

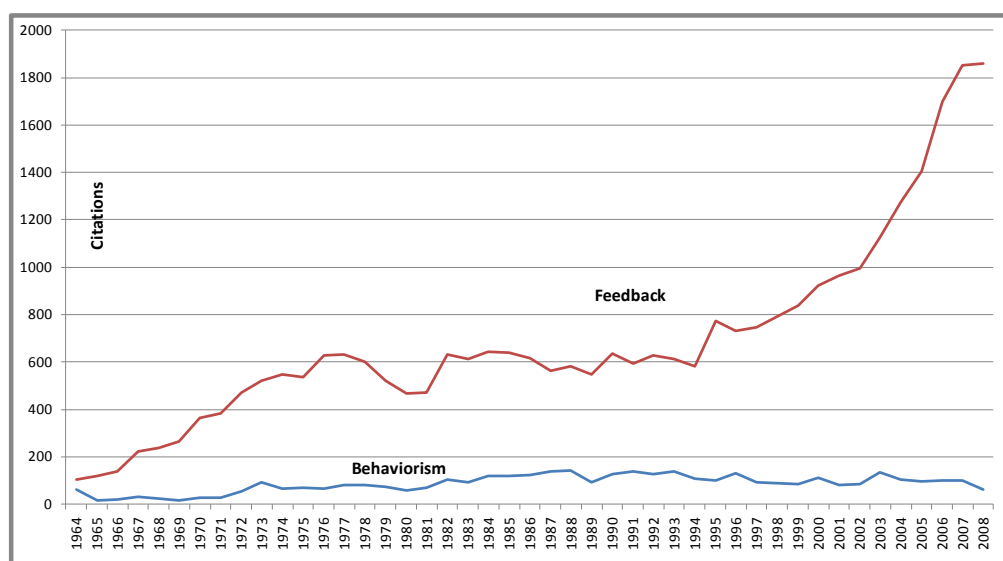
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Feedback in schools

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Feedback is a construct with a long history. It was salient during the heyday of behaviorism, but unlike behaviorism – the influence of which seems to have flat lined - reference to the notion of feedback has steadily grown in the psychological literature, with a particularly steep increase since the publication of Kluger and DeNisi’s (1996) meta-analysis (Figure 1).

Figure 1: Citations in PsycINFO with Feedback and Behaviorism as Keywords (1964-2008).



Kluger and DeNisi (1996) defined feedback as “actions taken by an external agent to provide information regarding some aspect(s) of one’s task performance” (p. 235). This clearly puts emphasis on performance. In most classrooms performance concerns the learning, the achievement, or the attitudes about the “work” that is being taught. Feedback may typically be comprised of constructive criticism and

advice, but could also be behavior, social interactions, and praise (e.g., “good girl”). A major conclusion from their meta-analysis of 131 articles was the variability of feedback effects. Specifically, it is not sufficient to claim that feedback works. Under some conditions, feedback information had no effect, or indeed debilitated performance.

These essential conclusions have been supported by my own work. For example, in Hattie (2009), I used a synthesis of over 800 meta-analyses, 50,000 effect-sizes from 240 million students to assess 138 influences on student achievement (from schools, homes, students, teachers and curricula). The average or typical effect of schooling was .40 (SE = .05) and this provided a benchmark figure or "standard" from which to judge the various influences on achievement, such as that of feedback. There have been 12 meta-analyses that have included specific information on feedback in classrooms (196 studies and 6972 effect-sizes). The average effect-size was .79, which is twice the average effect of all other schooling effects. This places feedback in the top 10 influences on achievement, although there was considerable variability. This reinforces Kluger and deNisi's conclusion that some types of feedback are more powerful than others. It also points to the need to identify the factors that make feedback effective or ineffective.

Happily, the resurgence of interest in feedback provides many opportunities to revisit some of the fundamental questions about feedback, such as the nature and purpose of feedback, how it can mean different things according to levels of processing and learning, and how feedback interacts with the attributes of the learner (situational, learning, and personality). This chapter explores some of these meanings of feedback, building on a model by Hattie and Timperley (2007) in light of recent theoretical and empirical developments. Following Sadler's (1989) notion of the “gap”, this model suggests that **feedback is powerful when it reduces the gap between where the student is and where s/he is meant to be.** **Feedback should therefore be useful when it helps students navigate this gap, by addressing fundamental feedback questions including “where am I going”, “how am I going”, and “where to next”.** **The chapter then describes four possible levels of feedback that instructors may choose to provide.** The chapter then reviews factors other than the level of feedback that determine its impact on student achievement.

