NATIONAL CENTER ON TIME & LEARNING

The Case for Improving and Expanding Time in School: A Review of Key Research and Practice

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COMMON SENSE TELLS US THAT WHEN IT COMES TO LEARNING, TIME MATTERS. An individual simply cannot become more proficient in any given area without committing a certain amount of time to grasping new content, practicing and honing skills, and then applying knowledge and skills to realizing specific aims. Think of the chess master who plays match after match to improve his game or the scientist who toils long hours in her laboratory to unlock the mysteries of an intricate phenomenon. For them, becoming more adept in their chosen field is the result, in large part, of the time they invest.

The great irony is that, for the better part of a century, our nation's public school system has, by its rigid adherence to the conventional calendar of 180 six-and-a-half-hour days, essentially disregarded the fundamental connection between time and learning. While expectations for the levels of preparation schools must offer the next generation of American workers and citizens have risen dramatically, education and policy leaders have not updated policies and practices to meet these changing demands. According to the 1994 National Education Commission on Time and Learning, expecting a much higher degree of learning from today's students, but providing no more time for them to absorb content and develop skills, constitutes no less than "self-deception... [that] asks the impossible of our students." True enough, to meet these high expectations, many students do not need more time in school than is traditionally available, for they can instead take full advantage of learning opportunities beyond school. But countless students do suffer the gap between time *available* in school to learn and time *needed* to learn. And, thus, the Commission report concludes with a stark observation: "If the United States is to grasp the larger education ambitions for which it is reaching, we must strike the shackles of time from our schools."[1]

So what happens when schools and students are provided significantly more time for learning? As this review will highlight, both research and practice indicate that adding time can have a meaningfully positive impact on student proficiency and, indeed, upon a child's entire educational experience. The evidence makes clear that expanded time holds this potential because more time confers three distinct, though overlapping, benefits for both students and teachers:

a. More engaged time in academic classes, alongside broader and deeper coverage of curricula;

b. More time devoted to enrichment classes and activities that enhance students' educational experiences and engagement in school; and

c. More dedicated time for teacher collaboration and embedded professional development that together enable educators to strengthen instruction and develop a shared commitment to high expectations.

In the following pages, we explore these three benefits, which emerge as a longer school day and year open up new learning and growth opportunities. We consider evidence that demonstrates how time relates to each of the three, using a mix of formal research studies and qualitative data from the field. As much as this evidence underscores the value that more time in schools can bring, it also makes clear that time is a resource that must be used well to realize its full potential. Absent intentionality of purpose

and the deliberate pursuit of high quality, the power of more time will simply lie dormant.

Because schoolchildren from high-poverty backgrounds typically enter school behind their more affluent peers academically and continue to lag behind as they age, and because these students often lack meaningful learning opportunities outside school, the three benefits of additional time *within school* hold special weight for them. Indeed, some scholars have argued schools can be "equalizers."[2] Thus, if disadvantaged children are to have any chance of developing the skills and knowledge they will need to thrive in 21st century society, the schools they attend— and the opportunities available to them and their teachers—must be improved and expanded.

The Role of Time in Boosting Student Academic Achievement

There is a large body of research that confirms the commonsensical connection between time and learning. A few examples follow:

- Research from Harvard economist Roland Fryer examined charter schools of New York City to identify those elements within schools that had the greatest impact on academic outcomes, and determined that instructional time of at least 300 more hours and high-dosage tutoring were two of the strongest predictors of higher achievement.[3]

- A study of three years of test data from Illinois schools validated that the more time individual students spent in reading and math class, the higher their scores in those subjects.[4]

- Research based on a large dataset of classroom observations in California found that differences in the amount of engaged learning time among students accounted for nine percent of differences in student outcomes in elementary grades, a strong association in the field of education.[5]

- A later study discovered that after disaggregating student outcomes by performance cohorts (i.e., examining four different groups of students, as arranged by their scores), the amount of time students spent engaged in learning was able to predict 36 percent of test score variance among the lowest performers.[6]

- A set of researchers found that the number of minutes spent reading each day during reading period held a causal relationship to individual reading achievement growth.[7]

- In a series of experiments, one scholar determined a direct correlation between students' time spent studying a passage and their proficiency on a fact-based assessment, finding that the more time students spent studying the passage, the greater their performance in both the near term and after one week.[8]

Just as time can be pivotal to learning for individual students, other research demonstrates the significance of time when the unit of analysis changes to the aggregate performance of a school. The most compelling piece of evidence that expanded-time schools have more success in promoting high achievement is found in a study of the charter schools in New York City led by Stanford University economist Caroline Hoxby. Using a multivariate analysis to identify the association of specific school policies to student outcomes, Hoxby and her colleagues discovered that those who attended charter schools with a significantly longer school year performed better on state assessments than their peers in charter schools with years of more conventional length. (Most of the charters in this study that feature a longer year also offer a longer day, so those two features can be considered as a unit.) Indeed, the researchers discovered that total learning time was one of the strongest predictors of student outcomes among the long list of school policies and structures identified.[9]

Other research has reported similar findings. One study, for example, found that, once controlling for background, students with 200 days in kindergarten made significantly more progress in mathematics from kindergarten to first grade than did students with 180 days of school.[10] An analysis of schools in Detroit that had added 15 days to the school year for three consecutive years concluded that fourth-grade students in the extended-year schools made greater improvements in reading, math, and science achievement over the three years compared to traditional-year students.[11] A meta-analysis of the effects of expanded time on student outcomes examined 15 empirical studies of extended school days and/or years and found that adding time was, more often than not, associated with improved student outcomes, noting stronger effects for schools serving large populations of at-risk students.[12]

