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Which Type of Feedback is Effective When

The Basics

This article is about the different types of feedback and how effective each is, and for what purposes. It is based on meta-analyses of educational research by John Hattie and Helen Timperley. All page references in this document refer to that meta-analysis, referenced at the end of this article.

The Basics section is an abridged, "just the facts" portrayal of the salient findings. Details follow in their own section.

Note: feedback is the second thing. Effective instruction is the first. Having the second without the first renders it ineffective.

Types of Feedback

FT: Feedback about the **T**ask: correct/incorrect and instructions for improvement. A key issue is how much detail to provide vs. suggestions and strategies. See the Matrix below.

FP: Feedback about the problem solving or task completion **P**rocess.

FR: Feedback that helps build student capacity to be disciplined, focused, interpret information to provide one's own feedback. (the R is for "self-**R**egulation.") Also part of FR is to build motivation and commitment to the task, and confidence in one's abilities (see *self-efficacy*, below).

FS: Feedback about the **S**elf, such as praise aimed at self-esteem: "You're a good student." "You are intelligent."

Instead of stroking self-esteem, or feeling good about yourself, we want to increase student *self-efficacy*: the feeling of wellbeing and confidence that comes from accomplishment.

The 3 Feedback Questions to Consider

1. Where am I going? (goals)
2. How am I doing? (progress)
3. Where to next? (to more complex and interesting challenges, not just "more.")

Goals are typically considered to be the learning outcomes or learning objectives that describe observable, measurable actions resulting from the application of concepts to tasks (assignments and assessments). Outcomes typically have performance criteria that specify the standard to which tasks are performed.

However, it need not be as top-down and rigidly structured as that. Also, outcomes often lack detailed task performance criteria. Goals may not be clear at the outset, and may emerge as clarified during the process of applying feedback. Students may have their own goals in addition to the instructional goals.

The Matrix

<table>
<tr><th colspan="3">Where am I going? (goals)</th><th colspan="2">How am I doing? (progress)</th><th colspan="2">Where to next? (desired challenges)</th></tr>
<tr><td rowspan="4">FT</td><td>FT is about Identifying correct and incorrect work (gap between goal and performance)</td><td>FT works best with low complexity tasks. FT involves mostly surface learning. Helps build confidence and self-efficacy, though.</td><td rowspan="3">→→</td><td colspan="2">High complexity tasks benefit more from process (FP) or “self-regulation” (developing problem-solving strategies) type feedback (FR): the “whys” and “hows.”</td><td rowspan="3" colspan="2"></td></tr>
<tr><td colspan="2">Immediate error correction feedback for low complexity tasks is good. (Delay is bad.)

Both positive and negative feedback is effective for FT.</td><td colspan="2">Immediate error correction for high complexity tasks is bad, because it interferes with the extra processing time needed to figure out how to complete the task (interferes with “automaticity” and “fluency building”).</td></tr>
<tr><td colspan="2">Effective if information on how to correct is provided (fb related to criterial for success)</td><td colspan="2">FP and FS are better for deeper learning.</td></tr>
<tr><td colspan="2">For FT, negative feedback (“disconfirmation feedback”) with corrective information is effective but only if the student has enough knowledge to use the corrective information. Negative feedback without corrective information is not effective.</td><td>FP</td><td>FP is about deeper understanding (the construction of meaning): relationships between pieces of knowledge, cognitive processes, development of principles that can be applied to more complex or different tasks (p. 93).</td><td colspan="2"></td></tr>
<tr><td colspan="2">Too much specific information breeds dependence and learned helplessness rather than helping students become self-managing learners.</td><td colspan="2">A major FP tool for students is error detection ability. It enables students to provide feedback to themselves. Errors may indicate a need to re-strategize, use different strategies,</td><td>FR</td><td>FR addresses the way students monitor, direct and regulate actions toward the learning goal. The aim is autonomy, self-control, self-direction and self-discipline</td></tr>
</table>

