence, carefully constructed feedback messages on students' written work can lead to enhanced performance, and educators' roles in this process are important. However, providing high quality feedback responses in communicating with students about their writing, such as delivering extensive, individualized comments, is time-consuming and may be impractical for teachers in many situations. The question arises as to whether more efficient forms of feedback can be found.

To that end, we designed a study that investigated the effects of what we refer to as generic, standardized written feedback on student performance (Lipnevich et al., 2014). Two forms of standardized feedback (a detailed rubric and essay exemplars) were utilized in an experimental design with undergraduate students at three U.S. college campuses. Students completed a draft of an essay as part of their course requirements and were then randomly assigned to receive a detailed rubric, essay exemplars, or both a rubric and essay exemplars for use in revising their work. The results revealed that all three conditions led to improvement that was significant and strong in terms of effect size. The rubric condition produced the biggest net growth in performance, with students who received rubric alone generating an effect size of $d = 1.0$, as compared to the other two conditions (effect sizes of $d \approx 0.50$ in each condition).

Andrade and her colleagues (Andrade, 2005, 2008; Andrade, Du, & Mycek, 2010) note that effective rubrics in writing clarify learning goals, guide educators' feedback on students' progress toward the goals, and allow students to judge their final writing product based on the degree to which they have met the learning goals. However, in her research, provision of rubrics as part of a feedback process varied in their effectiveness according to how they were used and the characteristics of the student participants. We speculate that the essential difference between her findings and ours is that we were working with students who were older and more advanced with regard to general academic abilities. Panadero and Jonsson (2013) reviewed the literature on using rubrics as formative feedback in a variety of settings, and generally found rubrics to be effective. However, in a quasi-experimental study, rubrics were found to not be effective in helping students to develop a multimedia presentation (Panadero, Alonso-Tapia, & Reche, 2013).

To our knowledge, no studies have previously examined rubrics solely as a form of feedback in lieu of detailed, individualized feedback on a writing draft (as opposed to *prior* to writing an initial draft). Possibly, when working with relatively sophisticated students, presenting a detailed rubric only after students complete a draft of their essay

makes this tool more effective. Particularly interesting is that the rubric condition produced better results than the rubric plus exemplars condition. Based on discussions with the participants, we speculate that students see exemplars as more useful to them, when in fact, rubrics are. We believe that students prefer exemplars because following a model is easier than assessing one's work against rubrics; however, assessing one's work against rubrics may well lead to a deeper level of processing by the students.

These studies and those of our colleagues in the field led us to the belief that we need a model to better understand the mechanisms through which learners receive feedback, how they react to it, and what they do about it. The following section presents an initial attempt at the development of such a model.

TOWARD A MODEL OF THE IMPACT OF FEEDBACK ON STUDENTS

There have been a number of models of feedback presented in the research literature (Bangert-Drowns et al., 1991; Hattie & Timperley, 2007; Narciss & Huth, 2004) with varying degree of success in terms of utility and applicability. With a number of models extant, one might reasonably ask why another is being developed. The answer here is relatively straightforward. The models that exist provide a good general overview of the feedback/learning process, but do not focus on how the feedback is received by the individual. What are the characteristics of individuals that lead to different reactions to feedback? How can feedback be tailored to a given situation to maximize the reception that it receives? Is feedback primarily a function of the nature of the setting or a more enduring characteristic of the individual?

Our goal in the model is to examine what occurs in the feedback/learning process between the time when the student receives the feedback and the time when the student takes action on that feedback (or chooses not to do so). That is, we want to consider what causes students to eagerly engage the feedback they receive, reject it, or simply ignore it. If feedback is not acted upon, it is not likely to be effective in enhancing learning. Thus, we see this model as an attempt to explicate the process that underlies the efficacy (or lack thereof) of feedback. The model (Figure 10.1) begins with the context within which the student/feedback interaction takes place. Not all feedback is the same and not all students are the same. Feedback that is effective for one student may not be effective for the next; the efficacy will depend on a number of factors. We examine each component of the model in order.

