A Review of the Literature on School Scheduling Practices and State Policy Trends

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Overview of the Study

Why was this study conducted? Maine and other states continue to examine and make changes to different aspects of K-12 school schedules, including time for core content instruction, lunch periods, physical exercise for students and school start times. In July 2023, the governor approved legislation (LD 1002) directing the Maine Department of Education to convene a work group to study different aspects of school schedules and approaches for structuring the school day, and for the Maine Education Policy Research Institute (MEPRI) to review the broad literature on this topic, to inform state and local policy decisions around school schedules. This report presents findings from MEPRI's review of the national literature on school scheduling, which includes: school scheduling practices across the US, research evidence suggesting best practices for school scheduling where available, and a survey of state policy trends and changes related to school scheduling. The literature review examines both instructional and non-instructional segments of the school day, but does not describe scheduling for all core subjects due to the time limitations of this study.

What did we learn from the study? Our broad search of the literature on school scheduling revealed some trends in practice, research and policy. These are briefly summarized here:

Instructional Time in Schools

Policies, Practice and Research on Instructional Time

- All states in the US specify a required minimum number of instructional days and/ or hours for elementary and secondary students. Most states require a minimum of 1,080 hours of instructional time. Maine, along with 17 other states, requires closer to 900 instructional hours during the school year. In Maine, school districts are required to provide a minimum of 180 school days, where up to five days can be used as teacher in-service days, so a minimum of 175 instructional days. In addition, the average instructional time each day should be a minimum of five hours. For 35 states, the minimum time required depends on grade level. Schools often provide more instructional hours over the school year than the minimum required by state policy.
- Maine ranked 47th in the US for the average number of hours in a school year (1,144 hours) across grade levels based on a national survey. One estimate suggests that if the five states with the lowest number of school day hours (Hawaii, Nevada, Maine, Oregon and Rhode Island) increased the school day to seven hours, students would gain the equivalent of an additional 1.3 years of instructional time. For Maine schools, this would mean increasing the school day by 30-40 minutes per day.
- Based on a 2017-18 national survey, states with the highest number of hours in the school year included Texas and Nebraska followed by Arkansas, Mississippi, Alabama, Wisconsin, Louisiana, West Virginia and Michigan.

- Some states have made efforts to increase the amount of required instructional time. New Mexico initially sought to encourage districts to increase instructional time through fiscal incentives, but eventually increased the required time from 990 hours for elementary students and 1,080 for other students to 1,140 instructional hours for all students. Other states have used grant programs to encourage schools to increase instructional time.
- Increased instructional time during the school day or year does not automatically guarantee improved student academic outcomes! The result will depend on a variety of factors including how instructional time is used to support learning, and the ability to reduce non-instructional time during the school day. The effects of increasing or decreasing time are greatest when the initial amount of instructional time is low. Student and teacher absences, interruptions during instruction and transition time between activities can all reduce actual learning time for students. Some low-performing schools in Massachusetts that piloted a longer school day (6 hours to 7.75 hours) used that time for non-instructional activities and also saw a reduction in the number of qualified teachers, resulting in no real improvement in academic outcomes. However, other Massachusetts schools have seen an improvement in math and language arts achievement from a longer school day.

School Year Calendars

- Maine and most schools in the US start the school year in August, but some schools start in July. Schools in the southern states tend to start earlier than other regions.
- Some states have policies on the start and end dates for the school calendar. Maine allows school districts to decide on their school start and end dates.
- Concerns about rising summer temperatures have increased consideration for delaying the start of the school year in some states. According to one report, schools in New England are less likely to have air conditioning than in some other regions. Excessive heat has been linked with lower student achievement and negative health impacts.
- State tourism interests have advocated for later school start dates in some places to extend the summer tourist season and ensure adequate staffing for those businesses.
- Both federal and state policymakers have made efforts to extend the school year with various degrees of success and outcomes. Some states have pursued a longer school year or year-round school (with shorter summer vacation) for the purpose of reducing summer learning losses or pandemic-related learning loss, and to increase student academic outcomes. New Mexico provided incentive funding to districts to add up to 25 school days to the calendar and saw significant gains in academic performance.
- Extending the school calendar increases the financial cost of schooling for districts and the state.
- One quarter of South Carolina schools adopted a year-round school calendar of 180 total school days but shorter summer break. Forty districts in Washington state are piloting a similar year-round calendar. The research on year-round schools does not yet show

evidence of benefits for academic outcomes, but more research is needed and will be forthcoming from these pilots.

- With year-round school, parents may experience challenges in accessing childcare during the longer breaks throughout the school year, and teens may have more difficulty finding jobs during their breaks.
- Teacher unions have generally opposed increasing instructional time whether through longer school days or school calendars.

Four-day School Week Schedules

- A four-day school week schedule eliminates one school day per week for staff and students. School days are slightly longer and the school week may have the same or fewer hours per week.
- Interest in the four-day school week schedule has increased in recent years, initially to decrease the time students spend commuting to school each week, but more recently as a strategy to attract and retain teachers during a time of staffing shortages in K-12 schools, particularly in rural settings. Adoption of a four-day school week is generally very popular with students, parents and teachers. Support for a four-day week increased after the pandemic. Once a district adopts this schedule, neighboring districts are more likely to adopt a similar schedule.
- Four-day school week schedules have been implemented since the 1980s, primarily in western states. Currently, 72% of Colorado public school districts have a four-day week schedule, and the vast majority of rural districts in that state (91%) have that schedule. In Maine, a school district could pursue this schedule change as long as they meet the minimum number of instructional hours required by the state.
- Some states are beginning to adopt policies to limit the use of a four-day school week out of concern for students' academic outcomes in those states. California, Montana, New Mexico and Oklahoma are among the states increasing oversight and restrictions on four-day school week schedules.
- Research on the impact of shifting from a five-day to four-day school week on student academic achievement generally found either declining achievement in math and English test scores or no difference. The academic impacts depend on other factors as well.
- Some families felt student behavior and well-being improved with the move to a four-day week. Students were more likely to be involved in extracurricular and community activities when they have one day off each week. Data on other impacts such as change in in-school bullying, discipline rates, substance abuse and youth crime rates are mixed.
- Most school districts saw a small cost savings by adopting a four-day school week and many chose to reallocate any small savings to other purposes in their budgets.

School Day Start Times

- School day start times vary across districts and states and tend to be different for elementary and secondary grade levels.
- Just prior to the pandemic, a national survey found the average start time was 8:03 a.m. for high schools and 8:15 a.m. for elementary schools. In that survey, the average start time for Maine schools across grade levels was 8.03 a.m., slightly earlier than the national average of 8:10 a.m., with start times varying across districts.
- Twenty-six states, including Maine, have proposed legislation in recent years to study school start times or to encourage or require later start times for students in upper grades. California and New Jersey require high schools to start no earlier than 8:30 a.m. Five states have pending legislation requiring a study of later start times for secondary students. Pennsylvania studied the topic and recommended districts adopt later start times for certain grades, and Utah has a resolution encouraging districts to consider later start times. Maine has considered proposals for later start times for middle and secondary students in recent years, but the state does not specify school day start times. It is a local district decision.
- The available research provides strong evidence of health, safety, well-being and academic benefits for a later school start time for adolescents to align better with changes in biological sleep patterns that occur during the teenage years. This research is the primary impetus for the increased interest in changing policies to allow for or require later school start times for middle and secondary grades.

Block Scheduling

- Block scheduling (longer class periods offered on alternative school days) continues to be widely used in middle schools and high schools in the US, showing little change since the 1980s and 1990s.
- An informal survey of Maine high schools conducted by the Maine Principals Association in January 2023 found that of the 151 member high schools, 42 responded and confirmed they have block scheduling. The length of class periods varied greatly, ranging from 40 to 80 minute blocks.
- While block scheduling has not been studied much since the 1990s, the available research provides evidence of some benefits for both teachers and students. However, the research evidence is mixed on whether or not block scheduling improves academic learning and achievement.
- Some studies indicated that teachers felt they had more time to cover content in their courses, go into more depth, and to use a broader range of instructional approaches beyond lecture to more actively engage students in learning when they had more time with block periods.

- Some studies found increased academic achievement outcomes for students with block schedules compared to traditional, daily class periods, while other studies found no significant difference in learning outcomes.
- Some studies found improvement in student attendance, reduced disciplinary actions, reduced dropout rates, improved school climate and reduction in student stress with the adoption of block scheduling.

World Language Instruction

- According to a national report from 2017, school districts across the US predominantly offer a limited choice of world languages in their curriculum: French, Spanish, and sometimes German, Latin, and sign language at the middle and secondary grades. While these choices have not changed much in several decades, there has been increased adoption of Chinese language instruction in recent years. Maine requires school districts to include world language instruction in the curriculum.
- School size, location and the availability of qualified educators constrain language offerings in school systems. World language education continues to have high staffing shortages in the US.
- Most schools offer daily class instruction of an hour or less, while some may have adopted block scheduling for language instruction and other subjects.
- Even prior to the pandemic, students were accessing world language courses through early college or online programs from other institutions, often outside the school day. The use of remote, online instruction accelerated during the pandemic. Research has found comparable learning outcomes for face-to-face programs and hybrid or online programs.
- Experts in the learning of a second language maintain that the amount of exposure most students have in school is not sufficient to build strong proficiency in a second language, and suggest additional informal, out-of-school learning and practice, and increased use of technology tools to support language learning.
- While research suggests that frequent instruction, more intense instruction and instruction over several years is needed to build competency in a second language, the available research does not clearly indicate a best approach for scheduling and delivering world language instruction to K-12 students. There are many variables that interact to affect an individual student's language learning outcomes.