Where am I going? (goals)	How am I doing? (progress)	Where to next? (desired challenges)
	determine how to better use existing strategies, and to seek help.	
A combination of specifics and directions on where to find corrective information (more, different, or correct information) is best, with less of the former and more of the latter over time.	Whether error detection leads to seeking information to correct the error depends on motivation: how likely it is that further effort/modifying plans would help bridge the gap between current performance and the goal and result in success in meeting the goal.	Goals are more effective if students are committed to them. Receiving timely feedback specific to them is motivating and engenders more commitment. Student commitment to academic goals is not automatic and needs to be nurtured.
Provide information that helps student clarify the goal so they can fully see the gap and determine what is needed to bridge it.	FP Ex., "Make the communication fit the audience by editing the descriptors you have used so the reader is able to understand the nuances of your meaning" (p. 90).	Commitment can also be enhanced by authority figures, peers, competition, role models, public statements about intentions, incentives and rewards, punishment, value placed on the reward of achieving an outcome, and belief that the reward will be received if the goal is met.
Lead students to FP and FR over time.		For **FR**, positive feedback is effective for tasks students want to do because it helps motivate them.
FT Ex., "You need to include more detail about how micromutations are different from macromutations."		Positive feedback *decreases* motivation for those same "want to do" tasks.
FT is most powerful when the information is about correcting misconceptions, rather than lack of information.		*Negative* feedback is more effective for tasks students "have to do" (tasks they are "not committed to").
FT for group work is confounded by individual students' perceptions of what applies to them and what applies to others in the group.		FR Ex., "You already know the features of the opening of an argument. Check to see whether you have incorporated them into your first paragraph" (p. 90).

Where am I going? (goals)		How am I doing? (progress)	Where to next? (desired challenges)
	FS	Remarks about the personal qualities of the student with respect to learning.	
		When combined with any of the other types, it dilutes their effectiveness because it focuses on the self, and not self-efficacy.	
Too much feedback of any one type passes a law of diminishing returns in terms of effectiveness. Better to start with task-focused specifics but, after a few, to suggest processes or strategies they could try, and sources of information they should find.			

Should you provide a grade with feedback comments? No, grades act as a disincentive for students to pay attention to feedback (p. 92).

Details

"Feedback is information with which a learner can confirm, add to, overwrite, tune, or restructure information in memory, whether that information is domain knowledge, meta-cognitive knowledge, beliefs about self and tasks, or cognitive tactics and strategies" p. 82.

Feedback can be affective domain (increased effort, motivation, engagement) or cognitive (conformation of correctness, restructuring understandings, suggesting lines of action students should pursue, indicating information that is missing and available, indicating alternative strategies).

Feedback works best when it addresses faulty interpretations rather than total lack of understanding.

The main purpose of feedback is to reduce discrepancies between current understandings or performance and a goal. Effective feedback must provide useful answers to these three questions:

1. Where am I going? (goals)
2. How am I doing? (progress)
3. Where to next? (hopefully more interesting challenges, rather than "more of the same.")

Where am I going?

Goals promote self-directed action, a general ability we want students to develop.

Challenging goals inform students of the type or level of performance, so they can evaluate their actions and effort. Feedback gives them information by which they can set reasonable goals and track their attainment of them, so they can adjust effort, direction and strategy as needed.

The relationship between feedback and the goal (learning outcome(s)) is complex:

- If feedback doesn't lead to reducing the gap between current and intended understanding or performance, students are likely to close the gap by other means such as overstating their current progress, reinterpreting the goal to lessen the criteria of the desired outcome, or "claiming various attributions that reduce effort and engagement" (p. 89).
- If the goal is poorly defined, students will not see a gap that needs reducing.
- If the feedback is unrelated to the criteria for success, it will be ineffective. (for example, focusing mostly on superficial characteristics such as formatting, presentation style, quantity vs. quality, spelling…(unless one or more of these items are critically related to the learning outcome)).