Hattie and Timperley's (2007) model of feedback

In my earlier review with Helen Timperley (Hattie & Timperley, 2007) we considered feedback to be information that aims to reduce the gap between what is now and what should or could be. Specifically, we claimed that feedback is information provided by an agent (e.g., teacher, peer, book, parent, self/experience) regarding aspects of one's performance or understanding that reduces the discrepancy between what is understood and what is aimed to be understood. "Understanding" is indeed most salient to education contexts. The feedback that reduces this discrepancy can be provided in many ways such as through affective processes, increased effort, motivation or engagement, by providing students with different cognitive processes, restructuring understandings, confirming to the student that they are correct or incorrect, indicating that more information is available or needed, pointing to directions that the students could pursue, and indicating alternative strategies to understand particular information. A key consideration is that feedback comes second – after instruction – and thus is limited in effectiveness when provided in a vacuum.

The model we developed can be used to frame many of the current debates. Of particular interest are typologies that we developed to outline the major questions that may be asked by students in relation to their performance, and the major dimensions of performance that feedback may address. Effective feedback needs to address one of three major questions asked by the teacher and/or by the student: Where am I going? (What are the goals?) How am I going? (What progress is being made towards the goals?), and Where to next? (What activities need to be undertaken to make better progress?). The key dimensions of performance are processes of understanding a task, the regulatory or meta-cognitive process dimension, and/or the self or person (unrelated to the specifics of the task).

The three feedback questions

Where am I going?

The first question relates to goals or *Where am I going?* While there is much research about the power of goals in the management and psychological literature, it is not as common in the education literature.

When students understand their goals and what success at those goals look like, then the feedback is more powerful. Without them feedback is often confusing, disorienting, and interpreted as something about the student not their tasks or work. Most school age students' goals are more sport or social than academic (Hastie, 2009), and most academic goals relate more to completion of work, being on time, and trying harder than on the quality of the academic outcomes. Hastie (2009) found that half of student-set academic goals invoked a sense of challenge, half were shared with another person (peer or teacher), and only rarely did teachers assist or ask students to set academic goals. Smith (2009) asked teachers to set specific targets for secondary students based on students' past performance and many teachers were reluctant to set goals as they claimed that attaining them was not in their control. Instead, in the teachers' view it was more the responsibility of students to invest effort and commitment towards attaining goals.

There are two major elements of goals – these are challenge and commitment. Challenging goals relate to feedback in two major ways. First, they inform individuals “as to what type or level of performance is to be attained so that they can direct and evaluate their actions and efforts accordingly. Feedback allows them to set reasonable goals and to track their performance in relation to their goals so that adjustments in effort, direction, and even strategy can be made as needed” (Locke & Latham, 1990, p. 23). These levels of attainment can be termed *success criteria*. These are goals without clarity as to when and how the student (and teacher) would know they were successful and are often too vague to serve the purpose of enhancing learning. Second, feedback allows students (and/or their teachers) to set *further* appropriately challenging goals as the previous ones are attained, thus establishing the conditions for ongoing learning. By having clear goals, students are more likely to attend to reducing the gap instead of overstating their current status, or claiming various attributions that reduce effort and engagement. Goal commitment, which refers to

one's attachment or determination to reach a goal, has a direct and often secondary impact on goal performance. There are many mediators that can affect goal commitment and among the more important are peers, who can influence goal commitment through pressure, modeling, and competition, and particularly during adolescence the reputation desired by the student can very much affect the power of this peer influence (Carroll, Houghton, Durkin, & Hattie, 2009).

How am I going?

The second question is more related to **progress feedback** (*How Am I Going?*). This entails feedback (about past, present or how to progress) relative to the starting or finishing point and is often expressed in relation to some expected standard, to prior performance, and/or to success or failure on a specific part of the task. Feedback information about progress, about personal best performance, and comparative effects to other students can be most salient to this second question.

Where to next?

The third question is more consequential – *Where to next?* Such feedback can assist in choosing **the next most appropriate challenges**, more self-regulation over the learning process, greater fluency and automaticity, different strategies and processes to work on the tasks, deeper understanding, and more information about what is and what is not understood.

