4: TIME FOR SCHOOL: ITS DURATION AND ALLOCATION

EXECUTIVE SUMMARY

RESEARCH FINDINGS

Small marginal increases (10-15%) in the time allocated to schooling show no appreciable gains in student achievement. Alternative calendars on which the typical 180 days of schooling are offered (e.g., year-round calendars) show no increased benefits for student learning over the traditional 9-months-on/3-months-off calendar. Summer programs for at-risk students are probably effective, though more research is needed.

RECOMMENDATIONS

- Small – 10-15% – increases in the time allocated for schooling would be expensive and would not be expected to produce appreciable gains in academic achievement.

- Furthermore, changes in the calendar by which those 180 days are delivered are very unlikely to yield higher levels of pupil achievement. In terms of pupil achievement, it matters not at all whether those 180 days are interrupted by one long recess or four short ones.

- There is no reason *not* to expect – but little research to support – that three months summer school would result in the same rate of academic progress as any three months of the traditional academic calendar.

- Within reason, the productivity of the schools is not a matter of the time allocated to them as much as it is a matter of how they use the time they already have.

4: TIME FOR SCHOOL: ITS DURATION AND ALLOCATION

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On average, America's children spend six hours each weekday and 180 days each year in school between the ages of 5 and 18. Roughly 25% of school districts have longer school years, and another 25% spend fewer than 175 days in school.[1] The questions addressed here have to do with the duration of schooling (allocated time) within the yearly school calendar, and the arrangement of that school time throughout the year. Would adding hours to the school day or days to the school year increase the amount that students learn? Would rearranging a fixed number of days schooling within the school year produce greater academic achievement? These are the central questions around which this review is organized. It is important to note that this report examines *allocated time* – the total amount of time students are in school. One commonly discussed and very visible aspect of school time will not be addressed in this review, namely, *engaged time* or *academic learning time* or *time-on-task*. Of the many hours children spend in school, the majority of them do not involve attention to learning the intended curriculum. Berliner estimated that American students are actively engaged in learning for less than 40% of the time they are in school.[2]

We are here dealing with the question of the potential effect on academic achievement of increasing the length of the school day, or increasing the number of days of schooling during a calendar year, or both. In addition, the research on alternative yearly calendars will be reviewed to see what advice it might have for increasing achievement. Other options not investigated here involve the assignment of homework as

a means of increasing students' learning time (this area has been thoroughly investigated by Walberg, Paschal and Weinstein[3] and more recently by Cooper[4]), or the rearrangement of a fixed amount of allocated time within the school day or week, as in block scheduling (see, for example, Cobb and Baker,[5] Veal and Schreiber[6]).

SCHOOL TIME RESEARCH

ALLOCATED TIME AND ACHIEVEMENT

Attention to allocated time as an important factor in accounting for differences in academic achievement received a huge boost in 1974 with the publication of research by Wiley and Harnischfeger.[7] These authors published the results of secondary analyses of the Equality of Educational Opportunity[8] dataset that seemed to indicate that the amount of schooling a student receives is a powerful determinant of the degree to which that student achieves academically. Wiley and Harnischfeger (hereafter W&H) based their analysis and conclusions on a group of sixth-grade students in 40 elementary schools in Detroit, Michigan. They quantified the amount of schooling present in a particular school by combining measures of "average daily attendance," "days in the school year," and "hours in the school day." When W&H related quantity of schooling to achievement holding constant a school's socio-economic status (as measured by "percent white," "average-items-in-the-home," and "average number of siblings"), they discovered what they regarded as an impressive effect of quantity of schooling on achievement. Indeed, W&H christened quantity of schooling (allocated time) a "potent path for policy."[9]

