



The Shrinking School Week

Effects of a four-day schedule on student achievement

THE OW MUCH FACE TIME do students and teachers need to keep pace with expectations for learning? It's an urgent question during a pandemic that has kept many students out of school buildings for more than a year. The importance of school attendance has divided communities across the country, as they weigh the potential risks of in-person instruction with those of prolonged separation from the school environment.

We can find at least some answers in the experiences of schools that have adopted fourday school weeks, typically as a cost-cutting move. I studied the academic performance of nearly 700,000 students in Oregon, where more than 100 schools in school districts facing budget shortfalls and attendance problems opted to cut instructional time instead of raising taxes or laying off teachers. My study looks at student test scores in reading and math over a 15-year period to see what happens when schools switch to a four-day week.

I find clear negative consequences for student learning when schools adopt four-day schedules. Although many schools start class earlier or end later during the four days they are in session, overall weekly time in school decreases by three to four hours. My analysis finds that, as a result of those reductions, math scores decrease by 6 percent of a standard deviation and reading scores decrease by 4 percent of a standard deviation. These impacts are comparable to those associated with other cost-saving measures, such as increasing class sizes and cutting student-support programs.

When a local community can or should open school buildings during a pandemic is a political decision, and whether schools can effectively educate students with live remote instruction is an open question. But the impact of decreased instructional time on student learning is not. These results show that when students receive less than a full-time school schedule, learning slows.

Cutting Costs by Canceling (Some) Class

The earliest known use of a four-day school week dates back to the 1930s in South Dakota. Today, most four-day schools are in the rural North and West. Their numbers

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have increased dramatically over the past two decades, from 257 schools in 1999 to more than 1,600 in 2019. Half of all U.S. states have at least one four-day district or school (see Figure 1).

Many school districts offer remedial or enrichment services on the day off, while others effectively create a three-day weekend for all students. When I studied the activities of 552 four-day school districts that provided information about the off day, about half were fully closed to students and staff on the off day. About 30 percent offered either remedial or enrichment programming to students, ranging from teacher office hours to field trips to very structured off-day programs. About one-quarter of the districts that did not offer student programs on the off day provided teacher professional development.

Nationwide, U.S. schools with four-day schedules offer an average of 148 school days, well below the 175–180 average typically provided under a traditional five-day schedule. Many districts lengthen each school day in order to meet their state's minimum requirements for instructional hours. Four-day schools average seven hours and 45 minutes of instruction each day, while five-day schools have shorter days that average six hours and 54 minutes. The end result is

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a loss of three to four hours of instructional time each week.

Most often, four-day schedules are adopted in response to a budget crunch, with communities opting to cut back on school hours rather than lay off teachers or let class sizes grow. However, in some cases, districts have made the switch to cut down on commuting time and cite improved teacher retention and student attendance as the main rationales. Regardless, the cost savings are relatively small. In a recent paper, I found a reduction of 1 to 2 percent in per-pupil operating expenses at districts that switched to a four-day schedule.

What happens when districts decrease the amount of time students spend in school? School attendance has a major influence on multiple dimensions of child development and family life. Schools provide academic instruction, which promotes knowledge and skill accumulation, and they influence socialemotional development as well. Students also gain access to school meals and physical education on campus, which may promote their overall health and well-being. And for some students, school can be a safe haven from instability, adult-sized responsibilities, or other challenges at home.

Less time in school also can pose stark challenges for families. The lack of school on a weekday is difficult for working parents, as the pandemic experiences of families and broad exodus of women from the workforce have made clear. A 2019 study found that four-day school weeks were associated with declines in workforce participation for women overall, but not for men or single mothers. In addition, children without supervision on the off day may engage in unproductive or risky behaviors—a 2018 study in Colorado found that juvenile crime jumped by almost 20 percent when schools switched to four-day weeks. Other studies have found greater marijuana use and a higher prevalence of bullying and sexual activity among students attending schools with four-day weeks.

A shorter week may also change the quality of some schoollevel educational inputs. If, for example, teachers generally find the schedule appealing, as a 2018 study of Missouri teachers found, districts could attract a larger and potentially higherquality pool of candidates and be more likely to retain talented staff. But the longer school day and potential loss of weekly subject-specific instructional time could also present instructional challenges. If teachers do not use the longer school day effectively or modify their courses to align with the new composition of instructional time, student learning may decline.

