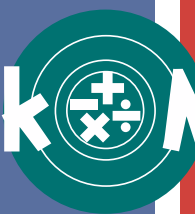




Modifying Children's Mathematical Tasks for Use in Content Courses for Prospective Elementary Teachers

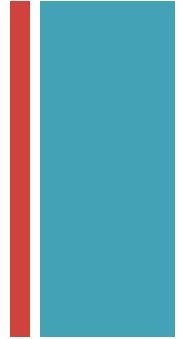
Task Masters



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AMTE 2014 Annual Meeting
February 6, 2014

+ Overview of session



- Brief description of our collaborative work on task design
- Analyze and discuss a children's task
- Share examples of our modifications to a children's task
- Modify children's tasks in small groups
- Pull together ideas on modifying children's tasks for use with prospective teachers

+ Selected research on task design



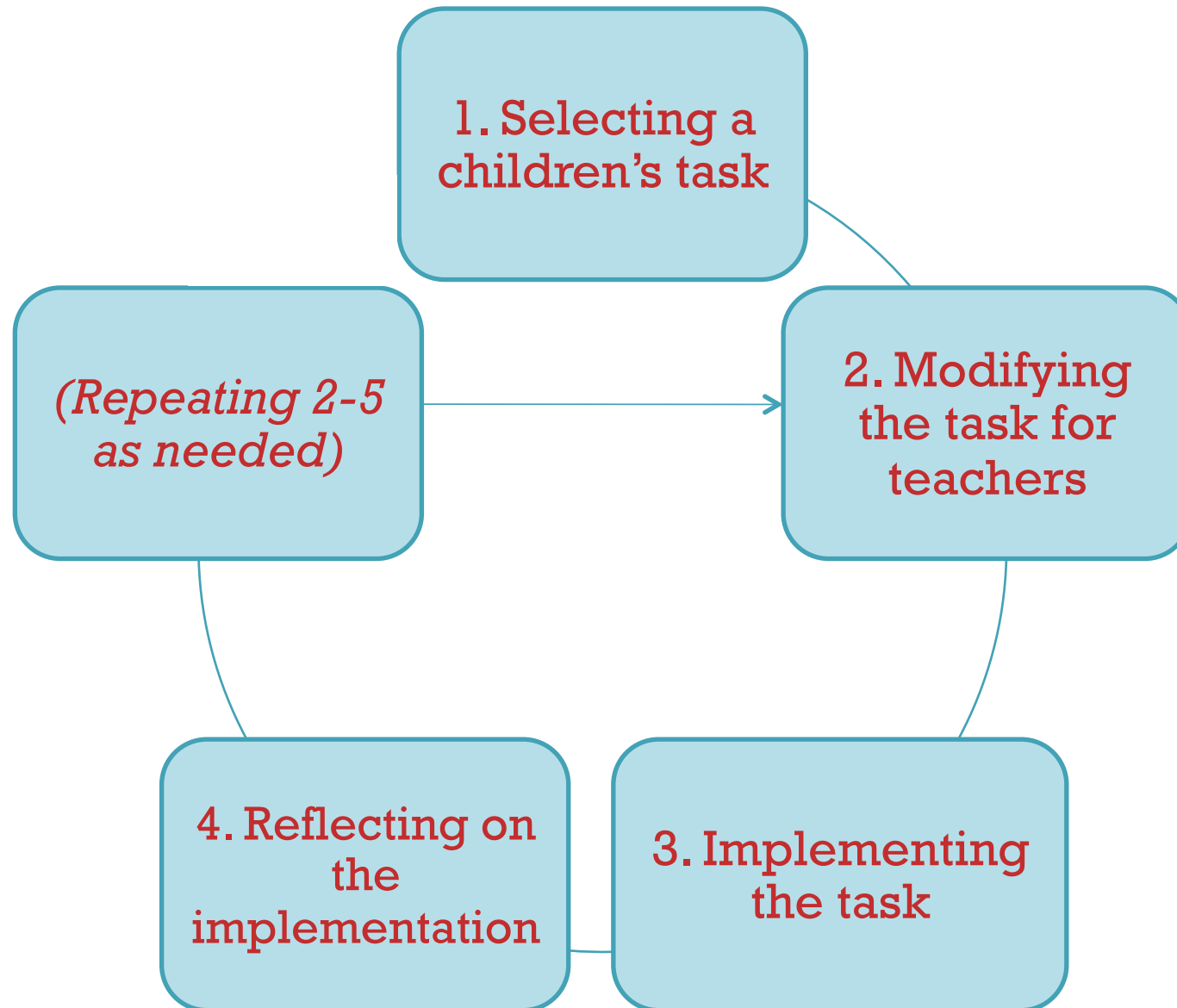
Liljedahl, Chernoff, & Zazkis (2007)