The Wiley and Harnischfeger findings did not go long unchallenged, even by researchers who were quite sympathetic with W&H's conclusions. Karweit[10] worried that the number of schools in W&H's secondary analysis of the Coleman data was small (40)

and that the effect of quantity of schooling only appeared for a subset of schools in the central city of Detroit. Moreover, the attempt to equate schools operating under very different circumstances by performing statistical adjustments on only three background variables, imperfectly measured, could well have left unaccounted for variability in the achievement data that might have been improperly attributed to quantity of schooling by W&H. The best corrective for these problems would be to attempt to replicate the effect on different data sets, each with its unique strengths and limitations. Karweit set out to do just that. Using the same Coleman EEO data set, Karweit analyzed the effect of quantity of schooling on achievement for schools in the inner city of Philadelphia, Milwaukee, Washington D.C., Cleveland, and Baltimore. In none of these instances was the W&H effect of quantity of schooling found. Next, Karweit conducted similar analyses using data for all schools in the state of Maryland. In this analysis, school-level test scores on the Iowa Test of Basic Skills (vocabulary, reading comprehension, mathematics and language) at Grades 3, 5, 7 and 9 served as the dependent variable and "percent in attendance" was used as the quantity of schooling variable, with background equating variables of "mother's education," "family income," "cognitive ability," and "percent disadvantaged." Again, no appreciable effect of variations of quantity of schooling on academic achievement was found. Still other analyses that Karweit performed failed to reveal the powerful effects that W&H had claimed. Karweit arrived, somewhat reluctantly it seemed, at the following conclusion: "Whether we use the school as the unit of analysis and incorporate quantity as a mediating variable, whether we examine central city or suburban schools, whether we control or do not control for ability, whether we use the individual as the unit of analysis, in no case do we obtain the sizeable effects reported

by Wiley and Harnischfeger."[11]

The Wiley-Harnischfeger and Karweit exchange did not end the matter of allocated time and achievement for researchers. Subsequent studies tended to confirm Karweit's findings that there is little relationship between small marginal variations in allocated time for schooling and measured academic achievement.

Learning Curves

Smith[12] correlated allocated time and achievement in social studies for about 70 sixth-grade classes and found no statistically significant relationship ($r = 0.17$ for allocated time and achievement gain). Brown and Saks[13] employed data from the Beginning Teacher Evaluation Study to fit "learning curves" relating allocated time to achievement. Their analysis showed small relationships between the two variables. When curves were fit separately for high-ability and low-ability students, the latter showed a slightly stronger relationship between allocated time and achievement.

The list of researchers who have found no important relationship between the length of the school day or school year and the achievement of students is long; a partial roster would include Blai,[14] Borg,[15] Cotton and Savard,[16] Fredrick and Walberg,[17] Honzay,[18] Karweit,[19] Lomax and Cooley,[20] Mazzarella,[21] and Walberg and Tsai.[22] It must be noted, however, that in every instance, the variation in the amount of allocated time is not great. No one has asserted, and no researcher believes, that students attending school for 100 days a year will achieve at the same level as students who attend school for 200 days a year.

Costs and Benefits

Proposals to increase the length of the school year must be looked at in terms of

cost and returns on such expenditures. Odden[23] estimated that extending the school day to eight hours or lengthening the school year from l80 to 200 days (marginal increases of 11% in allocated time) would cost the nation more than $20 billion yearly in 1980 dollars (or roughly $40 billion in year 2000 dollars). In a quantitative synthesis of the existing research on the relationship of allocated time to student achievement, Glass,[24] Levin and Glass,[25] and Levin, Glass and Meister[26] sought to relate the cost of increasing allocated time to the returns in terms of grade equivalent gains on standardized achievement tests. Their analyses, using the results of prior research, simulated the addition of one hour to each school day for an entire school year; this hour would be used equally for instruction in reading and mathematics (30 minutes each). This additional time represents increases of between 25% and 50%, depending on subject and grade level, in baseline allocated time for basic skills instruction. These authors estimated that such increases in allocated time would result in yearly increases in achievement of less than one month in grade-equivalent units (seven-tenths of a month in reading and three-tenths of a month in mathematics). Levin[27] suggested that increasing teacher salaries, hiring remedial specialists, or buying new equipment are all superior in cost-effectiveness to increasing allocated time. Levin, Glass and Meister[28] went on to compare the effects of a fixed financial investment in lengthening the school day with the effects of three other possible interventions intended to increase achievement in elementary school basic skills: computer-aided instruction, class-size reduction, and cross-age tutoring. Of these four interventions, increasing allocated time showed the smallest return per dollar spent. Levin and Tsang[29] supported this conclusion with analysis that drew upon economic theory; they concluded that large and costly increases in allocated time would be needed to effect

even small increases in academic achievement.