In a mixed-methods study designed to understand why middle school students in four Boston charter schools significantly outperformed students in district middle schools, the American Institute of Research reported that one of the major structural differences between the two

types of schools was their hours of operation. Students at Boston charters attend school for substantially more hours per day and more days per year than their peers in district schools. In fact, charter school students attend for the equivalent of an extra 62 traditional-schedule days per year, and evaluators concluded this difference has a marked impact on divergent outcomes.[13] Likewise, an evaluation of the Promise Academy, the charter school run by the Harlem Children's Zone, suggested that one of the key factors of the school's strong outcomes is its extended day and year.[14]

Another way to look at how time relates to learning in schools is to consider how teachers perceive its value. Teachers' assessment of the connection between time and learning and, in turn, their perceptions of how the current quantity of available learning time in school affects their students' proficiency are telling. For example, a survey of teachers across four states found that less than half (48 percent) believed that they had sufficient time to cover the curriculum.[15] The education research organization McREL (Mid-continent Research for Education and Learning) conducted a study in 1998 that sought to quantify the time implications in classrooms of delivering a standards-based education. Surveying teachers with many years experience, the researchers endeavored to determine how many hours would be needed to enable students to reach proficiency in learning standards for language arts, civics, mathematics, and science across four different grade spans, in three Western states. On average, the teachers estimated these subjects would take, in some grades and subjects, considerably more time to teach than the time actually available during a standard school year of roughly 1,000 hours total. (See Table 1.) [16]

With the majority of states across the country implementing the Common Core standards, the perceived differential between time needed to teach the expected curriculua and time available will likely only grow. Consider that in Massachusetts, a state with standards of equivalent rigor to that of the Common Core, only 39 percent of teachers believed they had sufficient time to teach the curriculum.[17] By contrast, 85 percent of teachers in Massachusetts Expanded Learning Time (ELT) schools believe they have sufficient time with their students to reach learning goals. (ELT schools are part of a statewide program to expand the school year by 300 hours, meaning each ELT school operates with an instructional day that is over 90 minutes longer than other district schools.) Massachusetts ELT teachers report the following advantages of having more time to teach:

- Coverage of more material and examining topics in greater depth;
- Completing, reinforcing, and extending lessons;
- Connecting concepts occurring in different classes;
- Setting context and repeating content, if necessary;
- Answering students' questions; and
- Discussing and reflecting on lessons.[18]

Activating this broader array of teaching strategies has a direct, positive impact on students. As one ELT teacher described, "More learning time has significantly increased student engagement and allows students and staff to establish more meaningful relationships that create credibility in the classroom." [19]

The evidence is clear that expanding time can contribute significantly to better performance for individual students and for schools as a whole. Still, education is too complex a process to infer or claim that augmenting a single element—

Table 1
Total Estimates of Instructional Time Needed (in hours)
To Teach Standards-Based Curricula in Four Core Academic Domains

Academic Domain	Grade Level			
	2nd Grade	5th Grade	8th Grade	12th Grade
Language Arts	447	443	608	258
Civics	37	201	273	346
Mathematics	245	289	281	309
Science	90	129	260	215
TOTAL	**819**	**1,052**	**1,422**	**1,128**

Digging Deeper on Time Use in Schools

even one as ubiquitous as time—will automatically raise achievement and deepen learning. Instead, when it comes to the connection between expanding time in schools and improving student achievement, the operative word is "can" and not "will." While expanded time holds the potential to activate or accelerate higher academic performance, other organizational and human capital components also must be in place for the additional time to generate its intended effect. Specifically, there are two underlying (and interrelated) reasons why school time maintains a complicated relationship to learning, and why, for educators and policymakers, expanded time must be considered an integral component of a broader set of interconnected school improvement strategies.