The four feedback levels.

In addition to describing the three feedback questions with which students may navigate the “gap” between present performance and aspirations, we (Hattie & Timperley, 2007) classified feedback in terms of four levels and noted the interaction of these levels of feedback with the nature of the tasks.

Task or product.

First, feedback can be about the *task or product* (i.e., learning new knowledge, learning to conduct an experiment) In this case feedback is powerful if it is more information focused (e.g., correct or incorrect), leads to acquiring more or different information, and builds more surface knowledge. This type of feedback is most common and most students see feedback in these terms. It is often termed corrective

feedback or knowledge of results. It is constantly given in classrooms via teacher questions (as most are at this information level), it is most provided in comments on assignments, it is often specific and not generalizable, and it can be powerful particularly when the learner is a novice. Most feedback to a whole class is of this task type, and most individuals do not consider such feedback as pertinent to them, so it can be given by the teacher and not received by the student. Having correct information, however, is a pedestal on which processing (level 2) and self-regulation (level 3) can be effectively built.

Processes

The second level is feedback aimed at the *processes* used to create the product or complete the task. Such feedback can lead to alternative processing, reduction of cognitive load, providing strategies for error detection, reassessment of approach, cueing to seek more effective information search, and employment of task strategies. Feedback at this process level appears to be more effective than at the task level for enhancing deeper learning, and there can have a powerful interactive effect between feedback aimed at improving the strategies and processes and feedback aimed at the more surface task information. The latter can assist in improving task confidence and self-efficacy, which in turn provides resources for more effective and innovative information and strategy searching. For example, Chan (2006) induced a failure situation and then found that feedback was more likely to enhance self-efficacy when it was formative rather than summative and self-referenced rather than comparative to other peers' feedback.

Self-regulation

The third level is more focused at the *self-regulation* level or the student's monitoring of their learning processes. Feedback at this level can enhance students' skills in self-evaluation, provide greater confidence to engage further on the task, can assist in the student seeking and accepting feedback, and can enhance the willingness to invest effort into seeking and dealing with feedback information. When students can monitor and self-regulate their learning they can more effectively use feedback to reduce discrepancies between where they are in their learning and the desired outcomes or successes of their learning.

The self

The fourth level is *feedback directed to the “self”* (e.g., “You are a great student,” “Well done”) and so often it **directs attention away from the task, processes or self-regulation**. Such praise can comfort and support, is ever-present in many classrooms, is welcomed and expected by students, but rarely does it enhance achievement or learning. When Kessels, Warner, Holle, and Hannover (2008) provided students with feedback with and without the addition of claims such as that the teachers were proud of them, this led to lower engagement and effort when the statements of pride were made. Hyland and Hyland (2006) noted that almost half of teachers’ feedback was praise, and premature and gratuitous praise can confuse students and discourage revisions. Most often, teachers used praise to mitigate critical comments, which indeed dilutes the positive effect of such comments. Praise usually contains little task-related information and is rarely converted into more engagement, commitment to the learning goals, enhanced self-efficacy, or understanding about the task. By incorporating self with other forms of feedback, the information is often diluted, uninformative about performance on the task, and provides little assistance to answering the three feedback questions (see Douglas & Skipper, this volume, for a review of the ineffectiveness of praise).

The first three feedback levels form a progression. The hypothesis is that it is optimal to provide appropriate feedback at or one level above where the student is currently functioning and to clearly distinguish between feedback at the first three and the fourth (self) level. **Feedback at the self level can interact negatively with attainment as it focuses more on the person than the proficiencies.**

Mediators of feedback and achievement.

As well as the three feedback questions and the four levels of feedback, there are other variables that can impact on the effects of feedback on achievement. These are detailed below:

1. *Giving is not receiving.* Teachers may claim they give much feedback, but the more appropriate measure is the nature of feedback received (and this is often quite little). Most teacher feedback is presented to groups and so often students believe that such class feedback is not about them – hence the dissipation of provided feedback. Carless (2006) also has shown that teachers consider their feedback far more valuable than the students who receive it. Students often find teachers’ feedback confusing, non-reasoned, and difficult to understand. Sometimes they think they have understood the teacher’s feedback when they have not, and even when they do understand it they may not know how to use it. Higgins, Hartley, and Skelton (2001) argued that “Many students are simply unable to understand feedback comments and interpret them correctly” (p. 270).

