Hands-on Science and Student Achievement

By

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Abstract

From the late 1950s through today, hands-on science has been promoted as a method of science instruction. Currently, recent national science reform efforts seek to temper its role. However, no consensus has been reached on the relationship of hands-on science to student achievement though this topic has been researched since the turn of the 20th century using various methods. To improve upon the literature, this work addresses three major limitations of past research— the lack of data on performance assessments of student achievement, the need to control for factors affecting both hands-on science and test scores, and the potential for a differential relationship by student ability. This work focuses on three research questions: 1) whether hands-on science is positively related to student achievement as measured by standardized test scores using both multiple choice and performance tests, 2) whether this relationship is stronger when using performance tests, and 3) whether this relationship differs by student ability. We apply regression analysis to two data sources. The primary data set is the 1994 RAND Survey of 1400 8th grade students and their teachers in Southern California which includes multiple choice and performance test scores. A second data source is the nationally representative NELS:88 with a focus on the 8th grade student sample. The initial findings vary by source of report, student or teacher, on the level of hands-on science. When accounting for the quality of the reports, the results show an association between the level of hands-on science and student test scores for both multiple choice and performance tests. The results find little difference for this relationship by type of test. Nor do they show strong evidence for a differential relationship due to student ability. These findings support the promotion of hands-on science at the middle school/junior high level while raising a concern about current science reform attempts to reduce and redirect its use. They also provide little evidence to support performance test programs on the grounds that they better reflect what is learned though hands-on instruction. Caveats on the findings and further research needs are discussed.