Context

To begin, assessments have consequences for students, and these consequences affect how the student behaves on the assessment (Smith & Smith, 2002; Wolf & Smith, 1995), and how he or she receives the assessment feedback. A student waiting on college entrance examination scores is in an entirely different state of mind than a student showing a math problem to a teacher as she walks through the classroom aisles. High consequence or "high-stakes" feedback is much more likely to produce anxiety than low consequence feedback. Does the student view this feedback as formative or summative? Is it supportive or judgmental? The setting in which the feedback is received matters as well. Is this feedback coming from a teacher whom the student trusts and likes, or is it impersonal, or coming from a source that the student views as untrustworthy, or even antagonistic toward the student's best interests? Contexts differ and they matter.
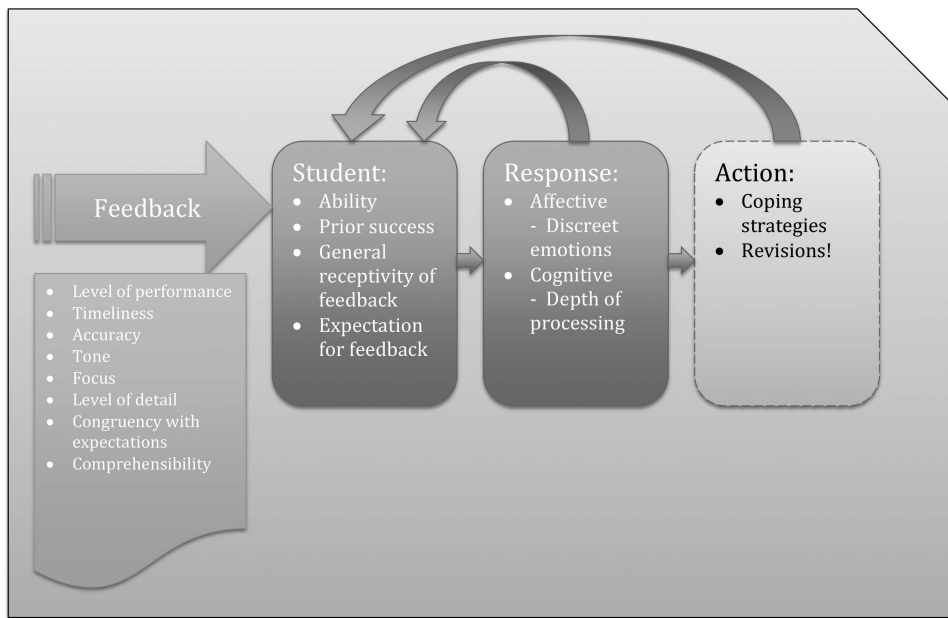
Figure 10.1 Feedback—Student Interaction Model

Yang and Carless (2013) attempt to integrate the plethora of factors that influence successful provision of feedback into a manageable taxonomy, with context of feedback taking a prominent position. They discuss three main areas of dialogic feedback that have to be considered when educators design instructional feedback: cognitive, social-affective, and structural. In regards to the cognitive dimension, students should be able to utilize feedback from peers and teachers to self-regulate their own performance. This process can be facilitated by trusting relationships among participants (social-affective dimension). Further, the strategy of using a multistage assignment or using technology to facilitate feedback use (structural dimension) also influences the overall acceptance and utilization of feedback messages. Other studies also show that context of feedback has the potential of changing the degree to which it will be utilized (Carless, Salter, Yang, & Lam, 2011).

Feedback

The model starts with feedback that is presented to students. Feedback can vary on a number of characteristics, and the individual efficacy of these for learning has been examined in a number of studies and summarized elsewhere (Hattie & Timperley, 2007; Kingston & Nash, 2011). The first thing we might consider is the degree of success in demonstrating that learning has occurred communicated by the feedback. In other words, according to the feedback being given, how close has the student gotten to the learning objective? Feedback on an assignment, essay, or test that is highly positive and communicates excellent performance is likely to be received more positively than feedback that suggests poor performance (Lipnevich & Smith, 2009b). For example, studies have shown that individuals tend to (a) process positive information about one's performance much faster than negative information and (b) take credit

for their successes while attributing their failures to outside influences (Sedikides & Strube, 1997). Feedback does not have to communicate a level of performance at all, and our own studies have suggested that avoiding such evaluations is effective. Nonetheless, keeping evaluative feedback in the model requires consideration of this aspect of feedback.

The next aspect in the model is the timeliness of the feedback. This is particularly interesting in light of research that suggests that the most rapid turnaround on feedback is not necessarily the most effective (Hattie & Timperley, 2007; Kulik & Kulik, 1988). While Shute (2008) provides advice as to when feedback should be given, the question that has to be asked here is: Is the feedback being received at the optimal time, whatever that may be? In her review of evidence on the timeliness of feedback, Shute concludes that delayed feedback may be superior for promoting transfer of learning, especially in relation to tasks that have concept formation as their goal. Immediate feedback, on the other hand, may be more efficient, particularly in the short run and for procedural skills (i.e., programming and mathematics) (Corbett & Anderson, 2001; Ferguson, 2011; Schroth, 1992).