Physical Education

- Most school districts in the US include physical education in the curriculum, but practices vary in terms of how often, how many minutes, and in what ways students receive physical education during the school day. Some students have physical education every school day, while many other students have far less physical education during the school week.

- Most states require physical education to be included in the curriculum, but do not specify a minimum amount of time, or require less than 60 minutes per week for elementary students and less than 90 minutes per week for secondary students. Only South Dakota has requirements that align with the US Department of Health and Human Services recommendation for 225 minutes per week (45 minutes per day) of physical education for secondary students and 150 minutes per week (30 minutes per day) for elementary students.
- Maine requires physical education for elementary and secondary students, but does not specify a minimum number of minutes, nor how often it should be provided during the school week.
- The 2019 Youth Risk Behavior Surveillance System survey found that nationally 25.9% of teenagers indicated they had daily physical education, while only 4.6% of Maine teenagers reported having physical education classes on a daily basis.
- The federal recommendation is for youth to have at least 60 minutes daily of moderate to vigorous physical activity as well as regular engagement in vigorous activity. This activity could be obtained both during and outside of the school day. Most states, including Maine, do not specify how much of the physical education time should include moderate to vigorous activity.
- National survey data indicate a significant decline in the percentage of students who engage in the recommended levels of physical activity, even within the past decade. Children from low-income families or whose parents have lower education levels are significantly less likely to participate in sports than other children.
- School and community partnerships can provide additional opportunities for youth to engage in physical activity outside of the school day using school or community facilities.

Non-Instructional Time in Schools

Recess Time

- Schools in the US have traditionally scheduled a brief recess of 15-25 minutes (shorter than class periods) at midday for students, typically after lunch. Recently, some districts and states have moved to schedule recess before lunch, to improve students' appetite for lunch and reduce food waste.
- Hawaii adopted a policy to schedule recess before lunch in 2009. Other states like California, Iowa and Missouri recommend this scheduling change and provide toolkits to assist districts. Some districts in Maine have also adopted this practice.
- Nine states have policies requiring schools to provide recess time, 14 states recommend recess time, and 17 states have non-codified policies such as guidelines on recess.
- In 2021, five states required under 20 minutes of recess, five states required 20-30 minute recess, and two states (Arkansas, Illinois) required more than 30 minutes recess in addition to physical education.

- Research and district reports on the impact of moving recess from after lunch to before the lunch period have found many benefits for students and the school. Students who have recess and exercise time just before lunch have improved appetites and eat more of their lunch, including the healthy foods offered, and food waste is reduced. In addition, students show better focus and attention in the classroom and better behavior both in the lunchroom and in classes after lunch. Teachers report less loss of instructional time.
- Staffing and logistical challenges with the change in recess scheduling were reported by some districts. Iowa, Missouri and Hawaii have developed toolkits with suggestions on ways to schedule recess before lunch and other resources can be found online.

Meal Time in School

- Schools have historically provided lunch or time for students to each lunch during the school day, and increasingly are also providing breakfast to students. The time allowed for lunch and breakfast in the school schedule varies across grades, schools and states. While the national average time for a school lunch period is 25-30 minutes, the scheduled time varies greatly across schools and actual seat time for students to eat is often far less. Waiting in line to receive food and bathroom breaks reduces time for students to eat.
- A survey of school districts conducted by the Maine Department of Education in 2021 revealed one fifth (21%) of elementary schools had the shortest lunch periods of 15-20 minutes, while 36% of middle schools and 22% of secondary schools had short lunch periods of 15-20 minutes. Other schools had longer lunch periods. Overall, 60% percent of schools had wait times of 6-10 minutes during lunch, and 9% of schools had wait times of over 11 minutes.
- Problems with short meal periods include insufficient time for students to eat their meal, reducing students' nutritional intake and ability to concentrate and learn in class, as well as the waste of food that goes uneaten.
- At both the state and federal levels, policymakers have considered and adopted policies to specify longer seat times for student lunch periods and have also called for studies. States adopting a policy requiring a minimum of 20 minutes of seat time for lunch include West Virginia and New Mexico. Connecticut, Rhode Island, and South Carolina recently proposed legislation for longer lunch periods. Recent federal legislation (the Healthy Meal Time Act) proposed a study to generate recommendations for best practice. Maine does not specify a minimum time for school lunch or seat time during the lunch period.
- North Carolina and Oregon both approved policies that allow school breakfast to be served during instructional time. West Virginia mandated a minimum of ten minutes for students to eat school breakfast. Other states are considering legislation related to providing time for school breakfast.
- Both the Centers for Disease Control (CDC) and the American Academy of Pediatrics (AAP) recommend a minimum of 20 minutes of seat time for school lunch, but do not provide recommendations for a minimum time for students to eat breakfast at school.

- Research studies have provided evidence of a wide range of benefits for students and schools with longer lunch periods, including: better health and nutrition, better focus and attention during class time, improved classroom behavior and less food waste.
- Research on school breakfast programs found that offering breakfast in the classroom, as opposed to before school, increased student participation in the programs. Other studies have found that students receiving school breakfast have fewer behavioral problems in school, improved learning and decreased absenteeism.

What did we conclude overall from the study? While many aspects of school scheduling have seen little change or attention in recent years, there have been some policy efforts and shifts in practice in a few areas of school scheduling across various states and school districts. These areas include: later school start times at the secondary grade level, increased instructional time, extended school year or year-round school calendars, longer times scheduled for school lunch, scheduling of recess before lunch, and the adoption of a four-day school week in western states. Interest in adopting statewide policy on school schedules will depend largely on the nature of the state's policy climate and priorities. In some states with a strong tradition that values local school district control, like Maine, state mandates are less common. Yet, school districts are experimenting with different approaches for increased instructional time or extended learning time to improve student academic outcomes and/ or reduce summer or pandemic learning loss. Staffing shortages, particularly in more rural districts and states, have led administrators to adopt a four-day school week to attract and retain teachers. Climate change is impacting temperatures in schools and may drive further changes in how the school year is scheduled over the calendar in some regions of the US.

What are some potential implications for education policy and/ or practice?

- Based on a national survey of principals, Maine ranks quite low—47th on the average number of hours in a school year. Increasing instructional time can potentially improve learning outcomes, but the relationship between time and outcomes is not perfect. The impacts of more instructional time will depend on many factors, including how the additional time is used and the quality of instruction. In most cases, efforts to increase instructional time have triggered negative impacts such as strong opposition from teachers and migration of teachers.

- There are several areas related to school scheduling that could impact student health and have other outcomes:
    - School year start dates: Maine allows local school districts to determine the school year start and end dates. The 2023 calendar year saw the largest number of record-breaking high heat days. Many of Maine's school buildings are considerably older than their intended lifespan and most do not have air conditioning. High temperatures in schools can have negative impacts on student learning as well as student and staff health. School districts in Maine may need to adjust school calendar start or end dates in light of the changing climate trends.

- School day start times: Maine does not specify school day start times, but allows districts to decide. There is an opportunity to increase sleep time for teenagers by having later school start times for middle and secondary students. Studies have demonstrated positive benefits for students for school start times of 8:30 or later. Adequate sleep impacts physical health, mental health, student behavior, safety and attention in school. Some school districts have implemented later start times, while others see many challenges in making this change. Districts may find it helpful to access ideas, models or guidance from the state education agency or from other states and districts that have successfully implemented this change.

- Physical education: Maine policy does not specify a minimum number of minutes for physical education nor how often it should be provided. The US Department of Health and Human Services recommendation is for 225 minutes per week (45 minutes per day) of physical education for secondary grade students and 150 minutes per week (30 minutes per day) for elementary students. The same department also recommends at least 60 minutes of moderate to vigorous daily exercise for youth, either during or outside the school day. Yet, less than 5% of Maine teenagers reported in 2021 that they have physical education daily. Adequate exercise supports students' physical health and also benefits students' mental health and behavior. With children and teens showing reduced levels of physical activity in recent years, state and local policymakers may want to examine the time and frequency for physical education as well as additional opportunities for exercise outside the school day. School-community partnerships can support programs outside the school day. More research is needed to understand how much physical education time is scheduled in Maine schools and the degree of alignment or lack of alignment with federal guidelines.

- Recess time: Maine policy does not specify a minimum number of minutes for recess time during the school day, nor when it is scheduled. Like physical education, recess time provides important time for physical exercise and contributes to students' physical health as well as mental health, attention in school and behavior. In addition to ensuring adequate exercise time, schools should consider when to schedule recess. When recess is scheduled just before lunch, students have better appetites and eat more of their school lunch and healthy foods, and food waste is reduced. Hawaii adopted a statewide policy for scheduling recess before lunch, while other states are encouraging districts to make this scheduling change. More research is needed to know what Maine school practices are for scheduling recess. There is an opportunity to pilot different recess schedules and study the outcomes.