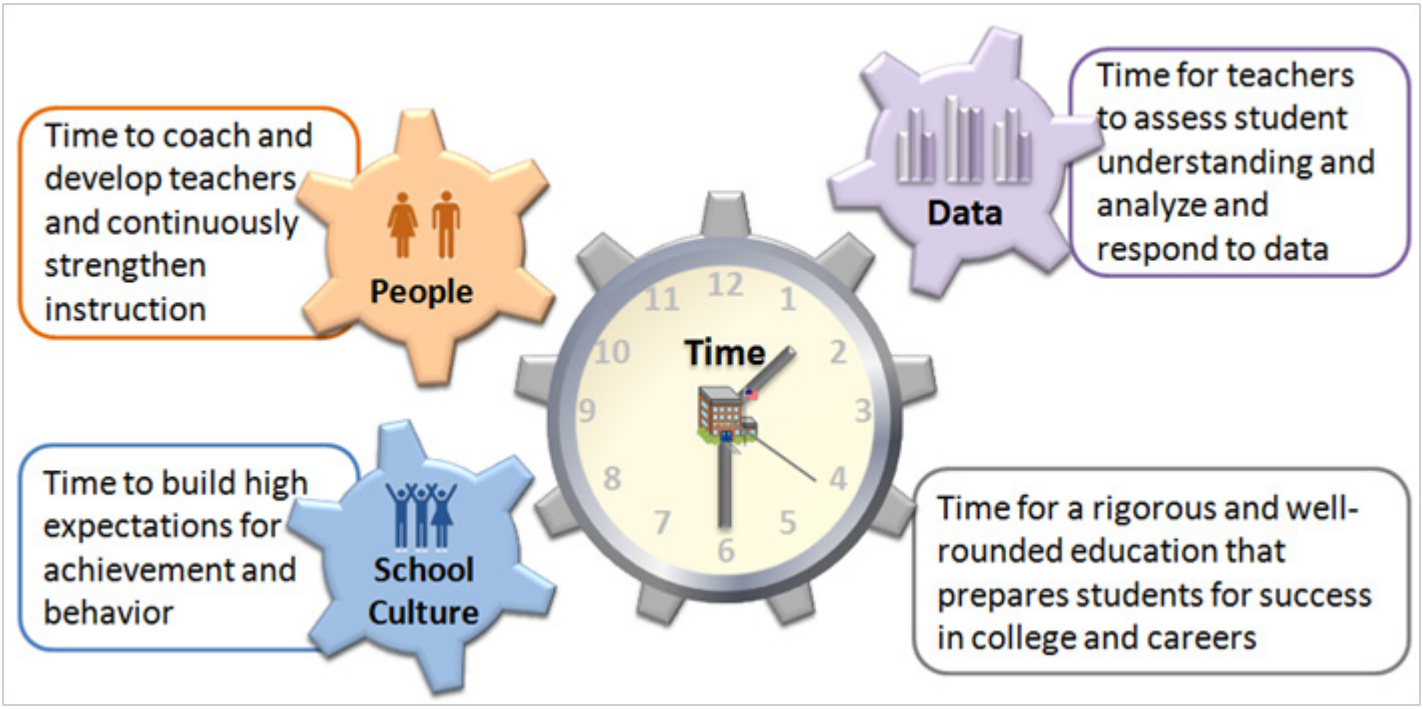
The first reason why expanding school time might not produce immediate, wholesale change relates to how schools structure the use of time within the day and across the year. That is, *how* teachers and students spend their time matters as much as the *amount* of time they have to spend. The National Center on Time & Learning describes the role of time as a single gear embedded within larger a system of gears that must turn together to achieve the promise of enhancing learning. (See Figure 1.) As Katherine Merseth notes in her book about five high-performing charter schools:

> "The purposefulness with which these schools structure time illustrates their priority for academics and facilitates the pursuit of their missions…. These practices, combined with deliberate structuring of people and nurturing culture, enable these charters to maximize time on task…." [20]

The second, and related issue, concerns the hard-to-measure, but still powerful, matter of teaching quality. A large body of research has demonstrated that quality

Figure 1

Four Interlocking Gears of Successful Expanded-Time Schools



"All of the four gears in this diagram are fundamental to successful school reform. While the gear of time helps turn the other three gears, in the absence of the others, this gear will spin unproductively. In that event, more time will have limited impact on student learning." [From Claire Kaplan and Roy Chan, *Time Well Spent: Eight Powerful Practices of Successful, Expanded-Time Schools* (Boston, MA: National Center on Time & Learning, 2011), p. 7]

of instruction is the most significant, in-school factor contributing to student achievement. [21] It is for this reason that the most extensive recent review of the effects of expanded time on student outcomes had to conclude that:

> …[t]he content and instructional strategies used in school are paramount to the success or failure of extending school time. It is only common sense that if additional school time is not used for instructional activities or if additional instruction is poor in quality, it is unlikely to lead to achievement gains. … Going further, we would suggest that instructional practices can be viewed as mediators of extended school time effects on students. That is, the effectiveness of instruction might determine whether extended school time has positive, negative, or no effects on student outcomes.[22]

Time cannot, in other words, be considered in isolation; its impact is governed by the user. Teachers who are effective with a conventional amount of time will likely be more effective with extra time because they would be inclined to use that additional time with students to enhance learning. Conversely, teachers who struggle to advance student learning within a standard amount of time would be less likely to generate meaningful impact simply by having more class time.[23]

Of course, the matter of teacher quality also relates back to the school's overall use of time, for teaching quality is often a function of how much time and energy a school devotes to professional development for teachers and for cultivating instructional improvement strategies. (See section on Teacher Collaboration below.) If a school organizes its day and year to provide substantial learning and growth opportunities for teachers, then the likelihood increases that time will be used well in their individual classrooms.

In light of how these factors play into the educational process, it is not surprising to find that in schools that have significantly more allotted time than the national average, there is still a range of student outcomes: Having equal quantities of time will not produce equally strong results. Consider an evaluation of KIPP middle schools—a network of charter schools that rests on a model featuring a schedule that is about 50 to 60 percent longer than average—which found that academic gains varied considerably. Though most KIPP schools saw significantly higher math scores among their students (as compared to peers in the respective local districts), outcomes were not equally strong across the schools. Seven KIPP schools were able to advance scores in math only modestly—though still outperforming their district peers—while 11 schools posted more impressive gains. The point is not to dismiss the positive effects that more time can bring, but merely to indicate that even among a highly-coordinated network of schools, variation in results is to be expected. Over the long-term, some schools generate stronger gains than others because variation in instructional quality and in the use of time at its most granular level is unavoidable.[24]

A Well-Rounded Education

Expanding time in schools is not just about increasing achievement in academic classrooms. Additional time also can open up opportunities to broaden students' exposure to different learning experiences. In poor neighborhoods, where the availability of such opportunities outside of school is often scant, the need for schools to provide such exposure is even greater. [25]

