Hi everyone. I’m Val Shute, and today I’d like to talk to you about formative feedback. Let me first provide some context for this topic choice. For many years, I’ve been longing to wrap my neurons around the slippery concept of feedback and all of its conflicting aspects – such as: what do you say, how do you say it, how much do you say, when do you say it, and under what conditions. So, finally last year I got the opportunity to carve out a little bit of time, and I started reading, and reading, and reading, and just about when my head was about to explode, I started writing. I’ve brought along some copies of the large literature review I wrote, and also some copies of my slides, so please help yourselves. Now, what I’d like to do is pluck out some of the more interesting feedback bits from the larger review and share them with you today.

In really broad brushstrokes, feedback has been acknowledged as one of the most instructionally powerful features in instructional design, and it’s still very relevant today. There’s been thousands of research topics published on the topic of feedback, going back to classic work by Thorndike on feedback and behavior in the early 1900s. But the problem is, within this vast body of research, there are many, many conflicting findings and no consistent pattern of results.

To constrain the topic, I’m just going to talk about task-level formative feedback today, as opposed to summary feedback which is more general and usually appears as a single score. As you can see in the slide, task-level feedback provides specific and timely information to the student about a particular response to a task. More sophisticated types of feedback may also take into account the student’s current understanding and ability level and adapt the message accordingly. One of the most important features of formative feedback is that it can signal a gap between a current level and desired level of performance or goal. Resolving this gap can motivate higher levels of effort as uncertainty is usually unpleasant and may be distracting. Another important feature is that it can also effectively reduce the cognitive load of a learner, especially novice or struggling students. Support for this claim by Sweller et al. shows how the presentation of worked examples reduces the cognitive load for low-ability students faced with a complex problem solving task. Finally, feedback can provide useful information that can help correct inappropriate strategies, procedural errors, or misconceptions.

So, what is formative feedback? As you can see on the left—this is your brain; and on the right—this is your brain on formative feedback. Obviously, formative feedback possesses some pretty amazing properties. But seriously, the simple definition of formative feedback that I crafted in the literature review is: “information communicated to the
learner intended to modify the learner’s thinking or behavior for the purpose of improving learning.” And like Baskin Robbins, it comes in a wide variety of types, such as verification of response accuracy, explanation of correct answer, hints, etc. In addition, there are various times at which you can administer feedback, such as immediately after an answer, or after some delay has occurred. Finally, formative feedback often interacts with other variables to differentially affect learning (e.g., learner characteristics, aspects of the task). The remainder of my presentation will touch on issues of type of feedback, timing of feedback, and some interactions involving feedback. I’ll conclude with some guidelines for formative feedback distilled from my big review, in terms of “What to do” and “What to avoid.”

One mega-problem I encountered in my research was that different studies used different terms for different types of feedback. This motivated me to create a taxonomy of feedback types that I intended to standardize terms and allow for comparisons across studies. The following list is loosely arrayed, from least to most complex information present in the feedback. Starting at the top, you have verification feedback—that’s just telling a student if they are correct or incorrect. Increasing along the complexity dimension, we get to more elaborated feedback that attempts to explain why a student’s response was incorrect, and may allow the learner to review part of the instruction. It may or may not present the correct answer. Now, elaborated feedback has its own little mini-taxonomy associated with it. The next slide shows six types of elaborated feedback.

One of these elaborated feedback types is “topic contingent.” That’s where information is given that addresses the target topic, and often involves simply re-teaching the material. A more complex kind of elaborated feedback addresses inferred errors and misconceptions – what is wrong and why. This type of feedback requires upfront (and often costly) analyses, such as cognitive task (or error) analysis.

So based on the taxonomy of feedback types, it may be reasonable to assume that richer, more informative feedback – containing detailed information about task performance -- will enhance student learning… but that’s not the case. This slide shows the results of several studies comparing more complex feedback (bugs/misconceptions) with simpler feedback (topic-contingent). On the left, we see findings showing a positive effect of complex feedback over simpler feedback. In the middle we see another set of studies showing the two feedback conditions as comparable, and on the right, another study shows an inverse relationship between feedback complexity and learning. These inconclusive findings suggest there may be other mediating factors involved in the relationship between formative feedback and learning. We’ll explore the interaction-issue in a minute.
Now just to touch on timing for a bit, I found this lovely quote by Helen Keller, who is talking about her teacher, Annie Sullivan. I think it nicely highlights the timing variable in feedback. “It was because she seized the right moment to impart knowledge that made it so pleasant and acceptable to me.” So the key, of course, is finding the right moment. However, the timing literature, as with the feedback type literature, is filled with conflicting findings, usually examining issues of immediate feedback versus delayed feedback. One thing that can account for some of these inconsistencies is that the timing of feedback can actually exert positive and negative effects on learning. That is, with delayed feedback, a positive effect could be that it actually encourages users to engage in more cognitive and metacognitive processes. But on the downside, delaying feedback for struggling or novice learners can be very frustrating and possibly detrimental to learners, so what you see is kind of canceling out of effects. The same logic holds for immediate feedback.