International Comparisons

As has been pointed out, children in typical public schools in the U.S. attend school for six hours each weekday for 180 days a year. Some other industrialized countries, e.g., the United Kingdom, operate schools for up to eight hours a day for as many as 220 days a year. The sensational character of international comparisons of educational achievement has done much to obscure the issue of allocated time for schooling and mislead the public and policy makers. Stigler and Stevenson[30] attributed the superiority of Japanese students in mathematics to their longer school year. Barrett,[31] in a journalistic account of the duration of school years in various countries, claimed that the cause of the low performance, particularly at higher grades, of U.S. students in algebra, calculus, and science was the relatively short U.S. school year. Such international comparisons as TIMSS (Third International Mathematics and Science Study) are frequently read as supporting the conclusion that certain high-scoring nations, which have longer school years than the U.S., owe their superior status to the greater amounts of allocated time for teaching and learning. In most cases, the differences between allocated time in the U.S. and in other nations are small and statistically insignificant. But more important, the assessments of achievement are undertaken in such non-standardized ways as to render any conclusions suspect, or patently invalid.

Bracey forcefully criticized the attempt to base policy decisions about America's schools on the TIMSS data.[32] For example, consider the TIMSS assessment in science and mathematics. Although the U.S. ranks relatively high in achievement at Grade 8, most public attention focuses on the poor performance of the U.S. at "Grade 12." When

this poor standing is linked – rhetorically, not scientifically – to the relatively short U.S. school year, bad research is compounded by being invoked as the basis for bad policy recommendations. There are so many circumstances, particularly at the Grade 12 level, that differ among nations that little credibility is warranted for the TIMSS findings. For example, although the TIMSS assessment ostensibly assesses students in the "last year" of high school, the meaning of the "last year" differs from country to country, enrolling 19 year-olds in one nation and 17 year-olds in another; the U.S. high-school seniors are among the youngest assessed. The U.S. students were among a small minority of nations which chose to disallow the use of calculators on the TIMMS test. And to make matters worse, the U.S. is the only TIMSS assessment site in which most instruction is not in the metric system, although the TIMSS tests use only the metric system where measurements are involved. U.S. seniors score relatively low in international assessments of educational achievement, and they spend relatively fewer days in school during the year; but there are many other factors that intervene in this relationship, and the conclusion that small marginal increases in the length of the school year would lead to greater achievement is not warranted.

Conclusion Regarding Increasing Allocated Time and Student Achievement

The import of a couple of decades of research on the effect on student achievement of small, marginal increases in the amount of time allocated to schooling is clear. Such increases have virtually no benefits for student achievement, and what small benefits there might be would not be justified by the increased cost of small increases in the length of the school day or the number of days per school year. This conclusion has a counter-intuitive ring to it: if any amount of schooling is effective – as it surely must be,

or else unschooled children would achieve at levels equal to their schooled counterparts – then why shouldn't more schooling be better? The answer probably lies in the intricacies of curriculum development and the organization of instruction. Virtually all of the research on allocated time for schooling has studied natural variation in the length of the school year and small differences therein. It is unlikely that an increase in the length of the school year of a few days (five or ten, for example) would prompt any important changes in the school curriculum. Most likely, teachers used the same textbooks and activities in the lengthened school year that they used in the shorter school year; more reviewing likely took place, and so on. Before major changes in curriculum and instruction take place, significant increases in the length of the school year would have to be attempted.