Compounding the problem of having limited opportunities to gain exposure to productive learning outside of school is the fact that, except for the tested subjects of reading and math, the variety of courses and enrichment activities that do exist in schools appears to have declined since 2003. A 2008 study by the Center on Education Policy found that elementary students spend, on average, 142 more minutes per week in English classes and 88 more minutes per week in math than in the days before the 2003 No Child Left Behind Act (NCLB). In the zero-sum game of school time, increases in some classes have meant decreased time in others. For the schools surveyed in the study, the classes that have most often lost time include science and social studies (now meeting about 75 fewer minutes per week), followed by art (57 minutes per week), and physical education (40 minutes).[26] (See Figure 2.) Yet, not all schools needed to make this harsh choice. Data culled from the 2007–2008 U.S. Department of Education's Schools and Staffing Survey (SASS) indicate that schools with expanded time (a longer day and/or year) allot more time than traditional-schedule schools (at statistically significant levels) to math, science, social studies, physical education, and music as well.[27]

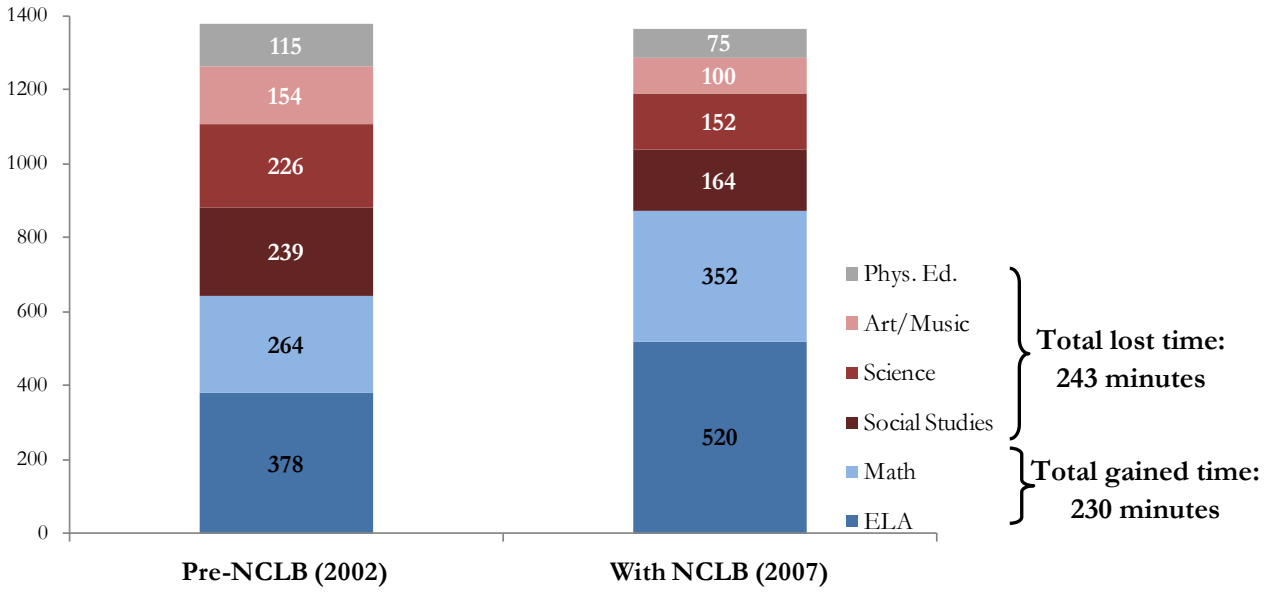
Certainly, parents are eager for schools to offer these broader and deeper opportunities. According to a survey of parents released in 2008, 84 percent believe a "well-rounded education" to be a "critical" or "very important" goal.[28] Though it may be more complicated to measure precisely the benefits of what a well-rounded education brings, there is sufficient evidence to suggest that having the opportunity to participate in arts programming and

Figure 2

Number of Weekly Minutes of Allotted Instructional Time

Pre-NCLB (2002) vs. With NCLB (2007)

By Subject



physical education classes can boost cognitive growth and better prepare students for a more productive life.

On the connection between arts education, academic achievement, and dosage (i.e., time spent) there is no shortage of research. Consider:

- The National Endowment for the Arts published a review of four studies with the following conclusion: "Socially and economically disadvantaged children and teenagers who have high levels of arts engagement or arts learning show more positive outcomes in a variety of areas [including grades, test scores, graduation rates, and school engagement measures] than their low-arts-engaged peers."[29]

- An analysis of national student databases found "significant and substantial" associations between higher grades and scores on standardized assessments and higher participation in arts programming (both in school and out). Authors concluded that "the arts appear to matter when it comes to a variety of non-arts outcomes…. The advantages accruing to arts involvement show up as both a general relationship, as well as in relations between specific art forms such as instrumental music and theater…."[30]

- A two-year study investigating the effects of a music and visual-arts curriculum on the performance of first graders found that the students who participated in the arts curriculum, though starting with a lower average test score than the non-arts curriculum students, posted higher scores after seven months in math—gains that continued into the following year. Further, the largest gains were among those students who participated for two years, the next highest for those who participated for one year, and the smallest gains for non-participants.[31]

- A study of middle and high school students revealed similar results. Students who participated in a daily 50-minute music instruction program grew faster in math achievement than those who participated just once per week and more than members of the group that did not participate at all.[32]

