You Can't School Mother-Nature: Using Weather-Related Closings to Identify the Impact of Schooling on Performance

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Final Report to
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I am pleased to submit the final report for my project, *You Can't School Mother Nature: Using Weather-Related Closings to Identify the Impact of Schooling on Performance* (SRF Grant #20066372). Below, I will briefly summarize the project, activities and results. In addition to the summary contained in this report, two papers are attached which summarize the project and results in greater detail.

Overview:

The purpose of this project was to provide insight into the role of instructional time on student achievement. To do so, we examined the impact of unscheduled loss of instructional days on student performance using data from Maryland public schools. The empirical question explored directly in this project is straightforward: Do students perform better on statewide assessments in years in which they have more school days to prepare for the tests? For obvious reasons, more days in school ought to help students better prepare for state assessments. Indeed, the very notion of a mandatory 180 day school year rests on a premise that a certain amount of time is necessary for teachers to cover and students to comprehend material.

In this project, we made use of natural variation in weather to identify the impact of time in school on performance on Maryland's math and reading assessments. This sort of natural variation in the "treatment" (instructional time) provided to students can provide a research design with an exceptional level of internal validity in a social setting. So, part of the value of the work on this project is due to the power of natural experiments to provide insight into the role of instructional time on learning outcomes.

Beyond this, the project's real importance derives from continued growth in reliance on testing and accountability in public education, and the simultaneous (though disconnected) interest in increasing instructional time. Part of the work done on this project was to consider the implications of the effect of instructional time on test performance for accountability systems. To this end, I examined: 1) The possibility that schools identified as failing to make Adequate Yearly Progress on goals set by No Child Left Behind were flagged, and 2) The role of year to year fluctuations in instructional time in masking real learning gains.

Activities:

The activities undertaken as part of this project where wholly data collection, research, writing and reporting of results by Dave Marcotte (Principal Investigator) and Steve Hemelt (Graduate Research Assistant). Much of this was spent in conducting the analyses that were ultimately disseminated in the paper "Unscheduled school closings and student performance," published in *Education Finance and Policy* during the summer of 2008. Marcotte's time was also devoted toward working with Benjamin Hansen of the University of California, Santa Barbara to combine analyses on Maryland with Hansen's similar analyses of Colorado and Minnesota for the purposes of assessing implications of instructional time on school accountability. The paper that resulted from this collaboration was revised and re-submitted to *Education Next*.

Results:

The primary empirical task addressed in this project was to identify whether and by how much students perform better on statewide assessments in years when they have more school days to prepare. Our identification strategy is rooted in the fact that tests are administered on the same day(s) statewide in late winter or early spring. So, any unscheduled closings due to snow reduce instruction time, and are not made up until after the exams are over. All estimates are derived by comparing students in a given grade at a school, with students in the same school and grade in other academic years with more/less instructional days prior to the test date(s).

We estimate that in academic years with an average number of unscheduled closures (5), the number of 3rd graders performing satisfactorily on state reading and math assessments within a school is nearly 3 percent lower than in years with no school closings. The impacts of closure are largest in mathematics and for students in lower grades.

Combining our estimates with actual patterns of unscheduled closings in the last 3 years, we find that more than half of schools failing to make adequate yearly progress (AYP) in 3rd grade math or reading, required under No Child Left Behind, would have met AYP if schools had been open on all scheduled days. Our work also more broadly considers implications of this research for accountability under NCLB. In that work, we show that if instructional days are ignored, the fraction of within-school variation in performance attributed to permanent learning gains rather than transitory fluctuations can be substantially overstated.

Publications:

Marcotte, Dave E., and Steven W. Hemelt. 2008 "Unscheduled Closings and Student Performance," *Education Finance and Policy.* v. 3(3), pp. 316-38.

Hansen, Benjamin, and Dave E. Marcotte. 2008. "Time for School: Instructional Time and Student Achievement" revised and resubmitted at *Education Next.*

Executive Summary

The legacy of the *A Nation at Risk* report in shaping education reform during the last 25 years is widely recognized. Among the report's recommendations was for an increase in standards and accountability. The report also called for an increase in time spent learning by American students, noting that annually more than 200 days of instruction are given to students in many developed countries, rather than the 180 or so common in the U.S. While the former is now a central tenet of many reform initiatives across the country, interest in longer school years has peaked relatively recently.

In this project, I consider and extend the evidence about whether more time in school would result in learning gains for American students. Heretofore, the limiting factors in answering this question have been the very small amount of variation across schools and years in the number of instructional days American students receive, and that schools/districts that do increase instruction time are not easily comparable to other schools.

To overcome these problems, I make use of natural variation in the amount of instructional time provided to students before taking Maryland's state assessments. The variation is due to the fact that all districts in Maryland have very similar academic calendars and take the assessments on the same day, scheduled before the start of the year. Yet, each year there is substantial variation across the state in the number of instructional days lost to bad weather. Indeed, there can be two to three more *weeks* of instruction in some schools from one year to the next at the time students take state assessments.

Using data on all elementary and middle schools in Maryland from 1993 to 2005, we find that in academic years with an average number of unscheduled closures (5), the number of 3rd graders performing satisfactorily on state reading and math assessments within a school is nearly 3 percent lower than in years with no school closings. The impacts of closure are smaller for students in 5th and 8th grade.

This natural variation in the "treatment" (instructional time) provided to students provides a research design with an exceptional level of internal validity in a social setting. So, part of the value of the work on this project is that we provide credible estimates of effect sizes of increasing instructional time on learning outcomes.

The project's real importance derives from continued growth in reliance on testing and accountability in public education, and the growing recent (though disconnected) interest in increasing instructional time. Part of the work done on this project was to consider the implications of the effect of instructional time on test performance for accountability systems. To this end, I examined: 1) The possibility that schools identified as failing to make Adequate Yearly Progress on goals set by No Child Left Behind were flagged, and 2) The role of year to year fluctuations in instructional time in masking real learning gains. We find that more than half of schools failing to make adequate yearly progress (AYP) in 3rd grade math or reading, required under No Child Left Behind, would have met AYP if schools had been open on all scheduled days.