Assessing Impact in Oregon

In this study, I examine the impact of four-day school weeks on academic achievement in math and reading. My analysis focuses on students in Oregon, where approximately one in 10 schools follow such a schedule. I explore three main questions: How does the four-day school week affect student achievement? How large are the achievement returns to instructional time both overall and in specific subjects? And how effective is the four-day school week as a cost-savings approach?

To answer these questions, I look at performance on annual statewide tests in Oregon for 690,804 students in grades 3 through 8, from 2004–05 to 2018–19. The student-level data also includes characteristics such as sex, race, free-and reduced-price lunch eligibility status, English as a second language program participation, and special education or gifted status. I also look at student absences and the percentage of days missed due to disciplinary incidents.

The total number of Oregon schools with a four-day school week increased from 108 in 2005 to a peak of 156 in 2014, before falling to 137 by 2019. For both four- and five-day schools, I calculate weekly time in class based on the start and end time of the school day, adjusting for early dismissals. Based on this data collection, 80 percent of the schools have identifiable weekly time in school information.

Overall, students in four-day schools have lower standardized math and reading test scores compared to students in fiveday schools. In math, about 61 percent of students at four-day schools pass annual tests compared to about 65 percent at fiveday schools. In reading, about 68 percent of four-day students pass compared to about 71 percent at five-day schools. These differences amount to about 7 to 10 more students passing annual tests at the average-size school.



Half of U.S. States Have at Least One Four-Day School (Figure 1)

Nationwide, some 1,600 schools have adopted four-day schedules. As of 2018, the practice was most prevalent in Colorado, Idaho, New Mexico, Oregon, and South Dakota.

NOTE: Data as of 2018. Three states that formerly had four-day schools are not included: Maine, Massachusetts, and New Jersey.

SOURCE: Center for Reinventing Public Education

There are some other key differences between four-day and five-day schools that could be contributing to the differences observed in achievement, however. Four-day schools have larger shares of low-income students, at 57 percent compared to 50 percent at five-day schools. White students make up 79 percent of enrollment at four-day schools and 65 percent of enrollment in five-day schools. Because they are predominately rural, fourday schools also have much smaller average student enrollments, at 578 students compared to 3,817 students at five-day schools.

Results

Impact on test scores. The clear differences between fourday and five-day schools suggest that simply comparing their achievement levels may not provide an accurate picture of the effect of the schedule change alone. To provide a better view, I look at how the achievement of students in specific districts changes when they shift from a five-day to a four-day week and compare those changes to contemporaneous trends in achievement of other districts that did not make the change.

Students earn lower math and reading scores on standardized tests after their schools switch to a four-day schedule. Overall, average math scores decrease by 5.9 percent of a standard deviation in math as a result of the switch to the four-day school week, while reading scores decrease by 4.2 percent of a standard deviation. That is nearly one-third the size of the impact of having a larger class size, and equal to losing 40 minutes of reading instruction each week.

I also look at how the schedule change affected performance of student groups. Math scores for special-education students improve by 2.6 percent of a standard deviation after switching to a four-day week; reading scores do not change. For English learners, reading scores fall by 4.1 percent of a standard deviation, but math scores held steady. One potential explanation for these findings is that while individualized education plans may help special education students supplement math instruction at home, weekend learning loss may be exacerbated for English learners if English is not the primary language spoken in their home environment.

In considering students by age group, I find that negative math achievement effects are most prominent in 7th and 8th grades. The negative reading achievement effects are more consistent across grades than math, but the largest negative impacts are also found in 8th grade. One potential explanation for these larger negative impacts in later grades may be that parents have more difficulty helping students with more advanced math and

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reading coursework at home. The earlier start times at four-day schools may also negatively impact adolescent students, leading to larger negative achievement effects in these later grades (see "Rise and Shine," *research*, Summer 2019).

I also track student test scores over time to better understand how switching to a four-day schedule affects achievement. There is a noticeable drop in test scores immediately after a school switches to a four-day schedule: in the year of implementation, math scores decline by 6.8 percent of a standard deviation and reading scores decline by 3.7 percent of a standard deviation.

After that initial dip, test-score performance tends to improve in subsequent years. This suggests that achievement losses ameliorate a few years after adoption of the four-day school week, but tells little of whether this is a feature of all four-day school week adoption (for example, students becoming more acclimated to the new school schedule) or driven by transitory four-day schools returning to the five-day schedule. I examine both possibilities and find that the lasting impacts of the four-day week are minimal for schools that eventually switch back to a five-day schedule. By contrast, the negative impacts for schools that permanently adopt four-day weeks appear to increase in magnitude in each subsequent year (see Figure 2). Four years after switching to a four-day week, students' math scores fall by 8.8 percent of a standard deviation and reading scores fall 10.4 percent of a standard deviations compared to the year before adoption.

