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Question: What should our state policymakers and educators listening to this panel know about keys to effective math instruction?

1. I will start with list of Don'ts:
 - a. Don't get embroiled in math wars.
 - b. Realize that all parties have some important things to say but also will misrepresent the views of the other side.
 - c. Realize that there is no magic bullet.
2. What states can do:
 - a. Prioritize and use rigorous evidence as a guide. That means covering some topics in depth during PD and planning of intervention foci.
 - b. Use sources such as IES Practice guides (see slide) and National Math Panel
3. What are big ideas to stress and why?
 - a. Fractions
 - i. Research evidence consistently shows 5th graders knowledge of fractions predicts how well they will do in algebra.
 - ii. Rationale: Fractions introduces students to thinking abstractly about numbers. It contains all kinds of complex ideas. For example, there are infinite ways to represent one fraction: $\frac{3}{2} = \frac{9}{6} = \frac{150}{100} = 1.5$.
 - b. Fluent use of a number line to represent fractions, add and subtract them, compare magnitude of all types of numbers.
 - i. Use of manipulatives and various visual representations to really understand the number line.
 - c. Word problems and problem solving
 - i. Try to integrate into work on computations and simple equations. This is routine in Singapore Math and other Asian curricula.
 - ii. See specific evidence based practices in IES practice guide.
4. Suggestions for how to do this:
 - a. PD that digs in deep on these topics rather than trying to cover all state standards for a grade level.
 - b. Part (but not all) of the PD is to ensure teachers understand all the complex mathematical ideas involved.
 - c. These topics can also be focus of interventions.
 - d. Set obtainable goals: e.g. all 5th and 6th graders will demonstrate real understanding of fractions and facility with problems involving fractions.
5. Other priorities
 - a. Make sure not only do new state standards cover statistics and probability and data science but that:
 - i. Teachers feel comfortable with this material.

- ii. Teachers have good curricula and texts to teach this and spend adequate time of this topic.