- Meal time: A 2021 school district survey in Maine indicated that 21% of elementary students 36% of middle grade students, and 22% of secondary students had very short lunch periods of 15-20 minutes total, with even less seat time for students to eat lunch. Across the US, state and federal policymakers have made efforts to specify a longer seat time for the lunch period. These efforts

proposed 20-25 minutes of actual seat time during the longer lunch period, in line with recommendations from the Centers for Disease Control and the American Academy of Pediatrics. Some states are also looking at ways to ensure students have adequate time to eat breakfast in school, typically during instructional time. Longer lunch periods can improve students' physical health and nutrition, increase student focus and attention in class, improve classroom behavior and reduce food waste. More research is needed to know how Maine schools schedule lunch and breakfast time during school, and to what extent practices align with federal guidelines. There is an opportunity to pilot longer lunch periods in Maine schools and examine the impacts. Some schools have found it helpful to serve pre-made lunches in the classroom for younger students, to reduce waiting time in line and increase actual seat time for students to eat. Other strategies are increasing the number of serving lines or reducing the number of items that need to be plated by staff.

- Four-day school weeks are becoming increasingly popular in western states, particularly in rural areas. Some school districts in other states have adopted this schedule change to reduce students' commute time to school, while more recently districts are using this change as a strategy to attract and retain teachers. Districts that adopt this change often see similar changes in neighboring districts. District cost savings is generally small and studies have shown that students have either no improvement or a decline in academic outcomes. School districts in Maine and elsewhere considering a four-day school week will need to consider the overall total number of instructional days and/ or hours to meet state requirements. Some states are limiting the use of this schedule out of concern for student learning outcomes.

What methods were used to conduct this study? MEPRI conducted a broad search of the literature for articles and research reports related to school schedules. We focused on both instructional and non-instructional segments of the school day (e.g., lunch and recess time), a core subject (world languages) an allied arts subject (physical education), as well school day schedules (block or non-block scheduling), school start times, the length of the school day, school week calendar, required instructional days or hours, and the school year calendar. Due to the limited timeframe for this study, we have not attempted to summarize the literature on instructional time for every subject taught in schools. We used online databases in our searches which also included some news articles, *Education Week* articles, and research reports. In our search for evidence-based research, we selected more recent research studies where available and studies that used the most rigorous research methods. For trends in state policies on school scheduling, we looked at news articles as well as the reports and tools provided on websites of national education organizations (e.g., Education Commission of the States).

Introduction

In July 2023, the governor approved legislation (LD 1002) directing the Maine Department of Education to convene a work group to study different aspects of school schedules and approaches for structuring the school day, and for the Maine Education Policy Research Institute (MEPRI) to review the broad literature on this topic, to inform state and local policy decisions around school schedules. This report presents findings from MEPRI's review of the national literature on school scheduling, which includes: school scheduling practices across the US, research evidence suggesting best practices for school scheduling where available, and a survey of state policy trends and changes related to school scheduling. The literature review examines both instructional and non-instructional segments of the school day, but does not describe scheduling for all core subjects due to the time limitations of this study.

Methodology

The MEPRI research team cast a broad net in searching the literature for articles and research reports related to school schedules. We focused on both instructional and non-instructional segments of the school day (e.g., lunch and recess time), a core subject (world languages) and an allied arts subject (physical education), as well school day schedules (block or non-block scheduling), school start times, the length of the school day, school week calendar, required instructional days or hours, and school year calendar. Due to the limited timeframe for this study, we have not attempted to summarize the literature on instructional time for every subject taught in schools, but have used a broad perspective. We used online databases in our searches which also included some news articles, *Education Week* articles, and research reports. In our search for evidence-based research, we selected more recent research studies where available and studies that used the most rigorous research methods. For trends in state policies on school scheduling, we looked at news articles as well as the reports and tools provided on websites of national education organizations (e.g., Education Commission of the States). Our findings are organized by instructional and non-instructional categories for the different scheduling practices we describe, and we have listed the literature resources at the end of the report under similar headings for convenience.

Findings

In this section, we summarize trends in practice, research and policy related to school scheduling and include information as follows: We describe the scheduling practice or approach, and how it is used in schools across the US, and any evidence we found of recent change in state policies on that scheduling practice. Where research was available, we provide information on the efficacy and/ or impacts of a particular scheduling practice and implications for best practice.

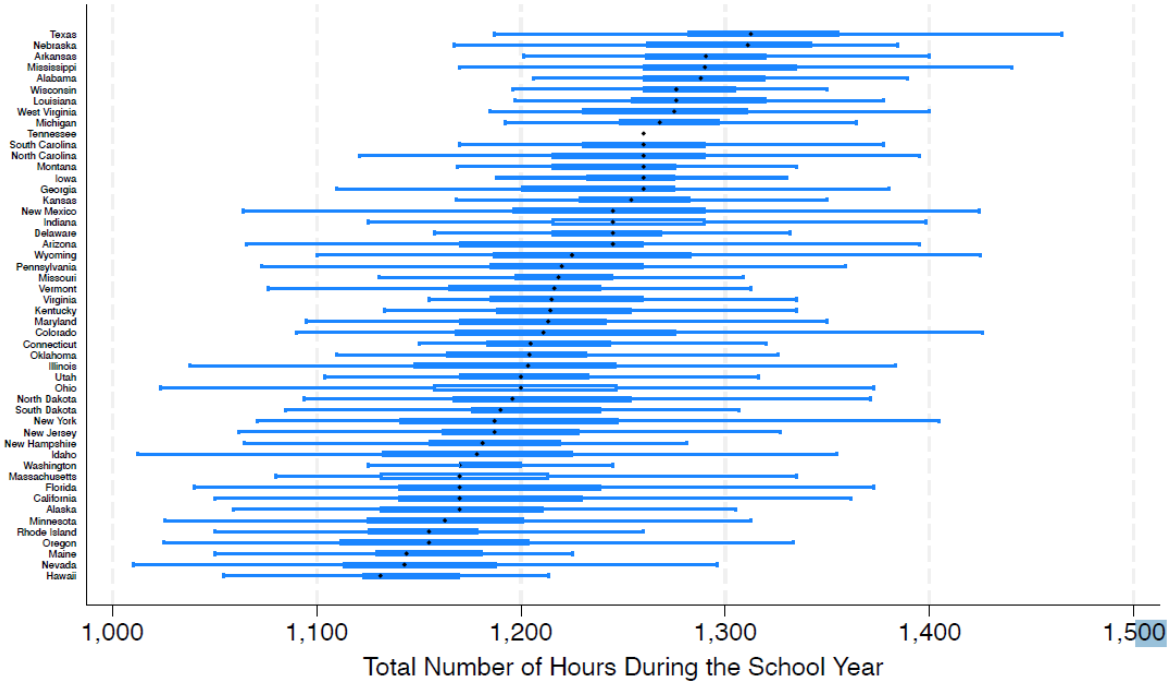
Instructional Time in Schools

State Policies on Instructional Time

Each of the 50 states has some minimum requirements of instructional time. These are typically specified as minimum number of school days, minimum number of instructional hours, and/or minimum length of a school day. In 35 states, the minimum requirement for instructional hours depends on grade level. Maine education law (MRSA Title 20-A, Chpt. 209 § 4801) requires schools to provide 180 days of school, and five days can be used as teacher in-service days, so a minimum of 175 school days. Maine also specifies a school day should be at least five hours per school day on average (Maine Dept. of Education Rule Chpt. 125, § 5.01). A five-hour school day for 180 days would total 900 hours. There are 17 other states that require 900 hours or fewer for fifth graders. Most states require 1,080 hours of instructional time (Education Commission of the States, 2023).

Most schools are in session more than their state laws require. The typical school is in session for 1,231 hours per year. Based on the 2018-18 National Teacher and Principal Survey, Maine is ranked forty-seventh among states for the average number of hours in a school year (1,144 hours). One estimate suggests that if the five states with the lowest number of school day hours (Hawaii, Nevada, Maine, Oregon and Rhode Island) increased the school day to seven hours, students would gain an extra 1.3 years of educational time, but it is not clear if that strategy is a cost-effective way to increase learning (Kraft & Novicoff, 2023).

Figure 5. Box-plots depicting the variation in total hours in a school year for U.S. public schools across states using data from the 2017-18 National Teacher and Principal Survey.
Notes: Boxes represent 25th to 75th percentiles with medians indicated with black diamonds. There is no variation among schools in Tennessee because the vast majority of sampled schools had exactly 1260 hours.