CHANGING THE SCHOOL CALENDAR (YEAR-ROUND SCHOOLS)

Given that increasing allocated time would likely yield small, insignificant increases in student achievement, are there ways of arranging the 180 days in the typical school year to promote greater academic achievement? Of all those ways of organizing a fixed amount of allocated time, only the proposals to deliver schooling on a "year-round" basis (equally spaced with intermittent vacations across twelve months) have gained much of a following among educators. Significantly, the original proposals to operate year-round schools (YRS) came from a consideration of the economics of school construction rather than any consideration of learning gains.

In year-round schools, as in traditional 9-month schools, students attend classes about 180 days spread throughout the twelve calendar months. Typically, the student body is divided into three, four or five groups; school year starting dates are staggered so

that at any one time, between one-third and one-fifth of the students are on vacation. In the most popular year-round schedule, the 45-15 plan, four groups of students attend school for forty-five days, or about nine weeks, and then have fifteen days off. Building capacity can be increased 25% because one-quarter of the student body is always on vacation. The 45-15 plan is the most popular year-round attendance plan because all students have a summer vacation, even if it is shorter than the traditional 3-month summer recess of the 9-month/3-month calendar. It is not, however, favored by high schools because the short, three-week vacations limit summer job opportunities. In the Concept 6 year-round plan, the calendar year is divided into six 2-month blocks. The students, in three tracks, have classes for four consecutive months and then a vacation for two months. Concept 6 can accommodate a one-third increase in enrollment. Because the students attend two 4-month terms a year, the administrative burdens of scheduling classes and recording grades are not as heavy as in the 45-15 plan. One-third of the students will have no summer vacation at all; in areas with great seasonal temperature variations, this track will be unpopular. Concept 6, then, can meet with a great deal of community resistance when the students' tracks are mandated and not freely chosen.

Another year-round schedule is the quinmester. Five 45-day terms, or quins, make up the year; students attend four of the five quins. In some districts, the fifth quin is optional; students who desire acceleration or enrichment, or who need remediation, attend all five terms. Obviously, if many students take advantage of this option, the district does not save money, because the enrollment remains the same as in traditional schools. There are many other year-round schedules, such as the trimester or quarter systems. The rationale for most, however, is the same: to avoid construction of new

schools by increasing enrollment at existing schools.

Determining which of the claimed advantages are in fact true requires a look at what has actually happened in year-round schools.

Do Year-Round Schools Improve Academic Achievement?

Year-round schools are principally a cost-cutting measure. Their success in reaching this goal and the many advantages and disadvantages that ensue from the change to a year-round calendar are the subject of some published policy studies[33]. But the subject of this review is the potential benefits to learning and achievement of converting schools on conventional 9-month/3-month calendars to year-round calendars. Proponents of the year-round calendar claim several advantages:

1) Students retain more over shorter vacations.
2) Learning proceeds via the psychologically more effective "distributed" rather than "massed practice" schedule.
3) Teachers spend less time reviewing previously learned material because of less forgetting during shorter vacations.
4) Because breaks will be more frequent, teachers experience less burnout.

Dempster[34] argued, in support of calendars such as the 45-15 year-round calendar, that spaced (or "distributed") practice over several sessions is superior to the same amount of time concentrated into a single study session. These arguments often rely on data drawn from laboratory experiments where subjects memorize nonsense syllables or perform other non-meaningful tasks. The relevance of these studies to actual classroom practice is questionable.

Cherry Creek District 5 in the state of Colorado implemented year-round schools

in 1974. After one year, student achievement in three year-round schools was compared to achievement in traditional calendar schools. Differences between standardized test scores in the two types of schools were found to be insignificantly small even after matching pupils on IQ. Similar findings are reported for other year-round programs in Colorado and across the country. For example, examination of three years of standardized test scores for Mesa County Valley School District (CO) indicates that the year-round schedule does not in any way enhance learning. A closer look at the Mesa County (CO) study reveals a pattern common in research on the academic benefits of the year-round calendar. In 1982, Chatfield Elementary School of the Mesa County Valley School District was converted from the conventional school calendar to the 45-15 year-round calendar. George and Glass[35] collected the SRA Achievement Test battery scores for all students at Chatfield who were tested in the spring of 1981 (before conversion to the year-round schedule) and again in the spring of 1982 (after one year on the year-round calendar). As a control, the district-wide SRA test scores were collected at the same two points in time; district averages were calculated after removing the scores of the Chatfield pupils. The results appear in the following table:

AVERAGE PERCENTILE GAIN (1981 TO 1982)
FOR CHATFIELD (YRS) AND DISTRICT-WIDE PUPILS

	Reading	Mathematics	Language
Chatfield (YRS)	+3%	+5%	+1%
District-wide	-3%	+3%	+2%

These gains are statistically insignificant and should not be "over interpreted." They indicate no superiority of one calendar over the other. They are indistinguishable from the kinds of yearly variation that all schools and school districts experience normally.

Many teachers and parents who favor year-round schedules believe that students learn more and faster when the learning process is interrupted for only short periods of time, as it is on the 45-15 plan. Even in Concept 6 schools as in Colorado Springs, Colo., the most teachers in year-round schools rated their pupils' vacation learning loss as less severe than in traditional schools.[36] Smith and Glass[37] attempted to substantiate teachers' perceptions in Colorado's Cherry Creek District 5. They found that although teachers in year-round schools spent less time reviewing pre-vacation material than teachers in schools on the traditional calendar, the actual achievement differences were insignificant on tests designed specifically to measure district objectives.

Other YRS Studies

The early findings in Colorado were replicated across the U.S. when researchers sought to compare achievement of students in YRS with their counterparts in schools on the traditional 9-month/3-month calendar. Several studies – by Naylor,[38] Zykowski,[39] Carriedo and Goren[40] – reached the conclusion that there is no significant difference in achievement between students in YRS and students in traditional calendar schools. Campbell[41] reported finding no significant achievement benefits due to year-round schools when compared with the traditional 9-month/3-month calendar in several Texas elementary schools. Webster and Nyberg[42] concluded that no evidence existed for the superiority of the year-round calendar at the secondary school level: "There appear to be

no trends in any of the districts describing either improvements or decline in standardized achievement test scores as measured by district-administered tests and the California Assessment Program. Further evidence produced from interviews and a review of evaluation reports from Los Angeles Unified School District confirm that the impact of year-round education on achievement scores at the high school level has been inconclusive."[43]

In a journalistic report on practitioners' assessments of the learning benefits of the year-round calendar, Harp[44] cited the experiences of administrators in several states to the effect that the year-round calendar appeared to have no appreciable benefits for academic learning. For instance, Dr. N. Brekke, a Superintendent of Schools in Oxnard, reported that 17 years of the year-round calendar failed to raise students' achievement to the California state average. Harp quoted administrators in Orange County, Florida, as saying that "'many of the benefits associated with the year-round schedule have been more perceived than realized… people want you to prove that test scores are going up, but that's a very difficult thing to do."[45]

Not all studies have failed to find achievement advantages for the year-round calendar. Those that do claim advantages, however, stem disproportionately from an advocacy organization that has grown up around this issue: the National Association for Year-Round Education (www.nayre.org/). (Institutional memberships range from $350 to $750 per year depending on the number of students that a school or school district has enrolled in year-round education.) NAYRE publishes its own research reports, and avoids established peer-reviewed scholarly journals; copies of research reports outlining the benefits of the year-round calendar sell for about $30. "Negative" studies have tended to

come from researchers working in universities.

The "Summer Forgetting" Argument for YRS

A primary argument in favor of YRS is that the long summer vacation of the 9-month/3-month calendar causes a large negative effect on student achievement. Allinder *et al.*[46] studied the summer break "forgetting" phenomenon for Grades 2 through 5. They found statistically significant losses in spelling, but not in mathematics, at Grades 2 and 3; they also found losses in mathematics, but not in spelling, for Grades 4 and 5.

