# What Were You *Thinking?* Students Recognize Feedback as Important for Learning

Emily Sederstrom[1], Lisa Wiltbank[2], Jennifer Momsen[2]
[1]University of Minnesota, Twin Cities [2]North Dakota State University

## 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:[1]
  - Confidence
  - Motivation
  - Type of feedback (written/verbal)
  - Applicability to other assignments
- Students have trouble recognizing feedback if it is not written[2]
- FA and subsequent feedback is hypothesized to be important for student learning, but empirical evidence is lacking[3] (Figure 1)
- In response to feedback, "it is not understood what processes students use or whether engagement leads to action[4]"
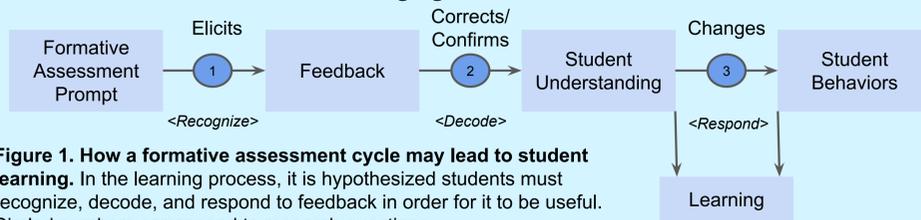


**Figure 1. How a formative assessment cycle may lead to student learning.** In the learning process, it is hypothesized students must recognize, decode, and respond to feedback in order for it to be useful. Circled numbers correspond to research questions.

### 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)

## Interviews and cued-retrospective reporting[5]

- Students watched recordings of FA from class (cue) and were asked to reflect on those moments (reporting) (Figure 3)
- After exam, a second interview was conducted to assess if engagement lead to action



**Figure 3. Chronology of interview data collection.** Two student interviews were conducted: one before the exam, and one after the exam.

### Students recognize 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 decode feedback

- How do you know you were right?

  "Yup, we were right. I think an **LA** came around and confirmed that we had **good answers**, and there was also the **group** at our table with us that had **similar answers** because they looked at the **book** too."

### 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**."

### Students recognize FA as important

- Students do recognize FA and subsequent feedback (Figure 2)
- Students can decode and recognize FA as evidenced in the interviews
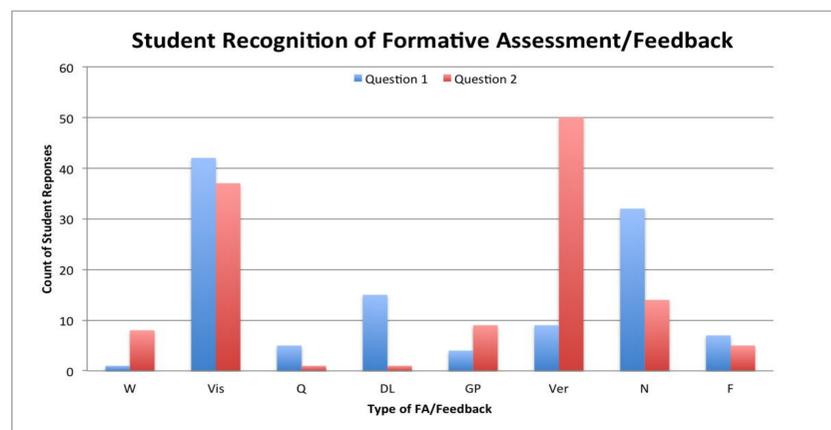- However, sample size is a limitation

## 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

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



**Figure 2. Distribution of identified formative assessments by students separated by survey question.** Surveys were coded using codes in Table 1. Some responses were double coded. Count refers to the number of survey responses that referenced the type of FA. Interrater reliability for Q1 = 0.819 and for Q2 = 0.882, which is "almost perfect[6]"

### Students recognize...

- Verbal and visual feedback frequently
- FA is useful to both students and instructors
- Visual feedback as a tool to inform both students and instructors
- Verbal feedback as more of a tool for instructors than themselves
- It may be that students have difficulty decoding and responding to verbal feedback in real time.

## 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*

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