Graph from Kraft & Novicoff (2023)

The literature shows that efforts to increase instructional time can sometimes result in improved student academic learning outcomes, but it depends on how that time is used. For example, if the additional time also includes improved or high levels of student engagement and/or instructional quality, then there may be learning gains. If the additional time is not used for instructional purposes or used effectively, there may be no gains in student outcomes. When the instructional hours are decreased significantly, (for example from a shift from a five-day to four-day school week), then academic achievement typically declines. The effect of increased of decreased instructional time is greatest when the initial amount of instructional time is low. Both student and teacher absences from school play a large role in the actual instructional or learning time a student experiences. In a case study of a large Northeastern district, 16-25% of potential instructional time was lost primarily due to unexcused student absences, interruptions and teacher absences. When a regular classroom teacher is absent, a substitute teacher may not be able to provide new instruction or high-quality instructional support to students. Additional loss of learning time occurs from students' off-task behavior, other in-class disruptions, non-

instructional activity and transition time between activities in the classroom (Kraft & Novicoff, 2023).

There have been several grant programs and other efforts to encourage low-performing schools to increase their instructional time (Checkoway et al., 2012). A three-year pilot program to increase instructional time by 300 hours ran in 40 schools in five states (Colorado, Connecticut, New York, Massachusetts, and Tennessee) starting in 2005 (Chen, 2023). Only one state's experience with increasing the allocated school by 300 hours is available for reference. In Massachusetts, the average length of the expanded school day for fifth graders resulted in a seven and three quarter (7.75) hour school day. In comparison schools that did not change, fifth graders had a six-hour school day. In the schools with extended hours, more time was spent on non-instructional activities including lunch, recess and administrative tasks. In the third year, the schools with extended hours had a lower percentage of "highly qualified core academic teachers" and a higher student-teacher ratio. Given the way schools used the extra time and the loss of more qualified teachers, it is not surprising that there was no statistically significant difference in the Massachusetts state test scores in language arts and math between the schools with extended learning time and comparison schools (Checkoway et al., 2012).

The costs associated with an expanded school day in four of the Massachusetts schools participating in the pilot program showed a wide variation of $1,570 to $4,300 per student. Personnel time accounted for most of the increased costs. Most of the funds were used for increased academic support that included intersession camps costing $828 to $2,265 per student (Kolbe & O'Reilly, 2017). By contrast, a more recent study of schools implementing extended learning (40 minutes per day) in 2015-16 found significant math and language arts academic gains in extended time schools in the first two years after implementation (Marek et al., 2017). Thus, academic outcomes will depend on a variety of factors including how schools choose to use the increased instructional time. Massachusetts continues to offer these expanded learning time grants (Mass. Dept. of Elem. & Secondary Ed., 2023).

States have faced resistance to their efforts to increase the required number of instructional hours. New Mexico began by offering funds for districts to add up to 25 days on a voluntary basis but there were few districts participating. When New Mexico recently increased the number of required instructional hours to 1,140 hours for all students, about three-quarters of New Mexico's schools needed to increase their instructional time. Previously, New Mexico had

required 990 hours for elementary students and 1,080 hours for middle and high school students. The increased instructional time requirement passed after negotiations with the teachers' union. One concession was to count 60 hours of teachers' professional development and meeting times toward the minimum instructional time (Mahnken, 2023).

School Year Calendars

In practice, most schools start the school year in August. In the current 2023-24 school year, Mississippi, Arizona and Georgia schools started the week of July 31st. Other southern schools started the week of August 7th (Florida, Alabama, Tennessee, Kentucky, Louisiana, Oklahoma, New Mexico and Hawaii were joined by Nevada and Indiana). At the other end of the spectrum, Minnesota, Wisconsin, Oregon, New York and New Jersey schools opened the week of September 4th (Heubeck, 2023). Maine schools typically start the school year near the end of August.

In addition to specifying the minimum number of instructional school days or hours required for K-12 schools, many states have policies on the start or finish dates for the school calendar. Most states specify the earliest start date. Southern states tend to have earlier start dates than northern states. Arizona, Arkansas, Missouri, Tennessee and Virginia have the earliest start dates in mid-August or earlier. Maryland, Michigan, Minnesota, Rhode Island and South Dakota all start after Labor Day. Two states, Maryland and North Carolina, specify the latest dates for schools to have classes, and both end near June 15th. Texas requires schools to be in session until May 15th (Education Commission of the States, 2023). Maine allows school districts to decide on their school start and end dates.

There has been some interest in changing early school year start dates. In Maryland, Ohio, and Virginia, the tourism industry has advocated for later school year start dates to boost revenue and to ensure adequate staffing for those businesses (Heubeck, 2023; Von Hippel & Graves, 2023). Another reason states may consider a later school year start date is that climate change is causing hotter summers, which impacts the heat levels in schools and on the playground. Heat advisories were issued in early September 2023 for large portions of the Northeast (Gokee, 2023). Children are more susceptible than adults to the effects of high heat. Pediatricians become concerned about the health of children when the temperature gets above 90 degrees. Exposure to high heat can lead to dehydration and heat exhaustion (Mohammed, 2023). Some have suggested the ideal temperature for learning is at or below 72 degrees (Gokee, 2023).

Children have been shown to have lower academic performance for each additional day over 80 degrees (Mohammed, 2023). Past research has shown scores on the PSAT and the Massachusetts elementary school state tests (MCAS) are lower in hotter years (Shankman, 2023). Many New England schools do not have air conditioning and many school buildings in Maine and elsewhere are aging facilities that are not easily modernized.

Every decade since the 1980's, there has been political pressure to extend the school year with more instructional time in total, in hopes of seeing academic gains (DiMarco, 2023). Previous US Education Secretary Arne Dunn advocated for more school days, pointing out that Asian countries have 30-35 more days of school. Those advocating for decreasing the length of summer vacation feel it could decrease summer academic learning losses. Opponents of longer school years say it would not give children a break and decreases other learning opportunities. (Chen, 2023). It is not clear how teachers feel about longer school years or year-round school, or the potential impact on school hiring and staffing.

When New Mexico provided funds for districts to add up to 25 days to the school year, participating schools saw significant gains in academic performance (Mahnken, 2023). In Richmond, Virginia two schools are piloting a 200-day school year. The district had advocated going to year-round school to make up for pandemic learning losses however, due to community opposition, this plan was not enacted. Of the 54 schools in that district, only two decided to participate in the pilot program to add 20 more school days (DiMarco, 2023; Finn, 2023). The estimated costs for the two elementary schools to add twenty days is $2.7 million, a 25% increase in the total budget for the two schools (DiMarco, 2023).

Year-Round School

Twenty-five states allow for a school calendar across the whole year, including the summer months (Education Commission of the States, 2023). In year-round schools, students typically attend 180 days of school but they have a shorter summer vacation and longer vacations throughout the year. A common model is a 45-day school session followed by a 15-day vacation period. Some schools are now trying this approach as a way to make-up pandemic learning losses. A quarter of South Carolina schools went to this type of calendar. Washington state has a 40 district pilot program to examine the effects of a year-round calendar on academic achievement. Proponents feel that frequent breaks may benefit student mental health and decrease summer learning loss. Based on the research available to date, year-round school

calendars have not been shown to boost academic achievement and in one study led to lower test scores. Some parents also feel that accessing childcare for the longer vacation breaks during the year is a challenge. Teenagers may also be challenged to find work during the school breaks (Von Hippel & Graves, 2023; Warner, 2023).

Four-day School Week Schedules

There is increasing interest in a four-day school week schedule, particularly in western states and rural communities. In this model, students and staff typically have longer school days than for a five-day schedule. A four-day week may eliminate Friday or Monday as a school day. However, schools shifting to a four-day week may also reduce the total instructional time by about 3-4 hours per week.

Initially, districts implemented a four-day week in rural communities to decrease the time students spent on the school bus commuting to school, and there was some hope of saving costs. Districts also saw an opportunity to create more time on the non-instructional days for teachers to engage in planning or professional development (Donis-Keller & Silvernail, 2009; Kilburn et al., 2023). More recently, rural districts have used the four-day week as a strategy to attract and retain teachers in a time of staffing shortages in K-12 schools. When districts adopt this schedule, other neighboring districts often respond with similar changes as they compete to attract teachers (Anglum & Park, 2021).

The idea of a four-day school week has been popular particularly with adults of child-bearing age. In a national poll, 53% of adults supported the idea of a four-day school week. Among those under 30, 63% supported a four-day school week. In the same survey 62% of adults supported longer school days, a longer school year or both to increase student achievement (Phi Delta Kappan, 2023). On the negative side, parents may have challenges in finding childcare for the non-school day each week, and some children may not be adequately supervised on those days. Studies have shown this schedule is popular with students, parents and teachers in districts implementing the change (Kilburn et al., 2023; RAND, 2023), but might not be supported in all settings. In some of the settings where this schedule is popular, families have a stay-at-home parent, extended family in the area and/ or non-traditional work that allows them the flexibility to supervise their children on the non-school day (Kilbern et al., 2023).

In 1980, Colorado became one of the first states to allow districts flexibility in scheduling instructional time. That year, three districts were approved for a four-day week schedule. This

school year, 2023-24, 72% of the 178 Colorado public districts use a four-day week schedule. It is very popular in rural districts with less than 1,000 students. Ninety-two percent of these districts (101) use a four-day week schedule (Colorado Dept. of Ed., 2023). All states west of the Mississippi have some school districts with four-day school week schedules. Nationwide, the number of districts with four-day weeks grew from 100 in 1999 to 662 in 2019, and then increased to 900 districts in 2023 (PBS, 2023).