2. *The culture of the student can influence the feedback effects.* Feedback is not only differentially given but also differentially received. For example, Luque and Sommer (2000) found that students from collectivist cultures (e.g., Confucian based Asia, South Pacific Nations) preferred indirect and implicit feedback, more group-focused feedback and no self-level feedback. Students from individualist/Socratic cultures (e.g., USA) preferred more direct feedback particularly related to effort, were more likely to use direct inquiry to seek feedback, and preferred more individual focused self-related feedback. Kung (2008) found that while both individualistic and collectivist students sought feedback to reduce uncertainty, collectivist students were more likely to welcome self-criticism “for the good of the collective” and more likely to seek developmental feedback, whereas individualistic students avoided such feedback to protect their ego. Individualistic students were more likely to engage in self-helping strategies, as they aim to gain status and achieve outcomes (Brutus & Greguras, 2008). Hyland and Hyland (2006) argued that students from cultures where teachers are highly directive generally welcome feedback, expect teachers to notice and comment on their errors, and feel resentful when they do not.

3. *Disconfirmation is more powerful than confirmation.* Confirmation is related to feedback that confirms a student’s preconceptions of hypotheses, independently of whether the feedback is appropriate

or accurate. Disconfirmation is related to feedback that corrects an erroneous idea or assumption or that provides information that goes against current expectations (see Nickerson, 1998). Students often seek confirmation evidence by, for example, seeking feedback that confirms their current beliefs or understandings, and disregard feedback contrary to their prior beliefs. When feedback is provided that disconfirms then there can be greater change, provided it is accepted.

These notions should not be confused with negative and positive feedback, as disconfirmation can be positive and confirmation negative (e.g., confirming a negative attribution). **Feedback is most powerful when it addresses faulty interpretations and not total lack of understanding** (when re-teaching is often most effective). In this latter circumstance feedback may even be threatening to the student. For example, “If the material studied is unfamiliar or abstruse, providing feedback should have little effect on criterion performance, since there is no way to relate the new information to what is already known” (Kulhavy, 1977, p. 220). Disconfirmation feedback can improve retrieval performance (at the task level) when learners receive feedback on incorrect answers, but not when they receive feedback on correct answers (Kang, McDermott, & Roediger, 2007). In similar research, Peeck, van den Bosch, and Kreupeling (1985) found that feedback improved performance from 20% to 56% correct on initially-incorrect answers, but made little difference for correct answers (88% with no feedback and 89% with feedback).

4. *Errors need to be welcomed.* **Feedback is most effective when students do not have proficiency or mastery and thus it thrives when there is error or incomplete knowing and understanding.** Often there is little information value in providing task level feedback when the student is mastering the content. This means that classroom climates should involve minimum peer reactivity to not knowing or acknowledgement of errors, and when there is low personal risk involved in responding publicly and failing (Nuthall, 2007). Too often, students only respond when they are fairly sure that they can respond correctly, which often indicates they have already learned the answer to the question being asked or are fearful of their peers’ reactions. Heimbeck, Frese, Sonnentag and Keith (2003) noted the paucity of research on errors, and they recommended that rather than being error-avoidant, error training that

increases the exposure to errors in a safe environment can lead to higher performance. Such an environment requires high levels of self-regulation or safety (e.g., explicit instruction that emphasizes the positive function of errors) and it is necessary to deal primarily with errors as potentially avoidable deviations from goals.

5. *The power of peers.* Nuthall (2007) has conducted extensive in-class observations and noted that 80% of verbal feedback comes from peers and most of this feedback information is incorrect! Teachers who do not acknowledge the importance of peer feedback, and whether it is enhancing or not, can be most handicapped in their effects on students. Interventions that aim to foster correct peer feedback are needed particularly as many teachers seem reluctant to so involve peers as agents of feedback. **Receiving feedback from peers can lead to positive affect relating to reputation as a good learner, success, and reduction of uncertainty, but it can also lead to negative affect in terms of reputation as a poor learner, shame, dependence, and devaluation of worth** (Harelli & Hess, 2008). If there are positive affiliative relations between peers, the feedback (particularly critical feedback) is more likely to be considered constructive and less hurtful (Bradbury & Fincham, 1990).

