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Developing flexible procedural knowledge in undergraduate calculus.

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Summary: Mathematics experts often choose appropriate procedures to produce an efficient or elegant solution to a mathematical task. This *flexible procedural knowledge* distinguishes novice and expert procedural performances. This article reports on an intervention intended to aid the development of undergraduate calculus students' flexible use of procedures. Two sections of the same course were randomly assigned to treatment and control conditions. Treatment students completed an assignment on which they resolved derivative-finding problems with alternative methods and compared the two resulting solutions. Control students were assigned a list of functions to differentiate. On the post-intervention test, treatment students were more likely to use a variety of solution methods without prompting than the control. Moreover, the set of treatment section solutions were closer to those of a group of mathematics experts. This study presents evidence that not only is flexible procedural knowledge a key skill in tertiary mathematics, it can be taught.

Classification: D35 C35 D55

Keywords: undergraduate mathematics education; flexible procedural knowledge; calculus education

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