In Maine, MSAD 3 piloted a four-day week in the 1970's during the energy crisis and after a vote to reduce the school budget. The district used the non-school day for teacher professional development. They found a 1.5% cost savings and wanted to continue the four-day week, but the request was not approved (Donis-Keller & Silvernail, 2009).

Some states are now limiting districts' ability to have a four-day school week. California and Montana have required districts whose students were not making adequate academic progress to return to a five-day school week. New Mexico put a moratorium on districts going to a four-day week (Kilburn, et al., 2023). Oklahoma is requiring greater oversight of districts moving to a four-day week (Morton, 2023).

There are few quantitative studies on four-day school week schedules. Most studies focus on a single district or region and their results may not be generalizable. Academic effects of going to a four-day school week are dependent on the amount of instructional time students receive, quality of instruction and other factors. Early studies showed that moving to a four-day school week either improved student academic achievement or showed no difference in Colorado, Kentucky, Idaho, New Mexico, Oregon and South Dakota (Donis-Keller & Silvernail, 2009). Overall, the available research has found either no difference or a decline in student test scores after adopting a four-day week. In Oregon, schools with a four-day school week had three to four hours less instructional time each week. Several studies looked at the four-day week schools in Oregon with decreased instructional time. One study found a decline in math and English test scores. Another study found math and English scores did not fall when schools went to a four-day week, but did not rise as much as they did in neighboring districts with a five-day week (Kilburn et al., 2023; Thompson, 2021; RAND, 2023). In a large-scale study of Colorado elementary student test scores where instructional time was constant, there was a positive increase in the number of students in four-day schools scoring at the proficient or higher level in math and English (Anderson & Walker, 2015). In a twelve-state sample of schools, schools with

a four-day week and less than 30 hours per week of instructional time showed a decline in math and English test scores compared to five-day week schools. For the four-day week schools with 31 hours or more of instructional time, there was no difference in their math or English test scores compared to five-day week schools (Thompson & Ward, 2022). In Oklahoma, there was no statistical difference in ACT scores after a district moved to a four-day week (Morton, 2023).

Regarding impacts on student attendance, most studies found there was no significant improvement in attendance in the four-day week schools compared to five-day week schedules (Anderson & Walker, 2015; Kilburn et al., 2023; Morton, 2023; RAND, 2023; Thompson, 2021). Some recent studies have shown decreased student absenteeism with the four-day week (Walker, 2019).

Some studies found positive impacts of a four-day week for students' well-being. A multi-state study found that students in four-day week schools had 3.5 to 4 hours more free time each week. They spent more time on hobbies, chores and homework than the five-day students. High school students worked more (Kilburn et al., 2023). Parents, teachers and students felt students' behavior and emotional well-being improved in a four-day school environment since they had an extra day to "reset" (Kilburn et al., 2023). Four-day school students were more involved in extra-curricular and community activities than their five-day counterparts (Donis-Keller & Silvernail, 2009; Israel et al., 2020). In several studies there was a decrease in school reported instances of bullying, assault and disciplinary actions in four-day schools (Donis-Keller & Silvernail, 2009; Morton, 2023). Negative impacts for students resulting from the adoption of a non-school day each week have included increased engagement in sexual intercourse and increased juvenile crime (Israel et al., 2020, Fischer & Argyle, 2018).

District cost savings from moving to a four-day week has been small. In some cases, school administrators felt there were some small cost savings. The average savings was around 2%, according to more recent reports. However, many districts reallocated the savings so they could maintain some academic and student services (Anderson & Walker, 2015; Kilburn et al., 2023; Thompson, 2021; RAND, 2023). Earlier studies from the 1980s and 1990s reported cost savings of 2% to 4% (Donis-Keller & Silvernail, 2009).

School Day Start Times

Schools districts set different start times for the school day, and start times also tend to differ for elementary and secondary grades. The National Teacher and Principal Survey (NTPS)

is conducted every four years. The most recent survey occurred during the pandemic when many schools were on reduced schedules (Start School Later, 2023). Before the pandemic, the 2017-18 survey found that 17.5% of high schools started at 8:30 a.m. or later. The average nationwide high school start time was 8:03 a.m. On average, elementary schools started later at 8:15 a.m. (NCES, 2019a). The average start time for Maine schools across all grade levels was 8:03 a.m., slightly earlier than the national average of 8:10 a.m. (NCES, 2019b). Bar Harbor, Biddeford, Old Orchard Beach, Old Town, and Saco are Maine school districts that recently changed their high school start times to 8:30 a.m. (Start School Later, 2023). Maine does not currently specify school day start times, but leaves it up to local districts to decide.

In recent years, twenty-six states have proposed legislation to study school start times, incentivize later school start times or require later school start times for middle school and high school students. California and New Jersey have policies that high schools begin no earlier than 8:30 a.m. Utah has a resolution encouraging high schools to look at later start times. Five states have pending bills requiring a study of later start times for high schools (Start School Later, 2023). Pennsylvania conducted an extensive study and recommended districts consider changing their school start times for certain grades for the health and welfare of their students. The study provided examples of how districts addressed concerns such as transportation (Joint State Government Commission, General Assembly of the Commonwealth of Pennsylvania, 2019). Several other states including Maine have had recent legislation under consideration according to one advocacy group (Start School Later, 2023). To date, none of the Maine bills proposing later school start times have passed. Legislators and state educational organizations have weighed in on the topic, some supporting and some opposing proposals for later school start times for secondary students (Popvich, 2023).

There are numerous studies providing evidence of health and well-being benefits for students when high school start times are delayed until 8:30 a.m. or later. Puberty causes a shift in teenagers' biological clock of two to three hours. They fall asleep later and awaken later. There is also a slowing of the brain mechanisms that allow sleep to occur, making it more difficult for them to fall asleep (Lee et al., 2017; Ziporyn et al., 2022). Lack of sleep is associated with difficulty paying attention, impaired short-term memory and processing of new information. There is also research evidence that teenagers' academic achievement increases with later school start times. Mental health benefits of later school start times include decreased risk of depression,

decreased anxiety and decreased risk of suicidal thoughts. With inadequate sleep, there is a detrimental effect on cardiovascular health, metabolic health and systemic inflammation. There is increased also a risk of obesity and diabetes with sleep deficiencies. Athletic performance improves with better sleep. Lack of sleep also causes an increase in risk-taking behavior, including substance abuse. With later start times, there are fewer car accidents involving teenagers and less juvenile crime according to several reports (Bastian & Fuller, 2023; Joint State Government Commission, General Assembly of the Commonwealth of Pennsylvania, 2019; Popvich, 2023; Start School Later, 2023; Ziporyn et al., 2022).

Block Scheduling

Block scheduling typically consists of longer segments of instructional time (more than the typical 40 or 50 minute class period), that would be scheduled on alternate days of the week. Block scheduling also results in fewer classes or subjects being taught each day, but longer class periods. Block periods may range from 60 minutes to over 100 minutes in length. Schools have been using block scheduling, primarily at the middle grade and secondary grade levels, in greater numbers since the late 1980s and 1990s. This practice emerged during a period of school improvement and school restructuring efforts and a push to increase instructional time on core subjects (Buckman et al., 1995; Evans et al., 2002). The National Commission on Time and Learning (1994) specifically recommended block scheduling as a strategy to increase academic learning outcomes.

An informal survey of Maine schools conducted by the Maine Principals Association in January 2023 (MPA, 2023) found that of their 151 member high schools queried online, 42 responded confirming that their schools have block scheduling. Some principals described their schedules, which ranged from 40 to 80 minute blocks and included a wide variation in length of class periods (40, 45, 60, 70, 75 and 80 minute blocks). Some schools used a 4x4 alternating day block schedule, and one school indicated a 5x5 block schedule.

The primary goal for implementing longer class periods was to provide more time for students to engage in in-depth learning experiences (such as hands-on investigations, project-based learning, or real-world applications), that would ultimately increase students' academic learning outcomes. For teachers, having more time could provide opportunities to use a broader range of instructional strategies and learning activities and time to support students in class.

Block scheduling has also been combined with traditional length classes for some subjects (such as math and world languages), to provide daily instruction and practice in those content areas.

While block scheduling has not been the subject of much research in recent years, there was extensive research and reporting on it primarily during the 1990s, with a focus on secondary grades. A number of studies reported positive impacts from block scheduling for increased student learning outcomes (Buckman et al., 1995; Mattox et al., 2005; Vogler et al., 2019; Walker, 2000) and some studies have also documented beneficial impacts in other areas, such as improvement in school climate (Buckman et al., 1995), student attendance (Buckman et al., 1995), reduction of student disciplinary rates (Buckman et al., 1995; Evans et al., 2002), and reduction of students' stress (Flocco, 2012; Rickard & Banville, 2005). However, one research review published in 2002 (Evans et al.) concluded the results of the 1990s studies were mixed for student achievement, attendance, and dropout rates. Evans and colleagues noted the lack of rigorous research on block scheduling up to that point and debate exists over the potential for block scheduling to improve academic and other outcomes. A more recent review of 12 studies concluded there was evidence of increased test scores in science but unclear results for math and English at the secondary level (Dickson et al., 2010).