A third characteristic of the feedback is its accuracy. A teacher grading multiple essays over a weekend may well miss or misread an excellent point that a student has made, and make a comment on the paper that is not relevant, or perhaps is quite simply wrong. Brackett, Floman, Ashton-James, Cherkasskiy, and Salovey (2013) present evidence showing that teacher emotions affect accuracy of marking. The authors reveal that emotions may bias the grades teachers assign to their students, such that positive and negative emotions influence grade assignment in emotion-congruent ways. Another aspect to feedback accuracy has to do with its *honesty*. If a student gets a "Great Job!" on the top of a paper that he/she knows is less than a great job, then all the feedback contained therein could be called into question. As teachers, we all know that there are some written papers that have little in the way of strengths, and yet markers often do not want to be unduly negative (Nikolakakos, Reeves, & Shuch, 2012). Nonetheless, being honest with the student may really be the best route toward student growth (Boekaerts & Cascallar, 2006).

This leads to the issue of tone, which may be *the* most critical aspect of feedback, with regard to the emotional reaction that students experience. There is a world of difference between, "This doesn't make sense," and "I'm having some trouble following your argument here." One can expect different emotional reactions to "another simple math mistake," and "Tom, please check these answers for simple math errors." The difference is in the *tone* with which honest feedback is given. Furthermore, some students may have more difficulty than others in properly perceiving the intended tone of the written feedback (Brookhart, 2011).

A fifth issue is the focus of feedback. Feedback might focus upon what Hattie and Timperley (2007) refer to as the task level of the work, or it might focus on issues of self-regulation, or it may focus on trivial aspects of the student work. For example, feedback might be focused on the reasonableness of answers in math problems, or the story line in a piece of writing. Imagine the difference in formative feedback that pointed out all the grammatical errors in a piece of writing compared to one that encouraged the student to do a read-through of a piece of writing concentrating on catching and correcting grammatical errors, and perhaps provided an example of how to do so (Ferguson, 2011).

A sixth aspect of feedback is level of detail, which has to do with the sheer magnitude and specificity of the feedback that the student receives. This might range from a simple letter or number grade on a third grade math assignment to pages of scholarly

commentary on a Ph.D. thesis draft. Has the student received enough feedback to effectively engage the material, or so much that the student is overwhelmed? Finding the right level of detail can be a challenge for the senders of feedback, often because teachers or peers may not have a good sense of how it is being received (Brookhart, 2011; Ferguson, 2011).

A seventh aspect of feedback is comprehensibility, which refers to accessibility and appropriateness of the feedback for the student receiving it. Is the sophistication of the feedback consonant with the ability of the student to process it? "Subject/verb agreement" as a comment on an essay is not helpful to a student who does not know what subject/verb agreement means and who may lack the resources or motivation to find out. This characteristic of feedback concerns the ability of the student to cognitively process the level at which the feedback is being delivered (Ferguson, 2011).

The final aspect of feedback is its congruency with expectations. Congruency with expectations is jointly a function of the nature of the feedback and the nature and disposition of the student. We include it with feedback because the student dispositions are reasonably stable and outside the immediate control of the feedback giver in any one feedback situation, whereas the feedback itself is variable. Congruence between the feedback itself and the students' expectations for feedback is important. At any level of performance, there may be a match or a mismatch between what the student receives and what he or she expected. Such mismatches may have very different consequences for how the feedback is received and acted upon (Eva, Armson, Holmboe, Lockyer, Loney, Mann, & Sargeant, 2012). For example, the literature on self-enhancement that comes from the field of economics shows that, in the context of performance assessment, feedback signaling performance below the expected level combined with one's perception of personal responsibility for that performance is the key trigger of self-enhancement (Audia & Brion, 2007). As a result, individuals will be more likely to attend selectively to positive indicators and ignore negative indicators (Baumeister & Cairns, 1992), or take full credit for successes and search for external excuses for failures (Bettman & Weitz, 1983; Jordan & Audia, 2012).

The feedback side of the model is complex because there are a number of issues to consider that can be reasonably expected to impact on how the feedback is received. What is critical is to acknowledge that not all feedback is the same with regard to how students will react to it.

