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Assessing Teaching Practice

IDENTIFYING POTENTIAL TRAJECTORIES IN TEACHER LEARNING: ELICITING STUDENT THINKING IN ELEMENTARY MATHEMATICS

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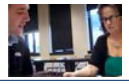
BACKGROUND

- **Eliciting Student Thinking:** A high-leverage teaching practice that entails posing questions or tasks that provoke or allow students to share their thinking about specific academic content (TeachingWorks, 2011).
- **Simulations**: An approximation of practice that places authentic practice-based demands on a participant. Can provide information that is not feasible or practical to determine in a real-life professional context.
- Understanding the nature of eliciting student thinking of teachers at different points in their professional trajectory could (a) suggest ways in which capability with the practice tends to develop over time and (b) surface implications for teacher preparation and professional development.





RESEARCH QUESTIONS

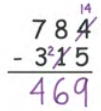
- What capabilities do **end of program** preservice teachers and **early career** teachers have with eliciting the process a student uses to solve a mathematics problem?
  - **End of program** : Teachers who have completed a teacher education program but have not yet begun work as a classroom teacher.
  - **Early career**: One to four years of teaching experience.
- What capabilities do **end of program** preservice teachers and **early career** teachers have with probing a student's understanding of the key mathematical ideas?

METHODS

- Participants: 20 end of program preservice teachers and 25 early career teachers.
- Simulation assessment: Participants interact with a simulated student.
- Analyzed performances focusing on the degree to which the questions posed resulted in the student revealing their:
  - mathematical process for solving the problem.
  - understanding of mathematical ideas underlying the process.

SIMULATION ASSESSMENT

Preservice teachers engage in three parts:



- **Preparation:** Preparing for an interaction with a standardized student about a specific piece of student work.
- **Simulation:** Eliciting and probing the standardized student's thinking to understand the steps the student took and the student's understanding of the key mathematical ideas.
- **Interview:** Interpreting the student's thinking.

Student Role Protocol to Standardize the Assessment

What the student is thinking:

- Uses an algorithm that is not conventional in the U.S. in which you add the same amount to the minuend and subtrahend to keep the difference the same.
- Understands that the process adds 10 ones to the minuend and 1 ten to the subtrahend and that it keeps the difference the same.
- Understands that 10 ones is equivalent to 1 ten.

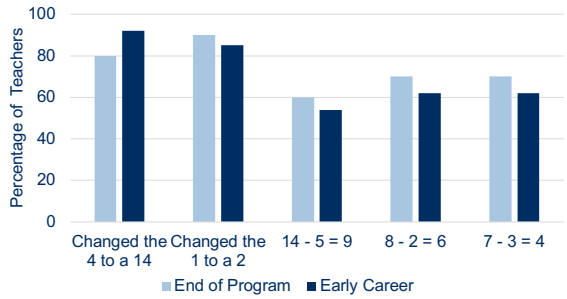
General orientations towards responses such as:

- Talks about digits in columns using place value language (e.g., 14 ones).

Responses to anticipated questions

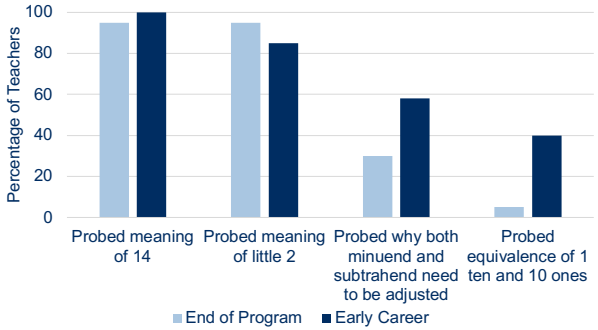
FINDINGS: ELICITING PROCESS

- Both groups of teachers demonstrated skill with eliciting the steps of the student's process.



FINDINGS: PROBING UNDERSTANDING

- Differences emerged in probing the student's understanding.



- **Probed meaning of 14 and little 2:** Both groups of teachers probed the student's understanding.
- **Probed why both the minuend and subtrahend need to be adjusted:** Almost twice as many **early career** teachers (58%.) probed the student's understanding compared to **end of program** teachers (30%). This difference is marginally significant (p = .085).
- **Probed the equivalence of 1 ten and 10 ones: Early career** teachers were more likely to probe the student's understanding (p = .005) but only 40% did so.

CONCLUSIONS & POSSIBLE NEXT STEPS

- Both groups displayed strong skills in probing understanding of surface level ideas such as the meaning of the 14 and the meaning of the little 2.
- **Early career** teachers were more likely than **end of program** preservice teachers to probe the student's understanding of mathematical ideas that underlie the student's process.
  - Increased experience teaching mathematics may result in increased skill in probing student understanding.
- Approximately half of **early career** teachers did not elicit the student's understanding of two key mathematical ideas that underlie the process:
  - This suggests a possible professional development focus for **early career** teachers.
- Future studies might explore teachers' decision-making around probing student's understanding. How do they decide which understandings to ask about?

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