Researchers also suggest that gauging the value of student participation in the arts by its contribution to increased academic performance is too limiting. As Elliot Eisner, a leading authority on the subject, argues in his book Arts and the Creation of Mind, arts education, assuming it pushes students towards mastery and reflection, can develop intellectual capacities that often go beyond those activated by the more traditional core academic curricula. Skills like finding multiple solutions to problems, decision-making, and the visualization of goals and outcomes may be enhanced by exposure to the arts.[33] A study of more than 2,000 middle-school students by researchers at Columbia University confirmed these effects, finding that students who had participated in at least three years of in-school arts

instruction scored significantly higher on an instrument measuring creative thinking and that these students self-reported much higher rates of positive attitudes towards school and learning than peers who had experienced less arts education.[34]

Physical education classes, which are allotted more time in schools that offer longer days and years, can also deliver a wide range of benefits, including increased coordination, skeletal strength, and accelerated metabolism, which, in turn, might help ameliorate the skyrocketing incidence of childhood obesity.[35] But the potential advantages of more physical education opportunities do not stop with improvements to the body. New research on brain structure and function indicates that regular physical activity might also stimulate physiological change to the brain that will, in turn, promote cognitive growth. Eric Jensen explains in *Teaching with the Brain in Mind* that the cerebellum, which controls physical movement, also regulates neuron activity to and from the cerebral cortex. Many studies have revealed that invigorating the cerebellum through physical exercise can then influence brain capacity to pay attention in class, engage in higher-order thinking, and hone memory, spatial perception, and decision making.[36]

There are other facets of the school experience that, though less structured, also can be vital to children's growth and development. The most obvious free time during the school day is recess, a period that has been vulnerable to reductions as educators consider how to wedge more time for academic pursuits into the day. Yet, research shows that recess can contribute to the healthy development of children across a number of domains, including increasing physical activity, spurring brain development, lowering obesity, and encouraging social development through game playing and negotiating relationships through unstructured activities.[37] One experiment suggests that recess itself can even affect the amount of time students focus on learning during class. Comparing two fourth-grade classes, researchers observed student behavior in these classes on randomly chosen days when a recess period was given for 20 minutes. On those days when students had recess, they were observed to fidget less and pay greater attention in class.[38] Schools with more time also have, according to the USED Schools and Staffing Survey, more recess time.

As with the discussion of academic time, the mere fact of having these enrichment opportunities—from arts and music to physical education and recess—will not guarantee they have any meaningful impact on students. The matter of program quality—which is both highly variable and difficult to measure—clearly mediates the potential effects. What is more certain is that the constraints of the standard day and year are more likely to hamper schools' capacity to offer these opportunities in the first place (or, at least, to offer them in substantial dosages). Time, in this respect, is an enabler, a necessary resource without which such opportunities might not exist.

The third benefit of expanded school time relates to how teachers spend their time and, specifically, how they spend their time preparing for their own classes and improving their craft, a linchpin of school reform. According to the National Staff Development Council (NSDC), "Efforts to improve student achievement can succeed only by building the capacity of teachers to improve their instructional practice…."[39] The NSDC maintains that building this capacity is best achieved not by keeping teachers isolated from one another, but rather by structuring opportunities when teachers convene so that they may work on

Teacher Collaboration

instructional improvements collaboratively. As Richard DuFour, a leading scholar of collaboration, explains: "For teachers to participate in such a powerful process, the school must ensure that everyone belongs to a team that focuses on student learning. *Each team must have time to meet during the workday and throughout the school year*."[40]

Yet, in most American schools, the occasions for teachers to meet regularly are too rare. The National Commission on Teaching and America's Future reports that teachers in the United States typically have three to five hours per week reserved for lesson planning, but that this time is seldom held in conjunction with colleagues.[41] An analysis of teacher contracts from many of the largest school districts in the country reveals that only about four in ten mention teacher collaboration at all, and of that number, a mere handful specify set times for this collaboration to take place.[42] Of the over 1,000 teachers surveyed in the 2009 MetLife Teachers Survey, just one quarter (24 percent) had at least three hours per week for collaboration, while 58 percent had two hours or less.[43] In schools with more time in the day, however, available evidence suggests that teachers meet more frequently. Among Massachusetts Expanded Learning Time schools, for example, principals reported that teachers spend an extra hour (or more) per week collaborating than they did when they operated with a standard day of six hours.[44]

Why is collaboration essential? Ideally, these opportunities to work together will then lead to the formation of what are known as "professional learning communities," or PLCs. A goal that has become more widely pursued over the last decade, a PLC involves developing among teachers a culture of collaboration with a shared objective of improving their instruction together. Researchers from the Center on Organizing and Restructuring Schools have found definitively that in schools with well-developed PLCs—measured by teachers reporting high levels of collective responsibility for student learning—students performed better in reading, math, science, and history. The authors of the report stress that students tend to do better in class because they receive the consistent message from teachers that students *should* strive to do their best. Teachers deliver this consistent message to students, as the adults develop their own shared commitment to holding one another accountable for improved outcomes. This shared commitment, in turn, emerges from frequent interactions among and between teachers.[45]

Therefore, allocating time for teachers to meet regularly is pivotal. There is considerable evidence to suggest that absent these opportunities to sit down together and discuss their students' learning needs and their own abilities to address those needs, teachers are much less likely to form PLCs. One recent study, for example, showed that compared to traditional professional development meetings, collaborative planning time (also known as "embedded learning opportunities") led to much higher incidence of reflective practice among teachers and, as the author explains, reflecting on practice is a first step towards strengthening instruction.[46] A set of researchers from Minnesota and Ohio conducted a study of the teaching staffs in 24 schools to try to determine those elements that might affect the formation of strong PLCs. These researchers found that, among the various school conditions they identified, having a regular time for teachers to meet together was the most powerful factor—one that explains up to 70 percent of the variation in the relative strength of PLCs among schools.[47]