Student

The second important factor in the feedback/response model is the student, each of whom is likely to react differently to the same feedback (Brown & Hirschfeld, 2007; Carless, 2006; Poulos & Mahony, 2008; Weaver, 2006). Some students are going to be generally more or less receptive to feedback, while others may react unpredictably and possibly inconsistently depending on the context and the nature of the feedback (Eva et al., 2012). In looking at how students respond to feedback, an interesting question arises almost immediately: Are some students generally more receptive to feedback across a variety of settings than other students? Or, is response to feedback highly dependent on the context and nature of the situation (Harris, Brown, & Harnett, 2014)?

Just like other psychological concepts, (e.g., self-efficacy, academic emotions) feedback may have to be examined as situated in two different planes; that is, (a) state, transient and situation-specific response to feedback and (b) trait, a more typical response to feedback. The latter characteristic is likely to be significantly impacted by subjective

beliefs, just like academic emotions (Goetz, Lüdtke, Nett, Keller, & Lipnevich, 2013; Goetz et al., 2014). This distinction between state and trait response to feedback is consistent with dual-process models of higher-order cognition. According to these models, individuals' state response to feedback would primarily reflect System 1 processes (fast, automatic, impulsive, perceptual), whereas a trait response to feedback would be indicative of System 2 processes (slow, controlled, reflective, analytic) (Kahneman, 2011; Strack & Deutsch, 2004). The question that we should ask ourselves is: How modifiable is this characteristic? Let us look at the characteristics of the student that might affect how he or she responds to feedback.

The first factor to consider is the current ability of the student with regard to the material under consideration. Is this a highly able student or one who struggles in this area? This is critical because the ability of the student is going to influence the design of the feedback for the student. More able students might be generally more receptive to feedback on their work, whereas weaker students may be more tentative or resistant toward feedback, although the literature is not robust on this matter (Dutro & Selland, 2012; Eva et al., 2012; Reay & Wiliam, 1999).

A second factor, closely related to the student ability, is the student's prior success. None of us like to do things that we do poorly and feedback that is going to point out our lack of success, especially if delivered in a social (e.g., classroom) setting (Stiggins, 2007). In contrast, if students feel and perceive that this is an area in which they do well and are successful, then the feedback they are about to receive is more likely to be welcomed. Thus, prior success sets the stage for how current feedback is received by the student.

A third characteristic of students concerning feedback is their general receptivity to feedback. Does a particular student enjoy getting feedback in general or dread it? Or does this depend on the setting for the student? "General receptivity of feedback" was found among a group of college undergraduates to be a more powerful predictor of emotional reaction to the feedback than feedback's "congruency with expectations" (Smith, Berg, Kendall-Smith, & Lipnevich, 2013). This result is consistent with Harris et al. (2014), which showed New Zealand schoolchildren had a generally positive disposition toward receiving feedback. Hence, it would seem to be a mistake to ignore students' general tendency to be positive or negative toward feedback.

In sum, the student side of the model has to do with how able the student is, what his or her history of feedback is within this subject area, whether the student generally likes or dislikes getting feedback, and what kind of feedback the student expects to receive for this work.

Response

By 'response' to feedback, we mean how the student receives the feedback both affectively and cognitively. It is what occurs within the self as the student peruses the feedback. The first response may well be an emotional one of joy, sadness, anger, or anxiety. It may be cognitive as well, including disbelief, agreement, realization that a point is well made by the teacher, or a belief that the teacher didn't understand what the student was saying. The affective side of this equation would be a series of discrete emotions. Studies have consistently shown that discrete emotions of the same valence have differential links with achievement and other outcomes (Goetz, Zirngibl, Pekrun, & Hall, 2003; Pekrun, Goetz, Titz, & Perry, 2002). Pekrun's (2006) control-value theory posits that feedback should be expected to affect students' emotions, which, in turn, will affect achievement-related behaviors. More specifically,

students' academic achievement should positively relate to enjoyment and pride, and negatively to anger, anxiety, shame, and hopelessness (see Vogl & Pekrun, this volume).

The cognitive side of the equation also concerns a number of distinct items. First, the student has to comprehend the feedback. This means not just "does the student understand what is here," but also, and perhaps more importantly, "does the student take the feedback on board; does the student take the time and have the ability to process the feedback?" Processing includes depth of processing. Is the student able to not only see how the feedback applies to the situation at hand, but how that information can be generalized to new and different situations?

The cognitive and affective aspects of the response to feedback interact with one another. The more the student understands what the teacher is saying, the more likely the student is to have a positive response. And the more the student has a positive response to the feedback, perhaps because of its tone, the more likely the student is to spend the time and effort to comprehend what is being said (Brookhart, 2011).

