Feedback is not always optimal for student learning
- Feedback is a part of a formative assessment (FA) cycle
- A variety of factors affect student perceptions of feedback:
  - Confidence
  - Type of feedback (written/verbal)
  - Motivation
  - Applicability to other assignments
- Students have trouble recognizing feedback if it is not written
- FA and subsequent feedback is hypothesized to be important for student learning, but empirical evidence is lacking (Figure 1)
- In response to feedback, “it is not understood what processes students use or whether engagement leads to action”

We asked:
1. Do students recognize feedback?
2. Can students decode feedback?
3. How do students respond to feedback?

We observed an intro bio class for instances of FA and feedback in addition, we collected the following data:
- Survey of student perception of feedback (n = 106)
- Student interviews, pre-exam (n = 3), post exam (n = 2)

Students recognize a variety of formative assessments

Survey Questions
1. Do you think you learned what [instructor] wanted you to learn in class today? How do you know?
2. Is [instructor] or the LAs aware of your learning in class today? How do you know?

Table 1. Survey codes used for categorizing student responses to the in-class surveys

<table>
<thead>
<tr>
<th>Category</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worksheet (W)</td>
<td>Yes, we completed a worksheet that made sense</td>
</tr>
<tr>
<td>Visual feedback or prompts (Vis)</td>
<td>Yes, because they saw our understanding via models on whiteboard</td>
</tr>
<tr>
<td>Ability to answer future questions or quizzes (Q)</td>
<td>Yes, I comprehend the model and could reword it on a test. Yes, I understand the material and if asked I believe I could answer questions on it and describe it</td>
</tr>
<tr>
<td>Non-evaluative instructor actions; lecture, class discussion, or learning objectives (DL)</td>
<td>Yes, I know the learning concepts. Yes, going over notes in class</td>
</tr>
<tr>
<td>General participation without mention of specific activity (GP)</td>
<td>Yes, I participated and paid attention</td>
</tr>
<tr>
<td>Verbal feedback or prompts; questions and direct interactions (Ver)</td>
<td>Yes, by feedback + conversations with her and the LA’s No, because we don’t get straight answers. A question will be asked and we never get a definite answer.</td>
</tr>
<tr>
<td>No mention of FA/feedback; internal evaluation (N)</td>
<td>Yeah, they walked around. Maybe, some things made sense.</td>
</tr>
<tr>
<td>Failed to answer (F)</td>
<td>Responses could be double coded.</td>
</tr>
</tbody>
</table>

Students recognize feedback

Students decode feedback

- What were you doing or thinking?
  - [The instructor] actually came over and was like, “talk to us,” and she was like, “oh, these animals undergo respiration too,” and we were like, “oh, we know,” it just looks confusing, but we have them going through cellular respiration.

Students respond to feedback

- Will you use this information to study?
  - “I figured I really ought to remember that,” because I didn’t know it at all.
- Would you do anything differently for the next exam? (Interview 2)
  - "I wouldn't study differently, I would just triple check closer."

Improvements for next round

- Surveys
  - Add questions to address student decoding and response
  - Interview
    - Add questions to address student recognition
    - Avoid hypothetical questions
    - Avoid asking about being “correct”
    - Push for more detailed responses; ask about their “process”
    - Increase number of interviews (n = 64)
    - Include students of varying academic ability
    - Analyze patterns of engagement and action
    - Use second interview to analyze differences in intended actions versus actual actions
- Increase focus on student ability to decode/respond to FA

References