Formative Feedback

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Applications of Principles that Promote Performance
Feedback in General

- Feedback is, “one of the more instructionally powerful and least understood features in instructional design.” (Cohen, 1985).

- 1000s of research studies have been published on the topic of feedback and its relation to learning and performance—dating back to early 1900s.

- Within this vast body of research, there are many conflicting findings and no consistent pattern of results.
This talk focuses on *task-level formative feedback*
- Provides specific and timely info to the student about a particular response to a task
- May take into account student’s current understanding and ability level

Features of formative feedback (FF) include:
- Signals a gap between current and desired level of performance or goal
- Reduces cognitive load of a learner, especially novice or struggling students
- Provides useful information that can help correct errors
What is Formative Feedback?

“… information communicated to the learner intended to modify the learner’s thinking or behavior for the purpose of improving learning.”

- Comes in a variety of types (e.g., verification of response accuracy, explanation of correct answer, hints, etc.)
- Can be provided at various times during the learning process (e.g., immediately after an answer, after some delay)
- May interact with other variables to differentially affect learning (e.g., learner characteristics, aspects of the task)
Taxonomy of FB Types
(arrayed by complexity)

- No Feedback
  - “Incorrect”
  - “The correct answer is …”
  - “Incorrect. Try again.”
  - The dogs was barking.
  - “That’s wrong because…”
- Verification
- Correct Response
- Try Again
- Error Flagging
- Elaborated
Taxonomy of FB Types

Elaborated Feedback

Attribute Isolation

Topic Contingent

Response Contingent

Hints/Prompts

Bugs/Misconceptions

Informative Tutoring
Feedback that contains detailed information about task performance will enhance student learning.

<table>
<thead>
<tr>
<th>Positive Effect</th>
<th>No Effect</th>
<th>Negative Effect</th>
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<tbody>
<tr>
<td>Swan (1983) found that a “bugs and misconceptions” approach was more effective in enhancing student learning compared to simply re-teaching (topic contingent).</td>
<td>Sleeman et al. (1989) conducted 3 studies comparing “bugs &amp; misconceptions” vs. topic contingent and found (a) they were both better than no tutoring, but (b) not different from each other.</td>
<td>Kulhavy et al. (1985) tested 4 types of FB (increasing complexity) and found complexity was inversely related to (a) ability to learn effectively, and (b) ability to correct own errors.</td>
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Timing

It was my teacher's genius, her quick sympathy, her loving tact which made the first years of my education so beautiful. It was because she seized the right moment to impart knowledge that made it so pleasant and acceptable to me.

-Helen Keller
Interactions
Interactions

- **Student** (e.g., motivation & prior knowledge)
- **Instruction** (e.g., objectives & tasks)
- **Feedback** (e.g., type & timing)
Kluger & DeNisi (1996)

To understand the world, one must not be worrying about one's self. -Einstein

Learning/Performance

Positive (enhance)
- Goal setting
- Correct solution
- Frequent messages
- Computer-delivered
- Personal growth

Negative (reduce)
- Orally-delivered
- Threats to self-esteem
- Discouraging feedback
- Praise
- No Goal Setting

Positive (enhance)
- Memory tasks
- Non-physical tasks
- Simple tasks

Negative (reduce)
- Following-rules tasks
- Physical tasks
- Complex tasks

Feedback Features

Task Features
Mason & Bruning (2001)

Student Achievement

Task Level

Timing of Feedback

Prior Knowledge

Type of Feedback

Low

Lower-level

Higher-level

Immediate

Low

High

Correct Response + Response Contingent

Correct Response + Topic Contingent

Correct Response + Response Contingent

Correct Response + Topic Contingent

Verification + Delayed Response + Response Contingent

Try Again + Delayed Topic Contingent

High

Lower-level

Higher-level

Immediate

Low

High

Delayed
Intermediate Summary

Studies find that FB *generally* improves learning compared to control conditions… but major gaps remain, especially in relation to interactions among instructional/task contexts and student characteristics that mediate FB effects.
## Things to Do

| Focus feedback on the task not the learner |
| Provide elaborated feedback in manageable units to enhance learning |
| Be specific and clear with feedback message |
| Keep FB as simple as possible but no simpler (based on learner needs and instructional constraints) |
| Reduce uncertainty between performance and goals |
| Give unbiased, objective feedback, written or via computer |
| Promote a “learning” goal orientation via feedback |
| Provide feedback after learners have attempted a solution |
### Things to Avoid

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<th>Do not give normative comparisons</th>
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<td>Minimize use of extensive error analyses and diagnosis</td>
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<td>Do not present FB that discourages the learner or threatens self esteem</td>
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<td>Use “praise” sparingly, if at all</td>
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<td>Try to avoid delivering feedback orally</td>
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<td>Do not interrupt learner with FB if she is actively engaged</td>
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<td>Avoid progressive hints that always end with the correct answer</td>
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<tr>
<td>Do not limit the mode of FB presentation to text</td>
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<td>Be cautious about providing overall grades</td>
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### Things to Avoid

Be cautious about providing overall grades

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<th>Wiliam (in press) summarized the following findings:</th>
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<td>1. Students receiving <em>just grades</em> -- no learning gains</td>
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<tr>
<td>2. Those getting <em>just comments</em> -- large gains</td>
</tr>
<tr>
<td>3. Those <em>with grades and comments</em> -- no gains (likely due to focus on the grade and ignoring comments).</td>
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Judging the Judges

Randy: “Yo! Wassup, Dawg? Check it out—that was a little pitchy for me in spots. It was just awright for me, dawg.”

Paula: “You look simply gorgeous tonight—green is definitely your color and I LOVE the new hair style!”

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!”
Questions?