Some schools using block scheduling have seen increased student academic achievement outcomes. For example, one high school in Florida saw that after the transition to block scheduling, over half (54%) of the randomly selected students increased their GPA (Buckman et al., 1995). In the same high schools, teachers reported they appreciated having more instructional time for "creative and meaningful student work, and the ability to structure a full lesson" with introduction of a concept or skill, discussion, and closure. Students felt they were putting more effort into their schoolwork and teachers felt they had seen improvement in the quality of students' work and were better able to meet their diverse learning needs (Buckman et al., 1995). Evans and colleagues (2002) studied three high schools in the late 1990s and reported teachers and students felt having more time allowed students to work on independent and group projects and to present their work in class. That study also saw GPAs increase, more AP courses offered and students participating, and an increase in SAT scores by 14 points (Evans et al., 2002). A dissertation study of four high schools in the mid-2000s also saw increased course grades and GPAs, as well as more participation in AP courses (Flocco, 2012). Mattox et al., (2005) found math test scores increased for sixth grade students in five large middle schools that adopted

block scheduling, but only in the second and subsequent years after implementation. In a study of 117 middle schools in South Carolina, Vogler et al. (2019) found seventh grade students' test scores improved significantly for social studies.

Other studies reported no significant improvement in academic outcomes for students with block scheduling (Gill, 2011; Gruber et al., 2001; Nichols, 2005), a decline in achievement (Bateson, 1990), or higher achievement in schools with traditional scheduling (Gruber et al., 2002; Lawrence & McPherson, 2000). In a large study of 43 middle schools in Virginia in the mid-2000s, Gill found no significant difference overall in student scores on the state math and reading assessment when comparing schools with block scheduling and traditional schools. However, the same study did find significant differences in the pass scores for Black and Hispanic students, with these students performing better in the A/B block-scheduled schools (Gill, 2011). Nichols (2005) found no significant improvement in English and language arts GPAs in five large urban high schools. In the mid-1990s, Lawrence and McPherson (2000) found that students with a traditional schedule in one North Carolina high school scored significantly higher on state assessments than students with block scheduling in another high school in the same district. Similarly, Gruber et al., (2001) studied two Georgia high schools in the late 1990s and found no difference in GPAs and statistically higher outcomes on state assessments for students with a traditional class schedule.

Positive impacts for improved school climate for teachers and students have also resulted from the adoption of block scheduling (Buckman et al., 1995). In two high schools in Florida that adopted block scheduling in the mid-1990s, a strong majority of students agreed that having fewer class changes resulted in a safer and more secure feeling in the school, that they knew their teachers better, and that school was more enjoyable with block scheduling. A strong majority of teachers reported that they "liked having more time to give students individual assistance, and opportunities to get to know the students personally" (Buckman et al., 1995). In another study of three school districts, teachers reported being able to spend more time with students individually (Evans et al., 2002).

Impacts on teaching strategies have received less attention, but some studies included teachers' reports that they could use a wider range of instructional strategies in their longer class periods (Rickard & Banville, 2005). Evans and colleagues (2002) found high school teachers felt they could cover concepts in more depth and move away from lecturing.

While the research on block scheduling in the 1990s showed somewhat mixed results for improving student achievement and other areas, few negative impacts have been reported from adopting block scheduling. The primary negative impact is the need for teachers to more carefully plan how they will use the larger blocks of instructional time and to think about more varied ways of engaging students in learning activities (Buckman et al., 1995). Teachers have also reported that having block schedules may make it harder for students to catch up when they miss a class (Evans et al., 2002).

In their review of the literature on block scheduling through the 1990s, Evans et al. estimated that nearly 40% of schools may have had this practice at that time. This scheduling practice is still in wide use in Maine and across the US in these grade levels. There is no indication that schools or states have reduced the use of block scheduling recently or plan to in the near future.

World Language Instruction

According to a national report on foreign language (non-English) study published in 2017, about 20% of the K-16 school-aged population was enrolled in language study at that time (ACIE, 2017). Across the US, world language instruction during the school day is generally offered to students within the middle and secondary grade curriculum, but is typically limited to two languages: French and Spanish. Some larger schools also offer German and/ or Latin, some offer sign language courses, and some school districts provide instruction in Chinese beginning in the elementary grades. The languages included within the secondary curriculum (within class, face-to-face instruction) across the US changed little over many decades (Collins & Munoz, 2016), however more schools have added Chinese to the curriculum and more schools have discontinued instruction in French and/ or Latin in recent years than have added those language (ACIE, 2017). Two factors appear to drive the range of choices in world language instruction: school enrollment size and availability of qualified educators. In recent decades, world language education has been an area of high staffing need nationally with fewer trained educators than available positions, and staffing shortages tend to be more acute in more isolated, rural communities and high poverty school districts (Edwards et al., 2022). Maine requires school districts to include world language instruction in the curriculum, but leaves it up to school districts to determine how to schedule that instruction.

World language (including English as a second language) is one of the content areas where some research has indicated the benefit of more frequent instruction (Dicks, 2022; Ellis, 2002; Ellis & Collins, 2009), more intensive instruction (AERA, 2006; Serrano & Munoz, 2007; White & Turner, 2005), and benefits in starting at an earlier age (AERA, 2006), in order for learners to develop and sustain higher levels of proficiency. However, some research studies found no real difference when comparing instruction with different levels of frequency or intensity (Collins & White, 2011). Because of the many factors that interact in language learning, the research is somewhat inconclusive about the optimal way to deliver or schedule second language instruction (Blazer, 2007; Dicks, 2022).

Most schools have used daily class periods of 40-50 minutes or more for this subject. In the case where schools may use block scheduling for English language arts and social studies, they may continue to have shorter class periods daily for world language and math. However, it should be noted that in recent years, more school districts are also helping students to access world language instruction remotely (ACIE, 2017). Some students enroll in early college courses during the school day and attend in person or remotely while most students taking these courses choose online courses, outside of the school day, where students learn languages not included in their local school curriculum from instructors at in-state or out-of-state institutions of higher education (ACIE, 2017). During the recent COVID-19 pandemic, many K-12 school systems and universities moved to remote education including world language instruction. Research comparing in-person or face-to-face language instruction with hybrid and online models for learning a second language (English and non-English, including synchronous and asynchronous instruction) has found these modalities are essentially equally effective (Dixon et al., 2021; Moneypenney & Alrich, 2016; Peterson, 2021).

The average time needed for a learner to gain proficiency in a second language depends on many factors, including the difficulty of the language, how similar or different it is from the learner's own language, the proficiency level desired, the quality of the instruction, and the learner's own language ability and motivation (AERA, 2006; Blazer, 2007; Collins & Munoz, 2016). The US State Department's language training program estimates that about 600-750 class hours are needed for an adult learner in an intensive language program to gain "professional working proficiency" in category I languages such as French or Spanish, and this translates to about four school years with one hour of daily instruction. German is a category II language

requiring more instructional time to gain proficiency. Arabic, Chinese, Japanese and Korean are among the most difficult languages in category IV, requiring about on average about 2,200 class hours of intensive instruction for an adult learner, which translates to about 14 school years or almost four times the length of time required for category I languages (US Dept. of State, 2023). According to language experts, gaining advanced proficiency in a second language may take closer to 10,000 hours, and substantial time for real practice with a language beyond what the school class period can offer. A survey of the published research on world language instruction from 2001 to 2014 in one major journal in the field found the actual exposure time students receive in secondary and post-secondary language instruction is far less than needed to gain general proficiency. Researchers suggest that language proficiency could be improved with increased use of technology and informal, out-of-school experiences with the target language (Collins & Munoz, 2016 Dixon et al., 2021).

Physical Education

Most K-12 school systems in the US include physical education in the school curriculum, but practices vary in terms of how often students engage in physical education (e.g., daily or not), how many minutes each time and over the school week, and the type and level of activity they engage in. For very young children (PreK-grade 1), some physical education or activity may be incorporated into the regular classroom while older children may have a separate class period and instructor for physical education. Some students have physical education every school day, while many other students have far less physical education during the school week. According to a 2019 survey, the Youth Risk Behavior Surveillance System, nationally 25.9% of teenagers had daily physical education classes, while 4.6% of Maine teenagers reported having daily physical education classes (Physical Activity Alliance, 2022).

Most states require physical education within the school curriculum, but many do not specify a minimum amount of time for physical education and activity. The National Cancer Institute's (NCI) Classification of Laws Associated with School Students (CLASS) website data base (2021) groups state laws around the amount of physical education time required by grade level, state requirements for a minimum amount of moderate to vigorous physical activity, and the use of school facilities by community groups for activities outside of school hours. Some state laws address additional factors such as teacher certification, student fitness assessment, curriculum standards and adaptive physical education, and are also shown in the NCI reference

but are not discussed in this report on school schedules. The NCI study shows that only five states require 150 minutes per week (30 minutes per day) of physical education for elementary students. Ten states require 60-149 minutes per week of physical education for elementary students. Most states either require an unspecified amount of physical education time or less than 60 minutes per week of physical education for elementary students. Only one state, Hawaii, had no physical education requirements. At the high school level, just one state, South Dakota, has requirements that align with the US Department of Health and Human Services recommendation for 225 minutes per week (45 minutes per day) of physical education for secondary students and 150 minutes per week (30 minutes per day) for elementary students. Five states required 90-224 minutes per week of physical education. Most states do not specify the time or require less than 90 minutes for secondary students. Maine requires physical education for elementary and secondary students, but does not specify a minimum number of minutes for this during the school day, nor how often it should be provided. Two states recommend physical education be provided but do not require physical education at the high school level (NCI CLASS, 2021).

