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For elementary school students to develop mathematical proficiency, teachers must possess rich and flexible mathematical understanding of the content they are teaching. However, too often our students experience college mathematics courses without grappling with the important underlying concepts. In this session we will consider the problem of college students' mathematical understanding and share a mathematics lab we developed to support prospective elementary school teachers while they learn mathematics. We will share innovative items designed to assess content knowledge and analysis of prospective and practicing teachers' responses to these items. A key aspect of our work is to have prospective teachers examine the mathematics through the lens of children's mathematical thinking, and we will use video clips of children and of college students to ground our discussion of issues of mathematics and mathematics learning. (Received September 14, 2007)