- used an iterative cycle for task design consisting of *predictive analysis, trial, reflective analysis, and adjustment*

Yackel, Underwood, & Elias (2007)

- modified children's tasks for use with PTs, which provided them with “experiences similar to those children encounter and for which the [prospective] teachers could not draw on familiar knowledge” (p. 354)

CYCLE FOR OUR WORK



+ Analyzing a children's task

Consider the *Investigations* task on p. 2 of the handout packet...

- What mathematical ideas does the task have the potential to elicit for children? For prospective elementary teachers?
- What would you need to consider and/or plan for in order to modify and implement the task with prospective elementary teachers?
 - In what ways would you modify the task for this new audience, and why?

+ What mathematical ideas are elicited by the children's task?



Problem	Strategies elicited	Connections to CCSS
1. $7/10$ or $3/5$	Same-Size-Pieces (i.e., Common Denominators)	3.NF.3d 4.NF.2
2. $7/8$ or $9/10$	Combination of Strategies: Comparing to Benchmark (of 1) and Same-Number-of-Pieces (i.e., Common Numerators)	3.NF.3d 4.NF.2
3. $4/3$ or $3/4$	Comparing to a Benchmark (of 1)	4.NF.2
4. $3/8$ or $1/3$	Same-Number-of-Pieces (i.e., Common Numerators)	3.NF.3d 4.NF.2

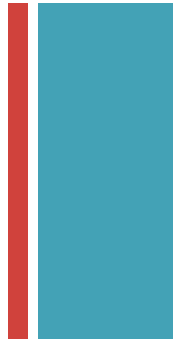
+ Goals and considerations

Ensure a high level of
cognitive demand

(Smith & Stein, 2011)

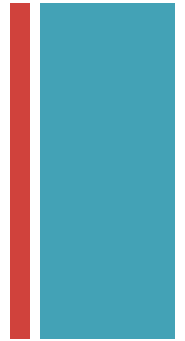
Provide opportunities for
PSTs to develop MKT

(Ball, Thames, & Phelps, 2008)