Action

The final aspect of the model concerns the action that the student takes with regard to the feedback. Feedback that is not acted upon is essentially useless for student performance. So the question becomes one of what the student does with the feedback. This is dependent upon a number of factors (e.g., the degree to which the student has received useful and usable information about his/her performance; whether the student has comprehended that information; the tone of the feedback, its congruence with expectations, and the general receptivity of the student to feedback). These factors will hopefully put the student in a frame of mind where he/she is disposed to work sufficiently hard with the feedback received so as to improve performance.

Actions also include the general coping approach that students take. As we have already mentioned, feedback has the potential of eliciting strong, and sometimes negative, affect. The student's coping strategy determines whether or not a student takes action and what kind of action it will be. There are many different taxonomies of coping, but most models encompass Lazarus and Folkman's (1984) initial distinction between problem-focused and emotion-focused coping (Folkman & Moskowitz, 2004, provide a review of coping models). A further distinction is often made between emotion-focused and avoidant coping (Parker & Endler, 1996). These coping styles aim to reduce stress that could have been caused by feedback in different ways. In problem-focused coping, individuals deal adaptively with stress by resolving the root cause of the stressful situation and, consequently, improving their performance (e.g., going carefully through comments and methodically addressing each one). In contrast, in emotion-focused coping, students would tend to maladaptively focus on their emotional responses to the stressor. So, a student may feel sorry for him- or herself, or could blame the instructor who provided negative feedback. Likewise, in avoidant coping, students would maladaptively try to avoid the feedback stressor as much as possible (e.g., going shopping or playing video games instead).

Overall, coping styles have been linked with personality traits, life satisfaction, academic achievement, and a range of well-being measures; hence, it is not too fanciful to speculate that they should affect the coping response of students as a result of feedback received (Carver, & Connor-Smith, 2010; Diener, Lucas, & Scollon, 2006; MacCann, Fogarty, Zeidner, & Roberts, 2011).

A Walk-Through of the Model

Feedback is received in context. It may be a process of feedback and a subject area where the student is comfortable or not about what is occurring. The feedback will have some level of consequence associated with it. It may be viewed as entirely supportive or it may have great import for the student and, thus, be anxiety-producing. It may be in a classroom environment that is friendly to feedback or be a competitive space and source of social comparison. Within the context, the feedback is delivered to the student. It may be detailed or sparse, aligned with the student's level or not. It may be painfully honest but delivered in a strongly supportive fashion, or be unpleasantly judgmental. It may match what the student is expecting or be wildly discrepant. The student receiving it will either be strong in this subject or not, have had good experiences with feedback, or perhaps be generally wary of getting feedback.

When the student receives the feedback, these feedback design factors come into play. They produce affective and cognitive responses that are often tightly interdependent. The student may experience dismay, joy, a feeling of pride, or embarrassment; worry about how parents or peers will react; have a sense of having disappointed the teacher or themselves in their performance, or of having made the teacher proud. In reading through the feedback, the student might be baffled by the comments or fully appreciative of them. He/she might only be able to generate a surface comprehension of what the teacher means or might be able to use the teacher comments as a springboard to an in-depth comprehension of where to go next. From this wellspring of affect and cognition, the student acts adaptively or maladaptively. He/she works on the assignment, processes the suggestions made by the teacher or perhaps discounts what has been said in order to save face and self-esteem. And finally, both the response to the feedback and the actions that the student takes reflect on who the student is, what the student knows and can do in this area, and how the student will respond in the next cycle of feedback. The feedback may trigger responses which generalize across settings and subject areas or remain specific to situations highly similar to this one.

It is our hope that this model helps to unfold the complexities of how students respond to feedback and highlight productive areas for future research. In the absence of empirical verification of the proposed model, we can only speculate as to how this might impact teachers in classrooms. But it is possible to look at the model, and reflect on what is established in the literature on formative feedback. We would suggest that, in addition to the excellent recommendations provided by Shute (2008), teachers are mindful of what they say to students via formative feedback. One might use the metaphor of a conversation in thinking about formative feedback. The teacher has begun the conversation by providing instruction and asking the student to generate a product (e.g., an essay, a lab report, a mathematics homework assignment) based on that instruction. The student picks up the conversation and responds to the request of the teacher. Now the ball is back in the court of the teacher. What will the teacher say next to the student? What will be the nature and content of that communication? For a student at the high school or tertiary level, this communication back from the teacher, tutor, or professor may be the only direct communication with the teacher for a substantial period of time. They are only words, but they come from us as teachers, and we know that the words of teachers can be powerful; we should choose them carefully.

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