COMMENTARY

Science Instructional Time Is Declining in Elementary Schools

What are the Implications for Student Achievement and Closing the Gap?

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American education policymakers have been strongly advised of the need for more graduates in the fields ofscience, technology, engineering and mathematics (STEM) and U.S. federal policy has focused on improving and increasing STEM education as a national priority for education over a number of years. However, data on the performance of American students shows that many students are not well prepared in STEM fields at high school graduation.

Research evidence shows that early education in science and mathematics is important as preparation for students pursuing study and careers in STEM fields. Thus, one policy strategy for improving STEM education and production is to ensure that elementary schools are providing appropriate early learning and support needed for later study in the STEM fields. Research on time and learning have confirmed through many studies that science class time needs to be allocated regularly during the school day and week, and that instructional time is a key equity issue because opportunity to learn science concepts and knowledge varies by the family background of students. However, while states set high school graduation requirements, decisions about academic content in the elementary grades and the amount of time allocated to different subjects are often made at the local level and often by individual teachers.

A new analysis of national and state-level data has addressed the question of how much actual instructional time is devoted to science instruction in the elementary grades and what are the trends over time. The analysis also addressed the relationship of science instructional time to student achievement in science.

Teacher reports for core subjects show time for science instruction has declined steadily over the past 20 years. Survey data from the National Center for Education Statistics show that teachers in grades 1–4 in self-contained classrooms reported spending an average of 2.3 hours per week on science instruction during the 2007–08 school year. Class time spent on science dropped from a national average of 3.0 hours per week in 1993–94 to 2.6 hours in 2000 and to 2.3 hours in 2004 and 2008. From 1994 to 2008, the total number of hours of instruction per week in elementary classrooms increased but the use of time shifted to math and reading/language arts. Time for science instruction in California schools averaged only 1.8 hours per week in 2007–08, significantly below the national average, and the state experienced a decline in science instructional time since the 1990s.

The question of implications of instructional time for student learning in science was addressed with data from the2009 NAEP science assessment in grade 4. The NAEP data revealed wide variation across the states in student achievement scores and the amount of class time per week spent on science instruction. Time spent on science in several states was twice the average instructional time provided in other states, and California ranked among the states with the least science instructional time.

The analysis of NAEP scores showed that students in classes with the most class time per week (four hours) had average scores 12 points higher than students in the classes with the least time (one hour). The average grade 4 scale score was 148, and state averages varied from 133 to 163. California's grade 4 average science NAEP score was 136. Multiple regression analysis was used to measure the effect of science time while controlling for other factors explaining student achievement differences. Instructional time on science did have a positive independent effect, but the socio-economic background of students had a larger role in predicting student achievement on NAEP.

The analysis highlights the issue of the impact of school accountability on curriculum and instruction across the academic subjects. If science is to continue to be taught with expected standards of learning and performance for all students, policy changes may be needed at all levels of our education systems to ensure access science education and equity in opportunity to learn.

The full research paper can be found in Rolf K. Blank, "Science Instructional Time Is Declining in Elementary Schools: What Are the Implications for Student Achievement and Closing the Gap?" Science Education, October 2013. The research was supported by The Noyce Foundation.

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