For a nation concerned about the long-lasting impact of school closures during a pandemic, these results should be reassuring. They suggest that briefly limiting students' time in school, in this case through a four-day school week, may result in a short-term negative achievement shock for students, but has no lasting detrimental impacts on their achievement. Continuing shorter school schedules, however, could have lasting negative effects.

Returns to time in school. A shift to a four-day week typically produces sudden changes in the amount of instructional time students receive both overall and in specific subjects. The size of these time changes can vary, however, based on a local district's schedule and whether it opts to offer remedial or enrichment services on the day off. This makes it possible to use the changes as a natural experiment to study how differences in instructional time influence student learning.

I find that changes in the total amount of time that schools are open to students do affect student achievement, helping to explain why students attending some four-day schools experience larger negative impacts than others. In particular, a onehour increase in weekly time in school increases math achievement by about 1.8 percent of a standard deviation. The effects on reading are smaller, at 0.8 percent of a standard deviation.

A more interesting metric to examine, however, is subjectspecific instructional time. Earlier studies by Victor Lavy and by Maria Cattaneo, Chantal Oggenfuss, and Stefan Wolter have found that a one-hour increase in weekly subject-specific instructional time boosts achievement in that subject by 6.0 percent of a standard deviation, but this is an average figure across all subjects. I used survey data on the allocation of time to different subjects in Oregon schools to calculate the returns to instructional time separately for math and reading. These calculations suggest that increasing weekly instructional time in math by one hour boosts achievement by 11.5 percent of a standard deviation. A one-hour increase in weekly reading instruction improves reading achievement by 2.5 percent of a standard deviation. We would therefore expect the learning lost due to a reduction in instructional time to be greater in math than in reading, a pattern that is evident in emerging research on American students' achievement in the wake of the pandemic.

Cost savings. Do the cost savings from switching to a fourday school week provide a sufficient tradeoff for these losses in student achievement? Many cost-cutting interventions are associated with declines in student achievement, and a recent study by C. Kirabo Jackson, Cora Wigger, and Heyu Xiong found a \$1,000 reduction in per-pupil spending reduces average test scores in math and reading by 3.9 percent of a standard deviation (see "The Costs of Cutting School Spending," *research*, Fall 2020).

The average savings from switching to a four-day school

week in Oregon are \$350 per student, or about a 2 percent reduction in expenditures. Based on my achievement results, I find that cutting costs by \$1,000 per pupil through shrinking the school-week schedule yields an achievement loss of between 10 percent and 19 percent of a standard deviation. By comparison, other research has found that when schools cut \$1,000 in spending through increasing class sizes, achievement falls by 12 percent of a standard deviation. Spending cuts achieved through closing schools are associated with declines of up to 20 percent of a standard deviation. In short, this trade-off is in line with or better than some other cost-cutting interventions, but worse than what would be expected from a reduction in general expenditures.

A Cautionary Tale

A four-day school week that reduces instructional time has a negative and statistically significant impact on student learning. Evidence from 15 years of test scores across Oregon show that student achievement drops when schools switch to a four-day schedule, and that those negative trends continue so long as five-day schedules are not restored. These detrimental achievement effects appear largely driven by reductions in weekly time in school, which decreases by three to four hours.

As a cost-cutting move, adopting a four-day school week is comparable to other program cuts and presents a viable option for financially-troubled school districts to consider. But

Drops in Test Scores After Switching to Four-Day Schedule (Figure 2)

The negative impacts of a four-day schedule grow over time. Four years after switching to shorter school weeks, math and reading scores fall by 8.8 percent and 10.4 percent of a standard deviation, respectively.



switching to a four-day schedule is likely to have implications beyond just cost savings and achievement. School attendance is an important opportunity for students' development overall, and it provides a safe daytime activity that benefits working parents. Diminished exposure to school-based counseling and health services, school meal programs, and other supports could also negatively affect child physical health and social-emotional development. Less time in school may mean more time for risky behaviors or exposure to unsafe conditions at home or in the community. Thus, it is critical for future research to examine these outcomes before making determinations regarding the overall efficacy of this school schedule.

