Novice Teachers' Attention to Students' Thinking

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Why Should Teacher Educators Care About Teachers' Attention?

- Ongoing, everyday assessment has a strong influence on teachers' instructional moves and student learning (Black & William 1998; Cowie & Bell, 1999; Hammer, 1997; Pierson, 2008)
- Everyday assessment fundamentally depends on teachers' attention to students' ideas and reasoning (Ball, 1993; Sadler 1998)
- Teachers' attention to the substance of students' ideas and reasoning can draw students' attention to that substance (Warren & Rosebery, 1995)

Can Novice Teachers Attend to the Substance of Student Thinking?

- Stage-based models suggest they cannot (Berliner, 1988; Fuller & Bown, 1975; Kagan, 1992)
  - and these models remain influential in teacher education (Adams & Krockover, 1997; Freese, 2006)
- There are theoretical and empirical challenges to these models (Grossman, 1992; Darling-Hammond & Snyder, 2000; Davis, 2006)
  - This work contributes to these challenges:
    - Qualitative case studies of novice teachers' attention
    - Proposing an alternative theoretical framework

What Counts as Evidence of Attention to the Substance of Student Thinking?

(From case studies of novice teachers)

- Teacher responds to a student's idea in terms of the meaning of what the student is trying to say.

- Teacher later reports noticing an idea even if she does not respond explicitly at the time

- Teacher shifts the flow of classroom activity to address student's idea

- Teacher pursues the substance behind students' ideas when little is in evidence.

1. Teacher: Alana, why did you think the orange ball would fall first?
2. Alana: Cause it has nothing in it.
3. Teacher: Cause it has nothing in it? Why will that make it fall first?
4. Alana: I just think it's the orange ball because it's light.
5. Teacher: Okay, it will fall first because it's light. Does anyone else think the orange ball will fall first?

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Teacher dropped Alka-Seltzer in water and asked students if it was a physical or chemical change (based on definitions they had learned earlier). Alice said it was a chemical reaction because "you're creating bubbles so you're creating something new." Teacher pursued Alice's comment with a new demonstration, as she described later:

"My inclination was to probe the association with bubbles and reactions… I expanded on the original example with an additional visualization. ..I took a bottle of cranberry juice and shook it to create bubbles…"

Novice Science Teachers Can Attend to the Substance of Student Thinking

- Case studies of 9 novice science teachers enrolled in a secondary certification program
- 5 classroom observations each
- Evidence shows
  - 6 of 9 attending to the substance of student thinking *during class* in their first semester of teaching
  - 8 of 9 attending to the substance of student thinking *during class* in their first year of teaching

Attending to Student Thinking in the First Semester of Teaching

1. Mike: Why do the pies get so much smaller?
2. Teacher: Ah, why is this pie so much smaller than this pie?
3. Billy: Because the 10% is what's passed on.
4. Mike: I know, but why do they only pass on 10%? Why can't they pass on more?
5. Teacher: That's a great question, who can answer Mike's question?
6. Billy: They use the rest of the energy to do normal things that they need to do to live.
7. Mike: Why can't they be lazy and pass on more?
8. Billy: Because then they would die, and they wouldn't pass on anything

Proposed Theoretical Framework for Understanding Teachers' Attention

- Novice teachers have *resources* (Hammer & Elby, 2002) for attending to the substance of student thinking.
- Institutional systems of schooling draw teachers' attention away from student thinking.
- When teachers *frame* (Goffman, 1974) teaching primarily in terms of their own actions and identities (and/or in terms of curricular coverage), these resources are not activated.
- Teacher education that focuses primarily on teachers' actions and identities fails to support a *framing* of teaching in terms of student thinking.

Implications for Science Teacher Education

- Science teacher education should *begin* by drawing novices' attention to the substance of students' thinking
- *Build discussion of strategies, etc. out of interpretation of student thinking*.
- Classroom case studies play an important role (videotape and/or student work)
  - Display student thinking as it arises in real classrooms
  - Provide a context for the group to discuss interpretations of students' ideas
  - Serve as a means for making teachers' own classrooms public and discussing possible instructional responses

Paper and Book

Levin, D. M., Hammer, D., & Coffey, J. E. (2009). Novice teachers' attention to student thinking. *Journal of Teacher Education, 60*(2), 142-254.

Levin, D. M., Hammer, D., Elby, A. & Coffey, J. E. (2012). *Becoming a responsive science teacher: Focusing on student thinking in secondary science.* Arlington, VA: NSTA Press.