Goals are more effective if students are committed to them. Receiving timely feedback specific to them is motivating and engenders more commitment. Student commitment to academic goals is not automatic and needs to be nurtured. A recent survey of UPEI and University of Alberta (Stacey Mackinnon UPEI) showed that 66% of students would switch programs or leave university if they didn't need it for a job. So, we can't assume most students are automatically interested in the course material they have signed up to take.

Commitment can also be enhanced by authority figures, peers, competition, role models, public statements about intentions, incentives and rewards, punishment and "general valence and

instrumentality" (p. 89). (Valence is the value a person places on the reward of achieving an outcome, and instrumentality is belief that the reward will be received if the goal is met.)

How Am I Doing?

This involves feedback on progress—how the student is doing in comparison with the expected standard, either overall or for part of the performance. This type of feedback is effective if it provides information about progress and/or how to proceed. Too often the majority of feedback is from tests, but often fail to provide feedback information that helps because they typically give only correct/incorrect answer information and marks.

Where to Next?

The thing to avoid is "more of the same." It is better if "next steps" involve enhanced challenges, more development of student ability to provide self-feedback, additional or better strategies or processes in working on tasks, deeper understanding, and more information about what is understood and not understood. Think of it as "feedforward" rather than "feedback." Think of key questions as being integrated in every assignment event, rather than separate items faced sequentially.

Four Types of Feedback

First: Task or Product Feedback (FT): information about whether student work is correct or incorrect. It may include instructions about acquiring more, different, or correct information. Ex., "You need to include more detail about how micromutations are different from macromutations."

Second: Process Feedback (FP): instructions about processing information, or the processes requiring understanding or for completing the task. Ex., "Make the communication fit the audience by editing the descriptors you have used so the reader is able to understand the nuances of your meaning."

Third: Student Self-Regulation Feedback (FR): instructions on how to develop greater skill in self-evaluation or confidence for further engagement in the task. Ex., "You already know the features of the opening of an argument. Check to see whether you have incorporated them into your first paragraph" (p. 90). This kind of information increases self-efficacy and beliefs about students as learners.

Fourth: Personal Feedback focused on the Self (FS): information about the personal qualities of the student with respect to learning. Ex., "That is a well-balanced and nuanced argument that has all the relevant information." The danger is that this may descend into boosterish, general comments, such as "Good job!" or "You are a great student." This information is not helpful for improved student self-feedback and self-regulation (becoming a self-managing learner), and appeals to self-esteem instead of self-efficacy (the sense of accomplishment and competence that comes from successful achievement).

Tips on Effectiveness

FS is least effective. FT is helpful in improving FP and FR. Combining FT with FS dilutes the effectiveness of FT. FT is most powerful when the information is about correcting misconceptions, rather than lack of information. Too much FT may interfere with students seeing the bigger picture/underlying principles and strategies.

Most feedback instructors give is about the task, which is a good start, and is the foundation on which feedback about process and feedback that helps students develop self-feedback skills (self-regulation) in

built, but it often fails to go there, and is often unintentionally diluted by feedback that is focused on the self: "Correct, good job." One of the problems with task-focused feedback is that it is not generalizable to other tasks, and keeps students dependent on it in order to keep functioning. Task-focused feedback that links to problem-solving processes and strategies is the most helpful for students becoming self-managing learners (p. 91).

Too much feedback of any one type passes a law of diminishing returns. Better to start with task-focused specifics but, after a few, to suggest processes or strategies they could try, and sources of information they should find. "It is likely that feedback at this task level is most beneficial when it helps students reject erroneous hypotheses and provides cues as to directions for searching and strategizing. Such cues can sensitize students to the competence or strategy information in a task or situation" (pp. 91-92).

More About Feedback on the Task

FT has many dimensions, each with different requirements and effect:

- Low to high complexity
- Individual or group performance
- Written or numeric notations.

FT works best with low complexity (high complexity tasks benefit more from process or "self-regulation" (developing problem-solving strategies) type feedback: the "whys" and "hows". Providing reasons for work being right or wrong at low levels of task complexity may unintentionally reinforce incorrect answers (due to the use of scarce cognitive resources needed for cognitive processing of the information) or be viewed by the student as unrelated to their goal of getting a correct answer, and thus ignored ("processed at a surface level").