Policymakers in several states are pushing back against the four-day school week, which suggests they are aware of some of its negative ramifications. In Oklahoma, for example, a new state law sets minimum quality standards for school districts to implement or continue a four-day schedule, which advocates estimate more than 90 percent of current four-day districts will not be able to meet. In New Mexico, where four-day weeks are popular but under pressure, public debate has included concerns about the experiences of low-income, working families.

Still, it seems likely that four-day weeks may well continue to grow in popularity, even if cost savings is not the motivating factor. The economic trends as we emerge from a prolonged global pandemic are not yet certain, and immediate budget cuts

> at schools appear unlikely in the wake of the \$170 billion in federal education aid under the 2021 American Rescue Plan. But teachers, students, and families also have now experienced radically different learning schedules due to school closures and broad adoption of hybrid schedules, which mimic the part-time nature of the four-day school week. That may stoke interest in a fourday schedule and put pressure on local school boards to consider it. These findings suggest that they proceed with caution.

> They also point the way to an expanded research agenda regarding four-day schools: not only how reduced attendance and instructional time affect academics, but the impact of what students are doing on their extra day "off." If students and educators want to explore school calendars outside of the typical five-day-a-week schedule, we need to know how to structure flex time to enhance and extend in-school learning. Otherwise, we risk compounding the learning losses students have already sustained in the wake of Covid-19.

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Schools Squandered Virtual Learning

A timid response, with lessons for the future

By MICHAEL B. HORN

DVOCATES OF DIGITAL LEARNING have long clamored for technology to play a central role in schools. Using technology, however, is not the goal in and of itself. Rather, it is a means to their ultimate end: remaking a public education system built for an industrial society, not the current knowledge-based one. In such a system, learning would be optimized for individual students to boost their enjoyment and academic progress in school.

The pandemic has ushered in a world of near-ubiquitous digital learning nearly overnight. It could have been an unexpected opportunity to create this future of learning, now. But the signs haven't been all that positive or promising that much of a remake is underway. Parents, for example, report in the latest Education Next survey that although they are satisfied with their children's schooling, there's a lot less learning happening (see "Pandemic Parent Survey Finds Perverse Pattern," features, Winter 2021). Indeed, a recent study of reading performance in Ohio suggests a decline in student achieve-

ment equal to about one-third of a year's worth of learning for all students and half a year's worth for Black students.

Rather than look for the silver lining in the sudden switch to technology-enabled learning over the past year, many educators have—perhaps understandably and predictably—squandered the opportunities for innovation. Even in ordinary times, schooling communities tend to favor stability over dramatic innovation, and that has apparently ruled the day yet again. But there are a few bright spots that can inspire hope for at least some tinkering toward utopia, even if there won't be mass transformations of schools as we know them.

The Hope for Digital Learning

Schools weren't built to optimize all students' learning. They were built for many things—inculcating the values of the American democracy, sorting individuals, serving mass numbers of children in the most efficient way possible—but not for ensuring that all students learn. Instruction happens at fixed intervals, and progress is mostly based on seat time, not mastery. Students can skate by while missing large chunks of knowledge.

Many advocates of digital learning have hoped that technology could change that. Technology can personalize learning by helping to deliver just-right content and instruction at a productive pace so each student can fulfill their potential—which can bolster learning outcomes.

Advocates often point to the proven power of tutoring to make their case, such as Benjamin Bloom's famous two sigma research, in which students in the 50th percentile were able to advance two standard deviations thanks to a tutoring intervention. That research has been revised to show much lower, but still impactful, results from tutoring.

Tutors create compelling outcomes because they ensure children are working at the right level of challenge. When they see a child doesn't understand something, they can stop and state a concept in a different way or discover that a child's misunderstanding stems from a gap in a more foundational concept. If, on the other hand, they notice a child already understands something, they can allow her to progress to a more challenging concept right away rather than grow bored. Tutors can ensure that learning is competency- or masterybased, meaning that the outcome or goal of learning is fixed, and time is

the variable. Students can spend as much or as little time as they need to master content.

This is not only more effective, but also more engaging. As Daniel Willingham frames it in his book *Why Students Don't Like School,* "Working on problems that are of the right level of difficulty is rewarding, but working on problems that are too easy or too difficult is unpleasant."

Tutors also can connect on social and emotional levels with a child to create a more motivating experience. Although technology doesn't directly do that, it frees teachers up from whole-class content delivery and administrative tasks, which allows them to focus on developing deeper connections with each student one-on-one and in small groups.