While the amount of collaboration time needed each week to generate meaningful impact on student achievement is uncertain, one piece of evidence suggests that the difference between what qualifies as sufficient time in collaboration and what might be inadequate is relatively modest in real terms (just one hour per week), but potentially significant in the spread of the culture of collaboration focused on improving student learning. In the 2009 MetLife survey, high-collaboration schools were those where teachers met an average of 3.4 hours per week, while in low-collaboration schools teachers met an average of 2.3 hours. Still, evidence of collaboration is much stronger in the schools with the additional hour. (See Table 2).[48]

And so, the path from dedicated collaboration time for teachers to better student outcomes is clear: Having more opportunities to meet allows teachers to work together, to learn from one another, to develop shared responsibility, and to commit to excellence—all of which will lead teachers to better serve the needs of their students and, in turn, will result in greater student proficiency. As a teacher in a Florida expanded-time school expressed about the impact of working more closely with her peers: "I didn't believe it [collaboration] would matter at first, but I've seen a huge difference in my own classroom. My students are learning more."[49]

Table 2

Higher Level vs. Lower Level of Teacher Collaboration at School: Attitudes and Experience

Frequency of Collaborative Activities (% responding always/often)	**All Teachers**	
	Higher (3.4 hrs./week)	**Lower** (2.3 hrs./week)
Teachers meet in teams to learn what is necessary to help their students achieve at higher levels	98%	63%
Teachers examine and discuss student work with each other regularly	93%	55%
My school structures time for teachers to work together	94%	47%
My principal's decisions on school improvement strategies are influenced by faculty input	92%	48%
Beginning teachers have opportunities to work with more experienced teachers	95%	59%

School Time and the National Future

In the early years of the 21st century, America has set ambitious goals for our educational system. We want nothing less than to enable the next generation of Americans both to compete successfully in the global economy and to be prepared to live rich, fulfilling lives. During his first months in office, President Obama stated the case clearly: "The relative decline of American education is untenable for our economy, it's unsustainable for our democracy, and unacceptable for our children—and we can't afford to let it continue. What's at stake is nothing less than the American dream."[50]

The president's rhetoric was confirmed in a startling study from the consulting firm McKinsey & Company, which revealed that failing to provide a first-rate education to all students and, by implication, allowing socioeconomic achievement gaps to persist, "imposes on the United States the economic equivalent of a permanent national recession." But the report also found reason for hope because "the wide variation in performance among schools and school systems serving similar students suggests that the opportunity and output gaps related to today's achievement gap can be substantially closed."[51]

Certainly, myriad factors account for the variation in school effectiveness, but, as this review has described, a preponderance of evidence points to the powerful association between more time in school (both generally and spent in specific activities) and better outcomes for students, especially for those who otherwise lack learning opportunities outside school. From the increased breadth and depth of academic content, through the greater exposure to the arts and other enrichments that deepen engagement and broaden skills, to the dedicated sessions for teachers to collaborate on improved instruction, a longer school day and year translate to expanded opportunities for learning.

While having more opportunities for learning does not automatically guarantee higher proficiency and better-developed skills among students from all backgrounds, without expanding learning time, there seems to be a much smaller chance of achieving such results. As Richard Barth, CEO and President of the KIPP Foundation, has asserted: "When you look at the public schools that are fundamentally changing the trajectory of students' lives in high-poverty communities, the overwhelming majority offer expanded learning time in school."[52]

Notes

[1] National Education Commission on Time and Learning, *Prisoners of Time* (Washington, DC: U.S. Department of Education, 1994).

[2] Douglas Downey, Thomas von Hippel, Beckett Broh, "Are Schools the Great Equalizer? Cognitive Inequality during the Summer Months and the School Year," *American Sociological Review*, 69:5 (October 2004), pp. 613-635.

[3] Will Dobbie and Roland G. Fryer, Jr, "Getting Beneath the Veil of Effective Schools: Evidence from New York City," NBER Working Paper, No. 17632, December 2011. On the number of hours, Dobbie and Fryer found that high-achieving elementary schools provide about 26.68 percent more instructional hours per year than typical NYC schools, while high-achieving middle schools provide about 28.07 percent more. Non-high-achieving charter schools, on the other hand, provide just 11.39 and 21.38 percent more instructional time at the elementary and middle school levels, respectively. (The typical high-achieving elementary school has 190.67 instructional days and an instructional day of 8.07 hours, compared to 183.80 instructional days and 7.36 instructional hours at other charter schools. The typical high achieving middle school meets for 191.00 instructional days, with a typical instructional day lasting 8.17 hours. Other charter middle schools in the sample meet for only 187.14 instructional days with an average day of 7.87 hours.)

[4] Dennis Coates, "Education Production Functions Using Instructional Time as an Input," *Education Economics*, 11:3 (Dec 2003), pp. 273-292.

[5] Charles Fisher and David Berliner, *Teaching and Learning in the Elementary School: A Summary of the Beginning Teacher Evaluation Study* (San Francisco, CA: Far West Lab for Educational Research and Development, 1978).

[6] R.A. Rossmiller, *Resource Utilization in Schools and Classrooms: Final Report (Program Report 86-7)* (Madison, WI: University of Wisconsin Center for Education Research, 1986).

[7] B.M. Taylor, B.J. Frye, and G. M. Maruyama, "Time Spent Reading and Reading Growth," *American Educational Research Journal*, 27:2 (1990), pp. 351-362.