Tilley, Cox, and Staybrook[47] studied summer regression in achievement for students receiving no educational services for three months. They found that most students experience some regression during the summer recess. Cooper *et al*.[48] reviewed 39 such studies and found that achievement test scores do indeed decline over the summer vacation. Their meta-analysis revealed that the summer loss equaled about one month on a grade-level equivalent scale, or one tenth of a standard deviation relative to spring test scores. The effect of summer break was more detrimental for math than for reading and most detrimental for math computation and spelling. Also, middle-class students appeared to gain on grade-level equivalent reading recognition tests over summer while lower-class students lost on them. Possible explanations for the findings included the differential availability of opportunities to practice different academic material over summer (reading is much more easily practiced than mathematics) and differences in the material's susceptibility to forgetting (factual knowledge is more easily forgotten than conceptual knowledge).

Both the Allinder *et al*. and the Cooper meta-analysis of the summer forgetting phenomenon place estimates on the loss of achievement over the traditional 3-month

vacation that are smaller than many expected. This may in part help explain why the YRS calendar does not produce the dramatic effects on achievement that some hoped to see.

Year-round schools can accomplish their principal goal of saving money by avoiding construction of new buildings. However, there is no credible evidence that the year-round calendar causes improved academic achievement. How is it, then, that an idea whose benefits have eluded all objective attempts to discover them nonetheless engenders enthusiasm and loyalty to such a degree that it has its own national organization? Perhaps the answer lies in the problems administrators have "selling" the idea of YRS to parents and teachers. YRS calendars can disrupt family life, including vacation schedules and traditional summer activities (baseball leagues, camping programs and the like). These problems can be particularly severe when one child in a family is on a year-round calendar and another attends school on a traditional calendar. Convincing parents that the inconveniences caused by the year-round calendar are worth the trouble is a task that falls to school principals. One argument used to make the case for conversion is that the year-round calendar is much superior to the traditional calendar in terms of academic learning. Unfortunately, this position lacks empirical support.

THE EXTENDED SCHOOL YEAR

Of course, the obvious antidote to summer forgetting is to extend the school year throughout the summer. Without thinking much about it, parents in surveys give strong support (85%) to the idea that students who fail to meet academic standards should attend summer school.[49] Such an extension for all students would represent an astronomical increase in the cost of schooling in the U.S. – on the order of $80 billion in current dollars. No such proposals have been seriously advanced and no research exists to

suggest the potential returns in terms of academic achievement. "Extended school year" proposals have been limited almost entirely to services for handicapped or disabled students.[50] Heyns's analysis of summer programs for at-risk students in Atlanta schools revealed gains in academic achievement, but at rates considerably slower than during the regular academic year.[51] The absence of research on the effectiveness of extending schooling through the summer months should not deter reasonable judgments of the potential success of such proposals, however. The elements in the successful delivery of schooling are not mysterious, after all. Well-trained and experienced teachers, good curriculum materials, adequate physical facilities – these ingredients in combination succeed day-in and day-out in teaching our nation's children. There is no reason to believe that the continuation with a high-quality program of the 9-month school year throughout the three months of the traditional summer recess would result in any less academic achievement than is observed during the regular school year. Cooper and his colleagues[52] have based their recommendations for quality summer school programs on a meta-analysis of the literature.

The absence of a relationship between small marginal increases in the length of the school year or the school day throughout the year must not be extrapolated to reach the conclusion that significant increases in allocated time for schooling (such as three months' instruction throughout the summer) would not result in significant increases in academic achievement.

RECOMMENDATIONS

The research conducted on time allocated for schooling yields three broad conclusions:

- Small – 10-15% – increases in the time allocated for schooling would be expensive and would not be expected to produce appreciable gains in academic achievement.
- Furthermore, changes in the calendar by which those 180 days are delivered are very unlikely to yield higher levels of pupil achievement. To paraphrase a famous poet, "180 days is 180 days is 180 days." And, at least in terms of pupil achievement, it matters not at all whether those 180 days are interrupted by one long recess or four short ones.
- There is no reason *not* to expect – but little research to support – that three months summer school would result in the same rate of academic progress as any three months of the traditional academic calendar.

Within reason, the productivity of the schools is not a matter of the time allocated to them. Rather it is a matter of how they use the time they already have.

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