Maine and most states do not have any state statutes addressing how much time physical education class time should be spent doing moderate to vigorous activity. Four states have laws requiring students to spend at least half of their physical education time doing moderate to vigorous activities. Twelve states have statutes that require less than half of the physical education time be spent in moderate to vigorous physical activity or recommend physical education classes spend an unspecified amount of time on moderate to vigorous activity (NCI CLASS, 2021).

Whole School, Whole Community, Whole Child (WSCC) is an initiative of the Centers for Disease Control (CDC) that emphasizes cooperation between the community and schools. One of the ten pillars is physical education and physical activity. WSCC recognizes the role families and communities play in improving childhood health behaviors (CDC, 2023). One way that schools and communities can interact is by letting outside organizations use school recreational facilities, which can allow for additional opportunities for students to engage in physical exercise outside the school day. Allowing community organizations to schedule the use of school recreational facilities is required by six states. Maine and most other states recommend informal cooperation between schools and community organizations to allow access to elementary school recreational facilities outside of school hours (NCI CLASS, 2021).

The federal recommendation is for youth to have at least 60 minutes daily of moderate to vigorous physical activity as well as regular engagement in vigorous activity (Physical Activity Guidelines Advisory Committee, 2018). This activity could be obtained both during and outside of the school day. According to national surveys (2019-20 National Survey of Children's Health, NSCH, and the 2017-2020 National Health and Nutrition Examination Survey, NHANES), only 21% to 28% of children reach the recommended levels for physical activity. Ten years ago, about 30% of youth met the minimum level recommended for physical activity (Physical Activity Alliance, 2022). The CDC's position is that "increased time spent on physical education does not negatively affect students' academic achievement." In addition to the physical benefits, increased physical activity helps students stay on task in the classroom, improves grades and improves standardized test scores (CDC, 2019).

With few states requiring the recommended time for physical education, meeting the goal of at least 60 minutes daily of moderate to vigorous activity relies on a child being active outside of school hours. However, children have been getting less physical activity outside of school in recent years. In 1969, almost 50% of elementary students walked or biked to school. The percentage of elementary students that walked or biked to school dropped to just over 10% in 2017 (Physical Activity Alliance, 2022). A 2020 national health survey found that 54% of children ages 6-17 participate in sports in the previous 12 months. Children from homes with lower income and lower levels of parent education were less likely to have participated in organized sports over the past twelve months. Less than a third (31%) of children living in households with an income less than the federal poverty level (FPL) participated in sports, while 70% of children from households with an income at 400% of the FPL or greater participated in sports. When a parent had a bachelor's degree or higher degree the percentage of children participating in sports (68%) was significantly greater than for children with a parent who had a high school education or less (37%) (Black et al., 2022).

Non-Instructional Time in Schools

Recess Time

The Centers for Disease Control (CDC, 2023) defines recess as "a regularly scheduled period in the school day for physical activity and play" in which "students are encouraged to be … engaged with their peers in activities of their choice, at all grade levels." Traditionally, a brief midday recess has been scheduled immediately or shortly after lunch and is shorter than a regular

class period. In more recent years, however, an increasing number of US schools have begun scheduling recess immediately before lunch, often for 15 to 25 minutes. Among the earliest adopters of lunch before recess was Hawaii, which made a state-wide policy change in 2009 (Hawaii State Dept. of Health, 2009). Since then, other state education agencies have recommended or supported the practice with "toolkits" for implementation, including in California (2023), Iowa (2020) and Missouri (2018). Additionally, some school districts nationwide and in Maine have embraced the practice of scheduling recess just before lunch.

Currently, nine states require schools to provide recess time, 14 states recommend recess time, and 17 states have non-codified policy such as guidelines on recess (NASBE, 2023). Maine does not have a specific requirement for frequency or time for school recess. Some states require or recommend recess time for physical activity beyond the designated physical education period, following recommendations of the Society of Health and Physical Educators (SHAPE America, 2023). In 2021, five states required recess of under 20 minutes, five states required 20-30 minutes (Connecticut, Florida, Missouri, New Jersey, Rhode Island), and two states required more than 30 minutes (Arkansas, Illinois) beyond physical education time (National Cancer Institute, 2023).

Many school districts and the state of Hawaii have made the scheduling change of moving recess to before lunch. California encourages districts to use this practice (California Dept. of Education, 2023). Part of the motivation for this change was to reduce food waste and expense for unconsumed food and beverages (Calvert et al., 2021). Schools noticed and researchers also found that when students spent time at play and physical exercise before lunch, preferably outdoors, they had improved appetites when they entered the cafeteria and ate more of their lunches, including healthy fruits and vegetables, and there was also a reduction in food waste (Ang et al., 2019; Ball State University, 2019; Calvert et al., 2021; Cohen et al., 2021; Green et al., 2019; Cambridge Public Schools, 2023). Research evidence has also found that having students eat an adequate and healthy lunch can result in increased attention and better behavior. Where schools scheduled recess prior to lunch, teachers reported that students were more calm and ready to learn, had improved focus and attention in the classroom, and had fewer behavioral challenges, both during and after lunch (Ball State University, 2019; Calvert et al., 2021; Green et al., 2019; Cambridge Public Schools, 2023; Montana State University, 2018; Missouri Dept. of Health and Senior Services, 2018). In one study, teachers also reported that

they reclaimed five to ten minutes of instructional time each day because students were more settled and ready to work after lunch than they had been when returning from recess after lunch (Education World, 2023). Because students did not need to take time for drinks and bathroom breaks right after recess, teachers were able to get students back to work more quickly.

Some schools reported logistical staffing and scheduling challenges when trying to move recess before lunch (Green et al., 2019). Some schools were reluctant to "break tradition" in their school schedules (Ball State University, 2019). To address such challenges, both research and state-level resources suggest various strategies schools can use to facilitate a smooth implementation of this scheduling change. For example, the California Department of Education recommends alternating lunch and recess schedules so some children are at recess while others are at lunch or splitting recess time so all children have brief recesses both before and after lunch (2023). Additionally, Iowa, Missouri and Hawaii have developed implementation "toolkits" to assist schools in making the transition. Additional resources can be found online (UnlockingTime.org, 2023).

Meal Time in School

Increasingly in recent years, school districts have provided not only lunch but also breakfast for students in school. Practices vary across grade levels, school districts and states in terms of the length of time allowed for the lunch period, and when and how breakfast programs are implemented. A perennial concern for many parents is the short time allowed for the lunch period, which may not actually allow for adequate time for students to eat most of their lunch or to eat in a healthy way after spending several minutes waiting in line to purchase food.

Nationally, the average lunch period is 25 to 30 minutes, while time waiting in lines can exceed 15 minutes, leaving perhaps 10 minutes or less for students to eat (Ettinger, 2019; Green et al., 2019). A survey of Maine school districts conducted by the Maine Department of Education in 2021 found that 21% of elementary schools, 36% of middle schools, and 22% of high schools had very short lunch periods of 15 to 20 minutes for lunch, while other schools had longer lunch periods. Overall, 60% percent of schools had wait times of 6-10 minutes during lunch, and 9% of schools had wait times of over 11 minutes (Maine Dept. of Education, 2021).

In response to concerns about the adequacy of time scheduled for school lunch periods, some states have begun making changes. In January 2018, West Virgina enacted a law requiring that students be given at least 20 minutes to eat lunch (West Virginia admin. rule, 2018). More

recently, New Mexico passed a law requiring schools to provide at least 20 minutes of seat time for lunch (Sparks & Prothero, 2023). Connecticut introduced a bill that would require 30 minute lunch periods (Gingerella, 2023) and similar bills were introduced in 2023 in Rhode Island and South Carolina, but they failed to pass (Sparks & Prothero, 2023). Research has found that for states that enacted laws specifying a minimum time for students to have lunch, school districts were more likely to provide at least 30 minutes for lunch (Turner et al., 2018). The California Department of Education cites the CDC recommendation of a minimum of 20 minutes of seat time for lunch and encourages districts to provide adequate time for students to eat (California Dept. of Education, 2023). Maine considered a proposal (HP 638) in 2023 to recommend a minimum of 30 minutes for lunch.

The issue of school lunch time has also been brought before the U.S. Congress. The *Healthy Meal Time Act* was reintroduced in 2022, calling for a study to generate recommendations on best practices for school lunch time scheduling (Healthy Meal Time Act, 2022; Schrier, 2022; Van de Venter, 2022). The proposed legislation garnered support from the American Federation of Teachers (Van de Venter, 2022), the School Nutrition Association (SNA, 2022) and other organizations and aligns with recommendations for a minimum of 20 minutes made by the Centers for Disease Control and the American Academy of Pediatrics (Burg, 2021; Healthy Kids Act, 2022). Although the initial legislation was not adopted, elements of the bill are still under consideration, including a proposal to study extended lunch times.