[8] Maribeth Gettinger, "Individual Differences in Time Needed for Learning," *Educational Psychologist*, 19:1 (1984), pp. 15-29; Gettinger, "Time Allocated and Time Spent Relative to Time Needed for Learning as Determinants of Achievement," *Journal of Educational Psychology*, 77:1 (1985), pp. 3-11; and Gettinger, "Effects of Maximizing Time Spent and Minimizing Time Needed for Learning on Pupil Achievement," *American Educational Research Journal*, 26:1 (Spring 1989), pp. 73-91.

[9] Caroline Hoxby and Sonali Murarka, "New York City Charter Schools: How Well are They Teaching Their Students?," *Education Next*, Summer 2008: pp. 54-61. For additional research that suggests how time plays a functionally significant role in the organization of a high-quality school see Katherine Merseth, et al, *Inside Urban Charter Schools: Promising Practices and Strategies in Five High-performing Schools* (Cambridge, MA: Harvard University Press, 2009) and Karin Chenoweth, *It's Being Done: Academic Success in Unexpected Schools* (Cambridge, MA: Harvard University, 2007).

[10] J.A. Frazier and F.J. Morrison, "The Influence of Extended-year Schooling on Growth of Achievement and Perceived Competence in Early Elementary School," *Child Development*, 69:2 (April 1998), pp. 495-517.

[11] C.A. Green, *The Extended School Year Consolidated Report: Achievement Test Scores and Survey Findings*, Technical Report (Detroit, MI: Detroit Public Schools Office of Research, Evaluation and Testing, 1998).

[12] Erika A. Patall, Harris Cooper and Ashley Batts Allen, "Extending the School Day or School Year: A Systematic Review of Research (1985 – 2009)," *Review of Educational Research*, 80:3 (September 2010), pp. 401 – 436.

[13] Atila Abdulkadiroglu, et al, *Informing the Debate: Comparing Boston's Charter, Pilot and Traditional Schools*. (Boston, MA: The Boston Foundation, 2009); Susan Bowles Therriault, et al, *Out of the Debate and into the Schools; Comparing Practices and Strategies in Traditional, Pilot and Charter Schools in the City of Boston (*Boston, MA: American Institutes for Research, 2010).

[14] Roland Fryer, R. and William Dobbie, "Are High-quality Schools Enough to Close the Achievement Gap? Evidence from a Bold Social Experiment in Harlem," *Unpublished manuscript*, April 2009.

[15] Surveys are conducted by the New Teacher Center and results can be obtained at: http://www.newteachercenter.org/tlcsurvey/index.php

[16] Judith Florian, *Teacher Survey of Standards-based Instruction: Addressing Time* (Aurora, CO: Mid-Continent Research for Education and Learning, 1999)

[17] Massachusetts Teaching, Learning, and Leading Survey (MassTeLLS), 2009.

[18] Amy Checkoway, et al, *Evaluation of the Expanded Learning Time Initiative Year Four Integrated Report: 2009-10* (Cambridge, MA: Abt Associates, March 2011), p. 53.

[19] Massachusetts 2020, *Kuss Middle School: Expanding Time to Excelerate School Improvement* (Boston: Author, 2009), p. 4.

[20] Merseth, et al, *Inside Urban Charter Schools*, pp. 179-82.

[21] See, for example, James H. Stronge, *Effective Teachers=Student Achievement: What the Research Says* (Larchmont, NY: Eye on Education, 2010).

[22] Patall, et al., p. 430.

[23] Two sets of research suggest how time metrics may be a helpful prism through which to view teacher quality. The first relates to how managing time in very subtle ways—and, more specifically, the way in which teachers structure classroom discussion—can have an impact. Studies of classroom interactions between teachers and students that examine deliberate or expected pauses in conversation—either to allow for questions from students or responses to questions from teachers, known in the research as "wait time"—have shown an effect on learning. Especially in math and science classes, teachers' wait time of three to five seconds (as opposed to shorter wait times) has been associated with an increased cognitive depth. On the one hand, if teachers paused a few seconds before posing questions, the questions themselves were more likely to be better focused on querying students' understanding rather than their mere recall. On the other, students' responses tended to be lengthier and more complex, if the teacher waited a few moments before calling on a particular student to answer. [Kenneth Tobin, "The Role of Wait Time in Higher Cognitive Level Learning," *Review of Educational Research*, 57:1 (Spring, 1987), pp. 69-95.]

Teacher quality also relates to how teachers motivate students to learn. Keep in mind that when it comes to maximizing productive learning time, the ultimate arbiter of how much time any given student commits to learning is the student himself or herself. Each student must decide to what degree s/he will persevere and dedicate his/her own mind to grasping new concepts and practicing skills. There is no single piece of evidence indicating with any precision to what degree teachers can influence student motivation, but several researchers have found that various techniques, including using extrinsic rewards sparingly, supporting students consistently, and promoting mastery learning, can enhance student attention and engagement. [For various research on teachers' role in enhancing student motivation, see Sandra Brooks, Susan Freiburger and Debra Grotheer, *Improving Elementary Student Engagement in the Learning Process through Integrated Thematic Instruction*. (Unpublished master's thesis, Chicago, IL: Saint Xavier University); L. Anderman and Carol Midgley, "Motivation and Middle School Students" (ERIC digest, 1998). Champaign, IL: ERIC Clearinghouse on Elementary and Early Childhood Education; Linda Lumsden, *Student Motivation to Learn* (ERIC Digest No. 92), 1994, (Eugene, OR: ERIC Clearinghouse on Educational Management); and Ellen Skinner and Michael Belmont, *A Longitudinal Study of Motivation in School: Reciprocal Effects of Teacher Behavior and Student Engagement* Unpublished manuscript, (Rochester, NY: University of Rochester, 1991).]