"Students, too often, view feedback as the responsibility of someone else, usually teachers, whose job it is to provide feedback information by deciding for the students how well they are doing, what the goals are, and what to do next" (p. 101).

FT and Group Work

Task-focused feedback provided to group work can be confounded by lack of clarity about what pertains to an individual student. A student may erroneously think a piece of task feedback pertains to her or him when it doesn't, or that it pertains to other people but not her or him when, in fact, it does. Students' commitment and involvement in the task and their notions of how feedback pertains to their own individual performance affect the effectiveness of group task feedback.

Should a Grade be Provided with the Feedback?

Also, which is better, a mark or written comments? Turns out comments can improve performance better than grades, but grades (or a combination of grades and marks) improve involvement but not performance (p. 92).

More About Feedback on Process

FP is better to facilitate deeper learning. FT is about surface learning: the acquisition, storing, reproduction and use of knowledge. FP is about deeper understanding (the construction of meaning):

relationships between pieces of knowledge, cognitive processes, development of principles that can be applied to more complex or different tasks (p. 93).

A major FP tool for students is error detection ability. It enables students to provide feedback to themselves. Errors may indicate a need to re-strategize, use different strategies, determine how to better use existing strategies, and to seek help. Whether error detection leads to seeking information to correct the error depends on motivation: how likely it is that further effort/modifying plans would help bridge the gap between current performance and the goal and result in success in meeting the goal.

More About Feedback That Focuses on Self-Regulation

"Students, too often, view feedback as the responsibility of someone else, usually teachers, whose job it is to provide feedback information by deciding for the students how well they are doing, what the goals are, and what to do next" (p. 101).

For FR, feedback that helps student self-regulation (the interplay between commitment, control and confidence in the correctness of one's answers, that addresses the way students monitor, direct and regulate actions toward the learning goal), the aim is autonomy, self-control, self-direction and self-discipline (p. 94).

Monitoring one's own task behaviour creates internal feedback ("idiosyncratic cognitive routines"). Self-assessment is a powerful tool to select and interpret information in ways that provide feedback. Self-assessment includes self-appraisal and self-management. Self-appraisal is ability to review and evaluate one's abilities, knowledge, and cognitive strategies. Self-management is monitoring and regulating one's ongoing behaviour through planning, correcting mistakes, and using fix-up strategies (p. 94). When students have these metacognitive skills, they can evaluate their levels of understanding, their effort and strategies; their opinions of others about their performance, and their improvement in relation to their goals and expectations. Most important, they know how and when to ask for feedback from others.

Student self-assessment also includes an assessment of transaction costs: the scope of effort, effect on oneself of the evaluations of others ("face costs"—saving face in light of the judgment of others), and "inference costs" (the cost of possible misinterpretations of feedback) on the one hand, balanced against the benefit of reducing the gap between current and expected performance (94). Often the offsetting benefit is increased by a natural desire to seek feedback, regardless of whether it has any impact on performance (p. 95).

Seeking help is a learner proficiency. Instrumental feedback (hints) helps build self-regulation. Executive feedback (answers or shortcuts) caters to the task level, sometimes the processing level (p. 96) and subverts performance in the long run.

Confidence and Self-Efficacy

Feedback is most effective when a student expects an answer to be correct but it isn't (a "high confidence error"). They study the feedback longer to correct their misconception (p. 95). (They "integrate new information into existing knowledge structures.") Conversely, if a student didn't expect an answer to be correct (a "low confidence error"), feedback is likely to be ignored. Even if it is correct in this low confidence situation, the feedback is still likely to be less effective, if not ignored outright.

Feelings of self-efficacy are important for feedback to have impact because self-efficacy (the sense of wellbeing that comes from successful accomplishment) initiates self-regulation so that commitment to the task and investment in effort is increased (p. 95).

