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Using the Experimental Design Ability Test (EDAT) to Measure Gains in Scientific Thinking

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A new assessment instrument, called the Experimental Design Ability Test (EDAT), is used to measure students' understanding of the criteria for good experimental design through their open-ended response to a prompt grounded in everyday life science problems. The EDAT can be administered in a pre/post test format to measure gains, is content independent, and only takes 10-12 minutes of class time to administer. Consistent and rapid evaluation of student responses is accomplished using a simple and specific 10-point scoring rubric that identifies whether students include each of 10 key aspects of experimental design. EDAT scores serve as a diagnostic, indicating which areas are in need of further instruction, because the scoring rubric is hierarchical: the 10th point is less frequently included in student responses than the first and if, for example, a student scores a "5", that generally means only items 1-5 were included. Undergraduate science education goals include development of students' scientific and rational thinking skills but currently accepted intelligence and placement tests do not measure rational thinking. The novel feature of the EDAT is that it assesses not only what students know about the scientific method, but it probes understanding based on what students are able to do. I have found that basic experimental design can be taught and gains in EDAT scores can be achieved, even in the non-majors introductory biology classroom.

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