6. *Feedback from assessment.* Assessment needs not only provide feedback to students about their learning, but could and should also provide feedback to teachers about their methods. Hattie (2009) has argued that this function of feedback is very powerful when assessment feedback is oriented to the teacher about who and what they have taught well/not well, the strengths and gaps of their teaching, and when it provides information about the three feedback questions. As teachers derive feedback information from assessments they set their students, then there can be important adjustments to how they teach, how they consider what success looks like, how they recognize students' strengths and gaps, and how they regard their own effects on students. **The essence of such formative assessment is providing teachers feedback from assessments about how they need to modify their teaching, and providing students with feedback so that they can learn how to self-regulate and be motivated to engage in further learning.** This is more

effective than when assessment is aimed to the students, who typically can estimate their performance before completing the assessments and thus often receive minimal feedback from assessments (Hattie, 2009). Teachers too often see assessment feedback as making statements about students and not about their teaching and hence the benefits of feedback from such testing are often diluted.

7. *There are many strategies to maximize the power of feedback.* While students, especially in higher education, are becoming even more disheartened with the amount and value of feedback they are receiving, there are ways to readdress this situation. Shute (2008) provided nine guidelines for using feedback to enhance learning: focus feedback on the task not the learner, provide elaborated feedback (describing the what, how, why), present elaborated feedback in manageable units (e.g., avoid cognitive overload), be specific and clear with feedback messages, keep feedback as simple as possible but no simpler (based on learner needs and instructional constraints), reduce uncertainty between performance and goals (i.e., helping the student to see where they are now relative to success on a task), give unbiased, objective feedback, written or via computer (more trustworthy sources are more likely to be received), promote a learning goal orientation via feedback (move focus from performance to the learning, welcome errors), and provide feedback after learners have attempted a solution (leading to more self-regulation). She also noted interactions with the level of student achievement: it may be optimal to use immediate, directive or corrective, scaffolded feedback for low-achieving students, and delayed, facilitative, and verification feedback for high-achieving students.

Conclusions

There is a lot known about feedback, but there is much more to know about how to optimize its powers in the classroom. Given the high levels of variability in the effectiveness of feedback, more research is needed on how to ensure feedback is given so that it is appropriately received, and there are few instruments that assess the frequency, types, and impact of feedback in classrooms. There are a number of conditions necessary for feedback to be received and have a positive effect. There needs to be transparent

and challenging goals (learning intentions), and an understanding of a student's current status relative to these goals. It is best if the criteria of success are transparent and understood, and that the student has commitment and skills in investing and implementing strategies as well as understandings relative to these goals and success criteria. However, models of feedback also need to consider its multidimensional nature. It has dimensions of focus (e.g., the three feedback questions), impact (e.g., the four feedback levels), propensity (e.g., the cultural and personality dispositions of the receiver), and types (see Shute, 2008). There is a need to know much more about how students set academic goals and how teachers and students set targets for learning as these can then enhance and increase the value of feedback towards these goals and targets. The notion of "personal bests," challenge, commitment, progress feedback, and student assessment capabilities (Absolum et al., 2009) are central to the effects of feedback; as are understandings about the various feedback strategies and different types and functions of feedback.

We have identified a number of mediators of feedback and achievement including the distinction between focusing on giving or receiving feedback, how the culture of the student can mediate the feedback effects, the importance of disconfirmation as well as confirmation, and the necessity for the climate of the learning to encourage "errors" and entice students to acknowledge misunderstanding and particularly the power of peers in this process. When assessments (tests, questions etc.) are considered as a form of gaining feedback then there are greater gains than when assessment is seen as more about informing students of their current status.

Indeed, there is an exciting future for research on feedback. It is becoming well understood that feedback is critical to raising achievement. In this light, the paucity of feedback in the classroom, at least in the sense of feedback that is received and understood by students, is an important conundrum. Research setting out to solve this conundrum could benefit from moving beyond descriptions of types of feedback. Research should set out to discover not only how to embed feedback in instruction but also to assist students to seek feedback, evaluate feedback (especially when provided by peers or the internet), and to use it in their learning. This may require a move from talking less about how we teach to more about how we learn; less about reflective teaching and more about reflective learning; and more research about how

to embed feedback into the learning processes. It probably requires better understanding of classroom dynamics, and providing other ways for teachers to see learning than merely through the eyes and reflection. This is especially the case given that Nuthall (2007) showed that about 70% of what happens in a classroom a teacher does not see or hear.

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