With regard to interactions involving feedback and learning variables, after all the reading I did on the topic, I believe that it’s really important that the type and timing of the feedback message is conditioned on instructional considerations. That is, the type and timing of the feedback message should be driven by considerations of instructional goals and task characteristics, as well as learner characteristics to maximize the informative value of the feedback. Speaking of timing--is anyone timing this talk because I’m not timing myself? <She wants immediate feedback. (laughter)>. Anyway, I’ll now briefly present two studies that take a closer look at some of these interactions.

In Kluger & DiNisi’s classic paper on feedback (which everyone should read if you’re interested in the topic), they examined more than 600 feedback studies and their associated effect sizes, spanning several decades of research. The basic premise of their theory is that feedback that focuses the learner on the task (and not on one’s “self”) promotes learning. This is echoed in the quote by Einstein. In this slide we see different feedback features on the left that significantly exert positive effects on learning such as clarifying goals and providing frequent messages. The negative effects include variables such as giving praise and messages that are threats to self esteem. I think what surprised me the most was that in 1/3 of the 600 cases they reviewed, feedback interventions actually reduced performance. The authors also discuss feedback interventions interacting with task features to exert positive and negative effects on learning. And finally, they note that feedback interventions should be seen as double-edged swords—where great care should be taken to know which interventions increase performance, and under which particular conditions.
The other study that I wanted to show you today summarizes feedback research and provides a prescriptive framework. This is the work done by Mason and Bruning who reviewed the literature on feedback delivered via computer-based instructional systems. Their model suggests the proper type and timing of feedback to give in relation to: (a) student achievement level, (b) task complexity, and (c) the learner’s prior knowledge in the area. The very general recommendation is to provide immediate feedback for students with low achievement levels; and delayed feedback for students with high achievement levels, especially for complex tasks.

In general, studies find that feedback generally improves learning compared to control conditions, but there are still major gaps, especially in relation to interactions among task and instruction variables, and student characteristics. I think there are probably a number of PhD theses embodied in that paragraph there. And while there’s no simple answer to ‘what feedback works?’ we can at least make some preliminary guidelines...at least I did at the end of my formative feedback literature review.

The paper I wrote contains four separate tables summarizing feedback in terms of things to do, things to avoid, and some prescriptions for timing and learner characteristics. A lot of these may seem real common-sensical, but there’s a big difference between acknowledging the fact that these are good things to do and actually implementing them in the classroom. For example, focus feedback on the task, not the learner. That’s something that came through in my reading of many articles. Also reduce uncertainty between the student’s current performance and the particular learning goals.

As far as things to avoid, do not give normative comparisons, and be cautious about providing overall grades. This also makes sense and is derived from the seminal work done on the topic by Dylan Wiliam.

For example, he recently wrote a really good article where he summarized the following fascinating finding: (a) students receiving just a grade showed no learning gains, (b) those who received just comments about their work showed large gains, and (c) those who received both grades and comments showed no gains. This is likely due to the student focusing on the grades and ignoring the comment. In fact, in an anecdote that he shares, a teacher passes back the test to her class of 30 students with a grade and some comments on it, and the first thing the students do is look at the grade. What’s the second thing they do? They look at their neighbor’s grade.

So now we’re at a point at the end of my talk where we can apply some of this new-found knowledge about feedback to a real life situation. The biggest feedback givers around are these guys here, Randy Jackson, Paula Abdul, and Simon Cowell. I’m sure everybody knows who they are, and they regularly give feedback to contestants on their show –
American Idol. Now some of them provide feedback which is better than what the others provide, so here are some quotes by each of these guys. Let’s analyze them in terms of what we’ve learned so far in terms of the good and bad things to do regarding feedback. First here’s Randy, “Yo! Wassup, Dawg? Check it out—that was a little pitchy for me in spots. It was just awright for me, dawg.” While a bit vague, but he did identify a particular problem area (i.e., “pitch”). And next there’s Paula, “You look simply gorgeous tonight—green is definitely your color and I LOVE the new hair style!” She regularly gushes praise, but often forgets to talk about the actual performance, and instead focuses on the person, not the task. And finally there’s Simon, “Let’s get real. That was hideous. If your lifeguard duties were as good as your singing, then a lot of people would be drowning!” Does anyone have idea as to which one I chose that is actually the lesser of the evils there? While I’m attracted to Simon’s comments for the humor value, he’s not really saying anything of substance. In addition, his feedback is very often insulting, discouraging, and diminishes self-esteem. So I think the only one who really contributes any kind of potentially helpful feedback is Randy--who actually addresses a problem area, which, in this case, is pitch. And that’s it.