In 2019, the Centers for Disease Control (CDC) published a research brief titled "Making Time for School Lunch," in which they underscored the importance of looking at both the total time scheduled for school lunch periods and the amount of seat time that students actually have to eat. The term "seat time" refers to the amount of time a person spends seated and eating. During lunch periods, students often spend several minutes waiting in line to buy their lunch before they can get settled at a table and eat. In their brief, the CDC recommended that students have at least 20 minutes of seat time for lunch, which aligns with seat time recommendations from the American Academy of Pediatrics (Burg et al., 2021).

Some studies have noted that while the *Healthy Hunger-Free Kids Act* of 2010 prompted schools to add more fresh fruits and vegetables on students' plates, these foods may take longer to eat. Extra time for chewing may be needed for hard foods like raw carrots and some fruits like oranges require peeling before they can be eaten (Chen, 2022). In schools where lunch periods

were 15 to 25 minutes, large amounts of food were uneaten and thrown away. This problem was compounded by students standing in long lines during lunch, which left as few as ten minutes or less for eating (Ettinger, 2019). Additional seat time is lost due to restroom visits during the lunch period break (CDC, 2019).

Research studies have described health and well-being benefits for students when they have longer lunch periods with at least 20 minutes of seat time. One finding is that students' consumption of fruits and vegetables increased significantly with longer lunch seat time (Burg et al., 2021; Prescott et al. 2020; Prothero, 2023; Stein, 2021). An additional benefit of longer seat time was a reduction in food waste and trash generation (Burg et al., 2021; Calvert et al., 2021). Teachers also reported that students who had longer lunches were calmer, returned to class more focused, and their social-emotional skills improved as a result of extra peer interaction during the extended lunch time (Olarte et al., 2022). Importantly, although teachers in the Olarte et al. (2022) study indicated that longer lunches posed some scheduling challenges, they nevertheless were in favor of the change.

Following the activity to adopt longer lunch periods for students, some states have also pursued policies on scheduling for school breakfast programs. North Carolina, for example, passed a resolution that breakfast may be included in the instructional day, as long as appropriate educational activity is taking place while students are eating (North Carolina State Board of Education, 2011). Similarly, Oregon lawmakers decided that the time students spend eating breakfast in the classroom while instruction is provided can still be considered as instructional time, for up to 15 minutes (Oregon state education statute, 2019), while West Virgina mandated a minimum of ten minutes be provided for children to eat breakfast in school (West Virginia admin. rule, 2018). Kentucky legislation took a different approach, requiring that all school districts schedule morning bus drop off early enough to allow sufficient time for students to eat breakfast (Kentucky state education statute, 2021).

While the CDC and American Academy of Pediatrics have not issued recommendations to date for a minimum time for students to each breakfast at school, research studies have provided evidence of positive benefits for students and schools when breakfast is provided at school, and also investigated the best ways to ensure that students have time for breakfast at school. Among the more successful options, according to Braden et al. (2019), is having students eat breakfast in the classroom. This study found that in schools using this approach, breakfast

participation was higher than for programs where breakfast was offered before school, and children exhibited better learning and improved eating habits throughout the day (Braden et al., 2019). Moreover, Cuadros-Manaca et al. (2023) found that breakfast after the bell was associated with fewer behavioral challenges while Kirksey and Gottfried (2021) found that breakfast after the bell was linked to decreased absenteeism. Despite the potential mess and inconvenience of serving breakfast in the classroom, 81% of teachers in one survey supported breakfast after the bell (McKeon et al., 2019).

Conclusion

While many aspects of school scheduling have seen little change or attention in recent years, there have been some policy efforts and shifts in practice in a few areas of school scheduling across various states and school districts. These areas include: later school start times at the secondary grade level, increased instructional time, extended school year or year-round school calendars, longer times scheduled for school lunch, scheduling of recess before lunch, and the adoption of a four-day school week in western states. Interest in adopting statewide policy on school schedules will depend largely on the nature of the state's policy climate and priorities. In some states with a strong tradition that values local school district control, like Maine, state mandates are less common. Yet, school districts are experimenting with different approaches for increased instructional time or extended learning time to improve student academic outcomes and/ or reduce summer or pandemic learning loss. Staffing shortages, particularly in more rural districts and states, have led administrators to adopt a four-day school week to attract and retain teachers. Climate change is impacting temperatures in schools and may drive further changes in how the school year is scheduled over the calendar in some regions of the US.

Implications for Policy and Practice

Drawing on the available evidence from our search of the literature and scan of state policy shifts recently related to school schedules, we offer some thoughts on potential areas for exploration for Maine schools.

- Based on a national survey of principals, Maine ranks quite low (47th) on the amount of time students are in school. Increasing instructional time can potentially improve learning outcomes, but the relationship between time and outcomes is not perfect. The outcomes will depend on many factors, including how the additional time is used and the quality of instruction. In most cases, efforts to increase instructional time have triggered some negative impacts, such as strong opposition from teachers and migration of teachers.

- There are several areas related to school scheduling that could impact student health and have other outcomes:
    - School year start dates: Maine does not set the school year start and end dates, but leaves the decision to local school districts. The 2023 calendar year saw the largest number of record-breaking high heat days. Maine's school buildings are considerably older than their intended lifespan and most do not have air conditioning. High temperatures in schools can have negative impacts on student learning as well as student and staff health. School districts in Maine may need to adjust school calendar start or end dates in light of the changing climate trends.

    - School day start times: Maine does not specify school day start times, but allows districts to decide. There is an opportunity to increase sleep time for teenagers by having later school start times for middle and secondary students. Studies have demonstrated positive benefits for students for school start times of 8:30 or later. Adequate sleep impacts physical health, mental health, student behavior, safety and attention in school. Some school districts have implemented later start times, while others see many challenges in making this change. Districts may find it helpful to access ideas, models or guidance from the state education agency or from other states and districts that have successfully implemented this change.

    - Physical education: Maine policy does not specify a minimum number of minutes for physical education nor how often it should be provided. The US Department of Health and Human Services recommendation is for 225 minutes per week (45 minutes per day) of physical education for secondary grade students and 150 minutes per week (30 minutes per day) for elementary students. The same department also recommends at least 60 minutes of moderate to vigorous daily exercise for youth, either during or outside the school day. Yet, less than 5% of Maine teenagers reported in 2021 that they have physical education daily. Adequate exercise supports students' physical health and also benefits students' mental health and behavior. With children and teens showing reduced levels of physical activity in recent years, state and local policymakers may want to examine the time and frequency for physical education as well as additional opportunities for exercise outside the school day. School-community partnerships can support programs outside the school day. More research is needed to understand how much physical education time is scheduled in Maine schools and the degree of alignment or lack of alignment with federal guidelines.

    - Recess time: Maine policy does not specify a minimum number of minutes for recess time during the school day, nor when it is scheduled. Like physical education, recess time provides important time for physical exercise and contributes to students' physical health as well as mental health, attention in school and behavior. In addition to ensuring adequate exercise time, schools should consider when to schedule recess. When recess is scheduled just before lunch, students have better appetites and eat more of their school lunch and healthy foods, and food waste is reduced. Hawaii adopted a statewide policy for

scheduling recess before lunch, while other states are encouraging districts to make this scheduling change. More research is needed to know what Maine school practices are for scheduling recess. There is an opportunity to pilot different recess schedules and study the outcomes.

- Meal time: A 2021 school district survey in Maine indicated that 21% of elementary students 36% of middle grade students, and 22% of secondary students had very short lunch periods of 15-20 minutes total, with even less seat time for students to eat lunch. Across the US, state and federal policymakers have made efforts to specify a longer seat time for the lunch period. These efforts proposed 20-25 minutes of actual seat time during the longer lunch period, in line with recommendations from the Centers for Disease Control and the American Academy of Pediatrics. Some states are also looking at ways to ensure students have adequate time to eat breakfast in school, typically during instructional time. Longer lunch periods can improve students' physical health and nutrition, increase student focus and attention in class, improve classroom behavior and reduce food waste. More research is needed to know how Maine schools schedule lunch and breakfast time during school, and to what extent practices align with federal guidelines. There is an opportunity to pilot longer lunch periods in Maine schools and examine the impacts. Some schools have found it helpful to serve pre-made lunches in the classroom for younger students, to reduce waiting time in line and increase actual seat time for students to eat. Other strategies are increasing the number of serving lines or reducing the number of items that need to be plated by staff.

- Four-day school weeks are becoming increasingly popular in western states, particularly in rural areas. Some school districts in other states have adopted this schedule change to reduce students' commute time to school, while more recently some districts are using this change as a strategy to attract and retain teachers. Districts that adopt this change often see similar changes in neighboring districts. District cost savings is generally small and studies have shown that students have either no improvement or a decline in academic outcomes. School districts in Maine and elsewhere considering a four-day school week will need to consider the overall total number of instructional days and/ or hours to meet state requirements. Some states are limiting the use of this schedule out of concern for student learning outcomes.

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