[24] Christina Clark Tuttle, et al, *Student Characteristics and Achievement in 22 KIPP Middle Schools* (Washington, DC: Mathematica Policy, June 2010).

[25] Susan Bouffard, et al, "Demographic Differences in Patterns of Youth Out-of-School Time Activity," *Journal of Youth Development*, 1:1 (May 2006), pp. 24 – 39.

[26] Jennifer McMurre, *Instructional Time in Elementary Schools: A Closer Look at Changes for Specific Subjects* (Washington, DC: Center on Education Policy, February 2008).

[27] The Schools and Staffing survey collects data from a representative sample of principals from across the country to identify, among other things, how students spend their time in school. For analysis of some key data related to time, see Tammy Kolbe, Mark Partridge and Fran O'Reilly, *Time and Learning in Schools: A National Profile* (Boston, MA: National Center on Time and Learning and Storrs, CT: Center for Education Policy Analysis, March 2011), p. 24.

[28] "Key Findings On Attitudes Toward Education and Learning," (Washington, DC: Peter D. Hart Research Associates, May 2008)

[29] James Catterall, *The Arts and Achievement in At-Risk Youth: Findings from Four Longitudinal Studies*, Research Report #55 (Washington, DC: National Endowment for the Arts, March 2012), p. 24.

[30] James Catterall, Richard Chapleau and John Iwanaga, "Involvement in the Arts and Human Development: General Involvement and Intensive Involvement in Music and Theater Arts," in Edward Fiske, ed. *Champions of Change: The Impact of the Arts on Learning* (Washington, DC: President's Committee on the Arts and Humanities, 1999).

[31] M.F. Gardiner, et al, "Learning Improved by Arts Training," *Nature*, 381 (May 1996), p. 284.

[32] B.J. Whitehead, *The Effect of Music-intensive Intervention on Mathematics Scores of Middle and High School Students*. Unpublished dissertation, *Dissertation Abstracts International*, 62 (08), 2710A. Also see, Donald A. Hodges and Debra S. O'Connell, "The Impact of Music Education on Academic Achievement," in *Sounds of Learning: The Impact of Music Education* (Carlsbad, CA: International Foundation for Music Research, 2005).

[33] Elliot W. Eisner, *Arts and the Creation of Mind* (New Haven, CT: Yale University Press, 2002). See also Richard J. Deasy, ed. *Critical Links: Learning in the Arts and Student Academic and Social Development* (Washington, DC: Arts Education Partnership, 2002), a compendium of studies that examine the wide range of effects that arts programming (music, dance, drama and visual arts) can have on students' cognitive development and their creative thinking skills.

[34] Judith Burton, Robert Horowitz and Hal Abeles, "Learning In and Through the Arts: Curriculum Implications," in Fiske, ed. *Champions of Change*.

[35] Oded Bar-or, "Health Benefits of Physical Activity during Childhood and Adolescence," *Fitness Research Digest*, 2:4 (1995), pp. 1-8.

[36] Eric Jensen, *Teaching with the Brain in Mind* (Alexandria, VA: Association for Supervision and Curriculum Development, 1998); "Physical Activity May Strengthen Children's Ability To Pay Attention" *Science Daily*, 1 April 2011; and W. H. Calvin, *How Brains Think: Evolving Intelligence, Then and Now* (New York: Basic Books, 1996).

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[38] Olga Jarrett, et al, "The Impact of Recess on Classroom Behavior: Group Effects and Individual Differences," *Journal of Educational Research*, 92:2 (November/December 1998), pp. 121-126.

[39] Linda Darling Hammond, et al, *Professional Learning in the Learning Profession: A Status Report on Teacher Development in the United States and Abroad*, (Dallas, TX: National Staff Development Council, 2009), p. 7.

[40] Richard DuFour, "What is a Professional Learning Community?" *Education Leadership*, 61:8 (May 2004), p. 10. Emphasis added.

[41] National Commission on Teaching and America's Future, *What Matters Most: Teaching for America's Future* (New York: Author, 1996).

[42] See the NCTQ database, TR[3], at http://www.nctq.org/tr3/search.jsp.

[43] *The MetLife Survey of the American Teacher: Collaborating for Student Success* (New York: MetLife Foundation, 2010), p. 72.

[44] See Checkoway, et al, *Evaluation of the Expanded Learning Time Initiative*.

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[46] Eric M. Camburn, "Embedded Teacher Learning Opportunities as a Site: An Exploratory Study," *American Journal of Education* 116:4 (August 2010), pp. 463-89.

[47] Karen Seashore Louis, et al, "Professional Community in Restructuring Schools" *American Education Research Journal*, 33:4 (Winter 1996), pp. 757-798.

[48] *The MetLife Survey of the American Teacher*, 2010, p. 21.

[49] See David Farbman, *Harnessing the Power of Expanded Time To Improve Schools: A Study of Three Districts* (Boston, Mass.: National Center on Time and Learning, 2011).

[50] Barack Obama, Speech to the Hispanic Chamber of Commerce, Washington, D.C., 10 March 2009.

[51] McKinsey & Company, *The Economic Impact of the Achievement Gap in America's Schools* (New York: Author, 2009), p. 6.

[52] Richard Barth, "Innovations at Work: The Power of Expanded Learning to Increase Student Achievement," Remarks at Congressional Briefing, Washington, D.C., 1 February 2011.