Abstract: Social inequality in mathematical skill is apparent at kindergarten entry and persists during elementary school. To level the playing field, we trained teachers in 24 randomly assigned preschool classrooms to assess children’s numerical and spatial skills every 10 weeks. Each assessment enabled teachers to examine each assessed child’s growth trajectory on each skill, evaluate the success of past instruction, design the next phase of instruction, and set learning targets. A key constraint is that teachers have limited time to assess each individual student during each assessment period. To maximize the information provided by each assessment under constrained time, we adapted the difficulty of each assessment based on each child’s age and accumulated evidence about the child’s skill. Compared to children in 25 randomly assigned control classrooms, children of the trained teachers scored 0.26 SD higher on numerical skills at posttest ($p=.004$). We observed no effect on spatial skills. The intervention also positively influenced children’s verbal comprehension skills (0.28 SD, $p<.001$) but did not affect their print-literacy skills. Findings suggest that preschoolers’ numerical learning improves when teachers enact a dynamic regime consisting of iteratively assessing children’s skill and planning and implementing instruction to support the next phase of growth. Findings also suggest that preschool math instruction does not subtract from verbal and literacy learning, but rather, may benefit verbal comprehension skills. We consider the potential contribution of this approach to the reduction of social inequality in numerical skill and discuss possible explanations for the absence of an effect on spatial reasoning.