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Do the Math: Cognitive Demand Makes a Difference

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d the ti ed ti n e t h enge i ing the l exp nding hie e ent nd i ting the ei ing hie e ent l ette p ep e t e e de in the ti e in ien e engi nee ing nd te hn g, th gh the e g e n t t ex i e thi *Research Points* t e the h enge en ing th t h e g p t dent en t ex ded

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ge e e ent h e nd th t the ti hie e ent n e p edi ted, the ti e the ti e to en nd the nt ti e pent t d ing d n ed the ti ene the e p edi t e inte e ted c^{-1}

 $et^{\hat{i}}$ ing ptin in the nited t te, e g ni ed ding t i nd \hat{i} it t \hat{i} , t t dent e ted int t \hat{i} in ing pe i i e



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e pite ntin ed et ne edt ing the e h een p g e t dent h in the p t ight h e en e t t high de nd e in e ing e eing p ed in highe e e the ti ex p e the ti ing in e e in the pe ent ge i n e i n t dent e ning edit in ege p ep t e, he e in e e ge e e t n t te ne t nd d nd g d ti n e-i e ent e the ti edit, h p i ie nd thei en ging e t h e e pped ith te d p d e ent in the pe ent ge i n e i n t dent e ning nde g d te nd

High-Level Mathematics

The percentage of African American students earning credits in college-preparatory mathematics courses increased dramatically between 1982 and 1990. These increases reflected state policy changes involving new standards and graduation requirements calling for more mathematics credits.

Despite the welcome progress, a word of caution: Merely mandating a narrow curriculum consisting of traditional college-prep mathematics courses will not undo problems endemic to the preK–8 mathematics program. Cognitive demand and instructional quality must be raised both in the lower grades and in high school.

Mathematics Tasks in a Classroom

Mathematical tasks convey messages about what mathematics is and what doing mathematics entails. A typical task passes through three phases. High-demand tasks are the starting point. As these tasks are carried out, teachers must keep students engaged in high-level thinking and reasoning, avoiding the urge to do the hard thinking for students when they struggle with a problem. Teachers should encourage students to use more than one problem-solving strategy, represent the problem in multiple ways, and explain and justify their work. High cognitive demands or thinking processes involved in solving a task can include the use of general procedures connected to underlying concepts and meaning, complex thinking, and reasoning strategies.

What Should Policymakers Do?

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Second, in tit te i p i ie th t, den e t ing t diti n nde e ed t dent, hi in de iding pti n t \setminus ing t dent th t į it thei pp t nitie t e n nd te de theiexp et egepept the ti $e^{-\sqrt{2}}$ Third, i e gniti e de nd in the ti te hing nd e ning in, the e ent nd e nd h , E e ted thin ingpee eint phen t dent n the ti n ept nd nne ti n , ng th e n ept , igh gniti e de ndi ein ed hente he int in the ig the ti t ex pel, en ging t dent t exp in thei ple ing

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