Student attitudes about success and failure can have more impact than the reality. If students are unable to relate the feedback to the cause of their poor performance, then that damages feelings of self-efficacy and leads to poor performance (p. 95). Also, undeserved success feedback increases outcome uncertainty and can also lead to poor performance because it engenders self-handicapping strategies (since they don't know what the reward was for) (p. 85).

For high self-efficacy students, feedback about initial success is effective because it signifies talent or ability, which in turn improves coping in the face of later negative feedback. For low efficacy students, however, feedback about initial success may make them risk-averse (reduces their motivation), because additional challenges run the risk of bringing them an unfavorable outcome (p.99).

When to Emphasize Effort

Feedback that attributes performance to effort or ability increases engagement and task performance IF provided over an extended period. During the early stages of task accomplishment, effort feedback works best when more effort is needed (p. 95). As skills develop, ability feedback is better (p. 96). Care is needed, however: ability feedback may reinforce a performance-oriented mindset rather than a learning-oriented one. The former results in poorer performance after failure and less enjoyment of the task (p. 96).

Increasing effort works when:

- It leads to more challenging and interesting tasks
- The goal is clear (specific rather than general; includes success criteria)
- "High commitment is secured for it" (p. 86): instructors can help motivate by providing challenging tasks and extensive feedback lead to greater student engagement and higher achievement (p. 88).
- Students believe they will succeed

Immediate vs. Delated Feedback

Immediate error correction feedback for low complexity tasks is effective. (Delay reduces the value of feedback.) Immediate error correction for high complexity tasks is ineffective, because it interferes with the extra processing time needed to figure out how to complete the task (interferes with automaticity and fluency building) (p. 98).

Positive and Negative Feedback

Negative feedback ("disconfirmation feedback") is better than positive for FS. Positive and negative feedback is effective for FT (p. 98).

For FR, positive feedback is effective for tasks students want to do because it helps motivate them. Positive feedback decreases motivation for those same "want to do" tasks. So negative feedback is more effective for tasks students "have to do" (tasks they are "not committed to") (p. 99).

For FT, negative feedback ("disconfirmation feedback") with corrective information is effective but only if the student has enough knowledge to use the corrective information. Negative feedback without corrective information is not effective (p. 100).

The Bigger Picture

Feedback is what happens second. Effective instruction needs to happen first (p. 100). There is generally too little feedback provided, and too much of that which is provided focuses on the self (which is generally ineffective) or the task (which, if it includes corrective information, is good in the short term but can lead to learned helplessness in the long term if no feedback about process or self-regulation (motivation, attitudes, focus, discipline, strategic thinking) is provided) (p. 100).

"With inefficient learners, it is better for a teacher to provide elaborations through instruction than to provide feedback on poorly understood concepts" (p. 104).

Feedback is differently received. Individualist cultures prefer direct, individual, self-related feedback related to effort. Collectivist cultures prefer indirect, implicit feedback that is group-focused, and no self-level feedback.

Goals may not be clear at the outset but rather discovered as students grapple with the task (p. 103).

"To be effective, feedback needs to be clear, purposeful, meaningful, and compatible with students' prior knowledge and to provide logical connections. It also needs to prompt active information processing on the part of learners, have low task complexity, relate to specific and clear goals, and provide little threat to the person at the self level. The major discriminator is whether it is clearly directed to the task, processes, and/or regulation and not to the self level. **These conditions highlight the importance of classroom climates that foster peer and self-assessment and allow for learning from mistakes**" (p. 104).

Assessments need to be about providing information students can use to address the 3 questions, rather than a snapshot of learning at a particular time (p. 104).

Reference:

Hattie, J. & Timperley, H. (2007). The Power of Feedback. *Review of Educational Research, 77*(81). DOI: 10.3102/003465430298487

The online version of this article can be found at: http://rer.sagepub.com/content/77/1/81

MacKinnon, S. L. (2016). "The Curiosity Project": Re-igniting the Desire to Inquire Through Intrinsically-Motivated Learning and Mentorship. *Journal of Transformative Learning, 4(1).* (To obtain details on the survey mentioned above, I suggest you contact the author directly. The survey results were mentioned in a presentation about the subject of this article.)