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The Development of Elementary Mathematics Knowledge for Teaching: Opportunities in an Expanded BEd

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Longitudinal study of Junior Intermediate (grades 4-8) preservice teachers entering the mathematics methods courses

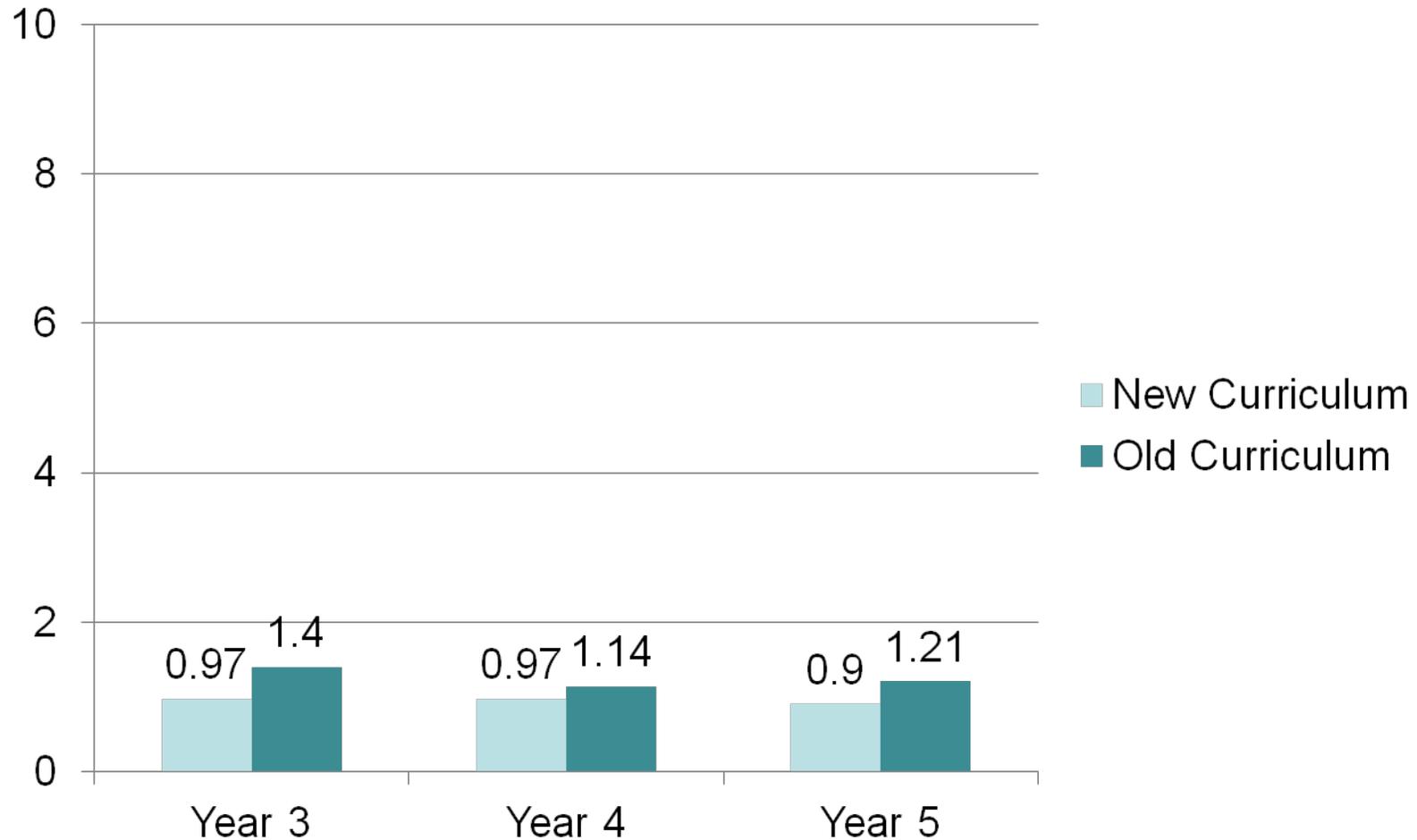
- We have surveyed, interviewed and/or tested PST's entering their (JI) mathematics curriculum and instruction courses since 2004, to study their conceptual understanding of elementary mathematics as needed to develop specialized content knowledge for teaching, (N = approximately 100 participants per year).



Highly Summarized Results

- PST's consistently demonstrated extremely weak conceptual understanding of math concepts at the beginning of the methods courses in the BEd program
- We have been unable to detect differences between PST's who had experienced the new (post-1997) elementary curriculum themselves, and those who had not
- We conclude that *all* PST's require support in developing conceptual understanding of elementary mathematics concepts as needed for teaching

Pretest survey results, scores out of 10 points



PST's entering methods courses were asked to explain, justify or model the basis of typical elementary mathematics procedures such as $5 - (-3)$. (eg. Kajander, 2010)



What we have done about it so far

- New undergraduate Education course called “Mathematics for Teachers” now a required (second year) course (for Concurrent Education Students) since 2011
- Workshops in “Math for Teaching” offered but with a fee charged
- High stakes exam in elementary mathematics content required to graduate with BEd (75% required, earned in September or March)



New Data ...

- Some (small sample) evidence that PSTs with the undergraduate mathematics-for-teachers course indeed do better in challenging the mathematics content exam in September
- Anecdotal evidence from methods course instructors suggests that PSTs with the new undergraduate math-for-teachers course are entering the math methods courses with a higher initial understanding of the concepts



Recommendation

- A two-year BEd provides an excellent opportunity to provide a specialized course in mathematics for elementary teachers during the first year of the BEd, focused on models and reasoning as needed for teaching
- Such courses should be strongly tied to the mathematics methods courses, and offered by faculty with strong mathematics education backgrounds



And one more issue

In our region at least, we do not have enough role-model associate teachers needed to offer all PST's a practicum in which problem-based teaching methods are encouraged.

"[My associate] was old school. He just said practical, procedural, it's the easiest, the best way, and I agreed in some form of it because he let me try it. It didn't work, so he said now we've got to go back to this way and teach them, drill it in their head ... I would prefer to have more conversation with the kids, more group work, but it's his classroom."

[pre-service teacher interview 2011]



Thank you ...

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