Personalization also can support a more active learning experience, which research shows is superior to passive learning. When students are learning actively, they spend most of their class time engaging in activities, answering questions, or participating in discussions, not listening to a lecture or waiting for their peers to finish a whole-group activity. A meta-analysis of 225 studies looking at the impact of active learning on science, engineering, and math found it would raise average grades by a half a letter. By comparison, failure rates under lecturing increase by 55 percent over the rates observed under active learning.



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The challenge has always been that offering a tutor for every child is prohibitively expensive. But digital-learning advocates have theorized that technology can make tutor-like experiences far more accessible. Connected devices and adaptive software can allow students to work at their right level on digital material, create more active-learning experiences, and allow teachers to focus on individual students' misunderstandings and motivations rather than delivering one-size-fits-all lessons.

The Reality of Remote and Hybrid Learning

As districts rushed to move learning experiences online, however, they largely haven't embraced these principles of personalization, active learning, mastery-based learning, and engagement and motivation. And while the industry of digitallearning developers and providers has exploded in the pandemic during the nation's overnight pivot to remote learning, they are still playing a bit role.

Instead, the majority of teachers offering remote instruction have simply recreated the traditional school day online. According to a nationwide survey by the Clayton Christensen

Institute, 42 percent of teachers say their daily hours of synchronous remote instruction resemble a conventional school day. *The Education Next* survey reports that the dominant model of remote schooling is whole-class learning, with 91 percent of students experiencing this modality several times a week compared to 35 percent who have one-on-one interactions with teachers.

Rather than taking advantage of the hundreds of millions of dollars invested in creating digital K–12 curricular products, teachers have been using materials they've created themselves, the Christensen Institute reports. The next-most-popular sources are commercial curriculum designed for classroom-based instruction and "various resources collated from online sources." Only 3 percent of teachers reported using commercial curriculum intended for a virtual setting.

What's more, while 19 percent of students learn in hybrid models—in which they are in school anywhere from one to five days a week and learn the other times remotely—a majority of schools haven't added the potential for personalization that would accompany such a blended-learning model. Instead, schools are continuing to treat students as set cohorts and offering instruction based on cohort, not on current level of learning, according to the Christensen Institute. Relatively small tweaks, such as combining hybrid models with other models of blended learning to create varied activities and dynamic cohorts for students, could have an enormous payoff. Similarly, implementing competency-based learning would help districts assess where individual children are in their learning. That could make the job of catching students up next year far more efficient.

But most districts and states have stuck to running schools

based on seat time and attendance. Even worse, some districts have asked teachers to teach in-person and remote students simultaneously, which has resulted in a clunky, passive-learning experience that broadcasts content to students and taxes teachers with more work.

Finally, one research insight from the field of online learning is that in-person interactions matter for most students to be successful. Students in full-time virtual schools typically need an involved parent, and students who take an online course do significantly better when there is an onsite mentor. Yet, according to the Christensen Institute, districts have largely eschewed supporting students with in-person supports through the use of learning pods, learning hubs, or innovative teacher configurations.

Silver Linings

Amidst this doom and gloom, there are glimmers of hope. Some 79 percent of teachers report having discovered new resources and practices that they plan to keep after the pandemic, according to the Christensen Institute survey. Nearly 40 percent report using technology to facilitate such innova-

> tive practices as individualized learning progressions, project-based learning, and mastery-based learning.

> Some districts, like the Cleveland Metropolitan School District, are seeking to double down on their masterybased and personalized-learning practices. They are fundamentally rethinking school structures and schedules and have embraced what may become a last-

ing innovation from pandemic-related school closures: learning pods (see "The Rapid Rise of Pandemic Pods," *what next*, Winter 2021). These structures can promote engagement, academic progress, and equity.

"What we saw is, there may be a new way of engaging young people during and after school time using some kind of pods 2.0 iteration," said Eric Gordon, the district's chief executive officer.

The community is exploring using pods after the pandemic subsides to address a range of student needs. This could include creating supervised outlets for inquiry for students who are bored in class with material they have mastered already, helping students removed for disruptive behavior stay on track rather than be suspended, or even having student-run pods that allow students to act as tutors so others can catch up on lost learning time. These sorts of practices can support student choice and accelerate learning, and offer the sort of enhanced opportunities that well-resourced families typically provide.

"Suburban communities were forming pods on their own," Gordon said. "Why shouldn't my kids have those benefits?"

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