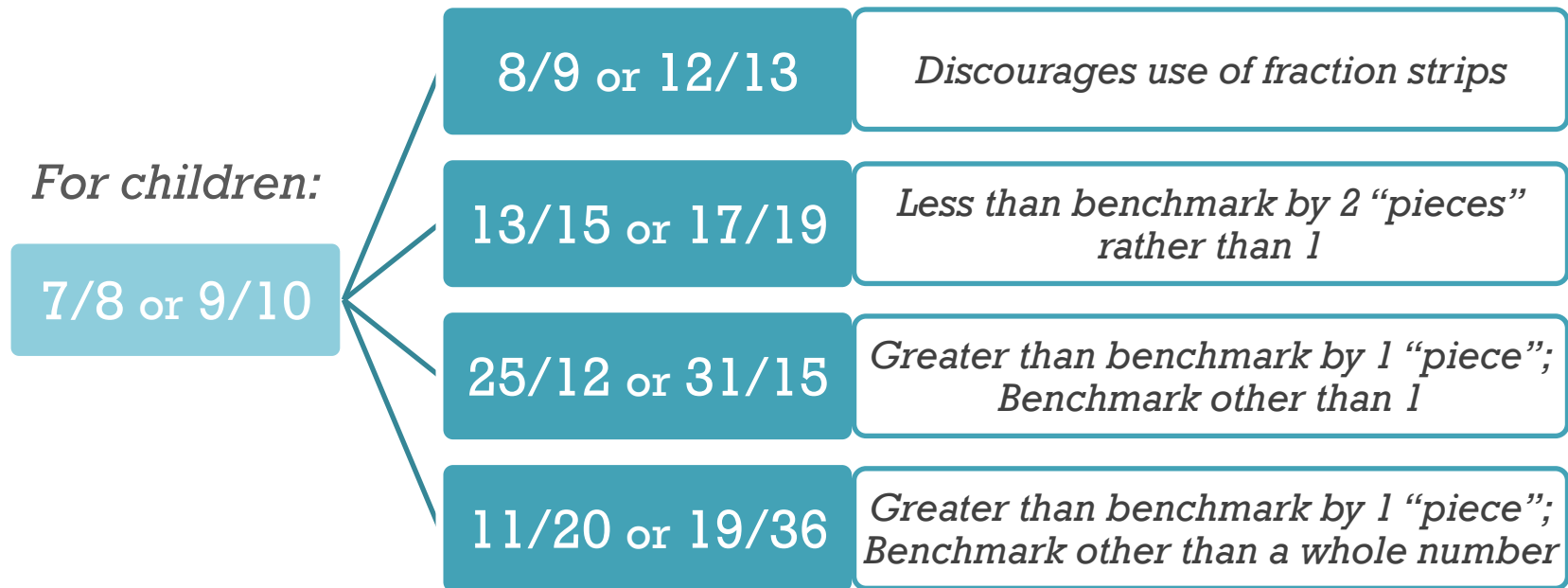


- Encourage teachers to seek alternative strategies by making their familiar procedures more difficult to apply
- Elicit a variety of strategies, including those not elicited from children's task
- Encourage solving problems in multiple ways
- Analyze children's thinking
- Provide opportunities for problem posing

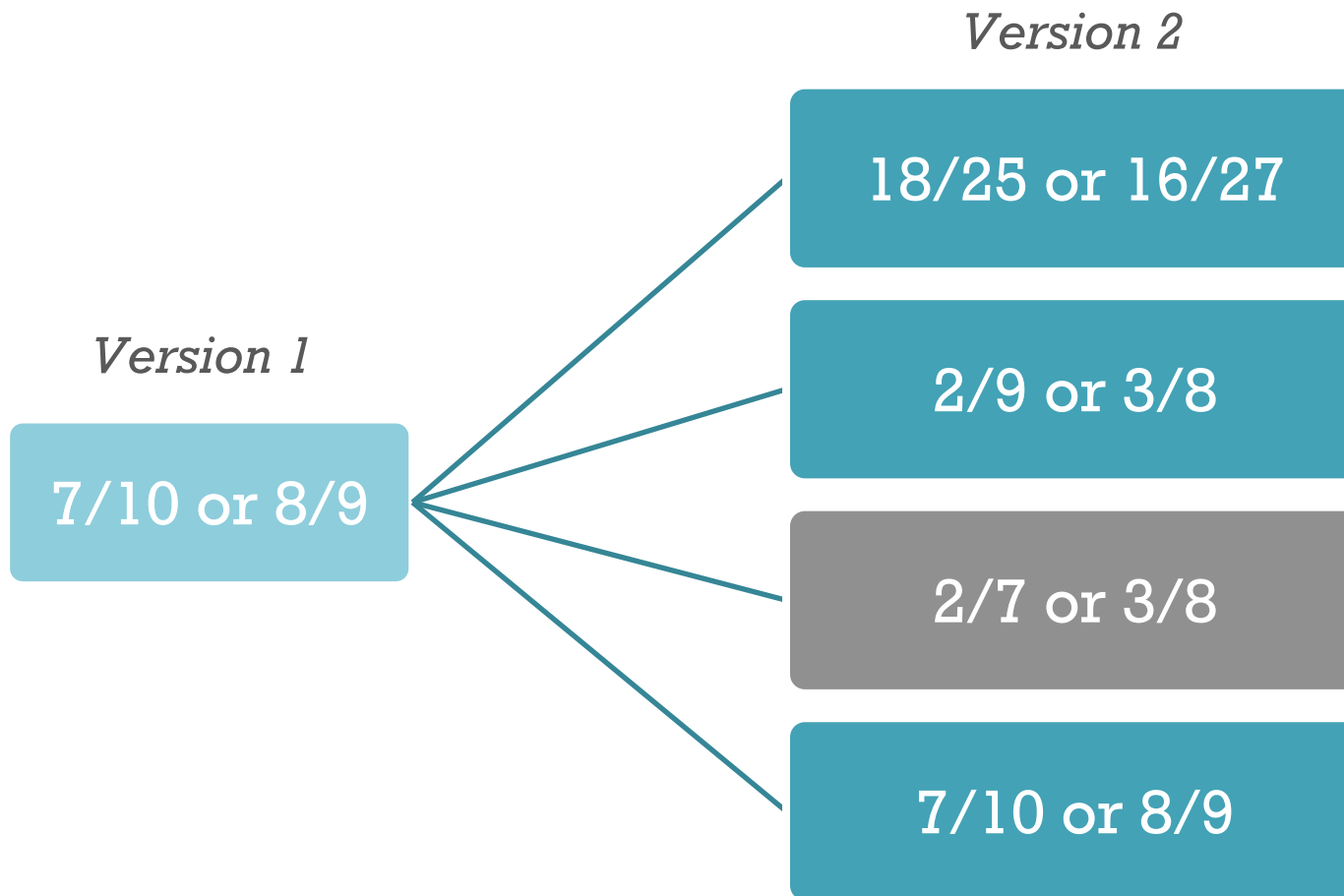
+ Our modifications: Modifying a children's item



For prospective elementary teachers:



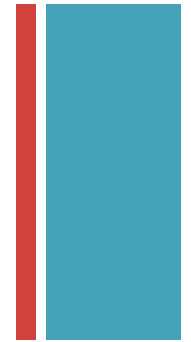
+ Our modifications: Eliciting a new strategy
Greater number of larger pieces



+ Our modifications: Developing MKT

Posing problems

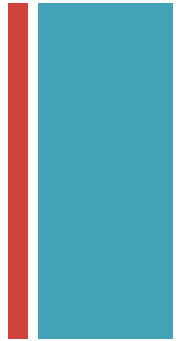
“...while a lot of attention has been focused on [PTs’] own ability to solve mathematical problems, little attention has been paid to their ability to construct and pose mathematical problems to their pupils” (Crespo, 2003, p. 267)



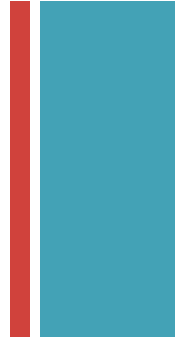
Version 1	Version 2
<p>Create three fraction comparison problems for a classmate that would be most-efficiently solved using strategies we learned in class.</p> <p>You can create your problems to target any strategies beside common denominators, but each problem must target a <u>different</u> strategy.</p> <p>List your three problems, the strategy that you are targeting for each problem, and a sample solution using that strategy.</p>	<p>Design a problem that...</p> <ul style="list-style-type: none">...can be solved with Strategy #3 (benchmark). Choose a benchmark other than $\frac{1}{2}$ or 1, since we have used those as benchmarks several times already....can be solved with Strategy #4 (greater number of larger pieces)....requires using a combination of two or more of our strategies. <p>As we discussed in class, your given fractions should be already be in simplest form and you should choose your fractions so that no other strategy other than the one you’re targeting would be especially easy/obvious to a classmate.</p>

+ Modifying children's tasks

- Select a topic/task(s) in the handout packet:
 - Algebra (p. 3)
 - Rates and Ratios (p. 4)
 - Whole number operations (p. 5)
 - Number theory (p. 6)
- Then, consider the following questions:
 - What mathematical ideas does the task have the potential to elicit for children? For prospective elementary teachers?
 - What would you need to consider and/or plan for in order to modify and implement the task with prospective elementary teachers?
 - In what ways would you modify the task for this new audience, and why?

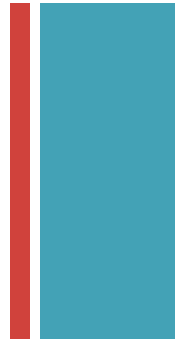


+ Take a few minutes to consider...



- What *design principles or rules of thumb* for modifying children's tasks emerge from your work?
- What do you see as the advantages and disadvantages of using children's tasks in content courses?
- In what other settings might using children's tasks in teacher education be useful?

+ Design principles for modifying children's tasks



- Encourage teachers to seek alternative strategies by making their familiar procedures more difficult to apply
- Elicit a variety of strategies, including those not elicited from children's task
- Encourage solving problems in multiple ways
- Analyze children's thinking
- Provide opportunities for problem posing

What other design principles might be useful?

+ Thank you for coming!



For the comparing fractions task and facilitation notes for this task, please see our website: www.mathtaskmasters.com



email: masters@mathtaskmasters.com