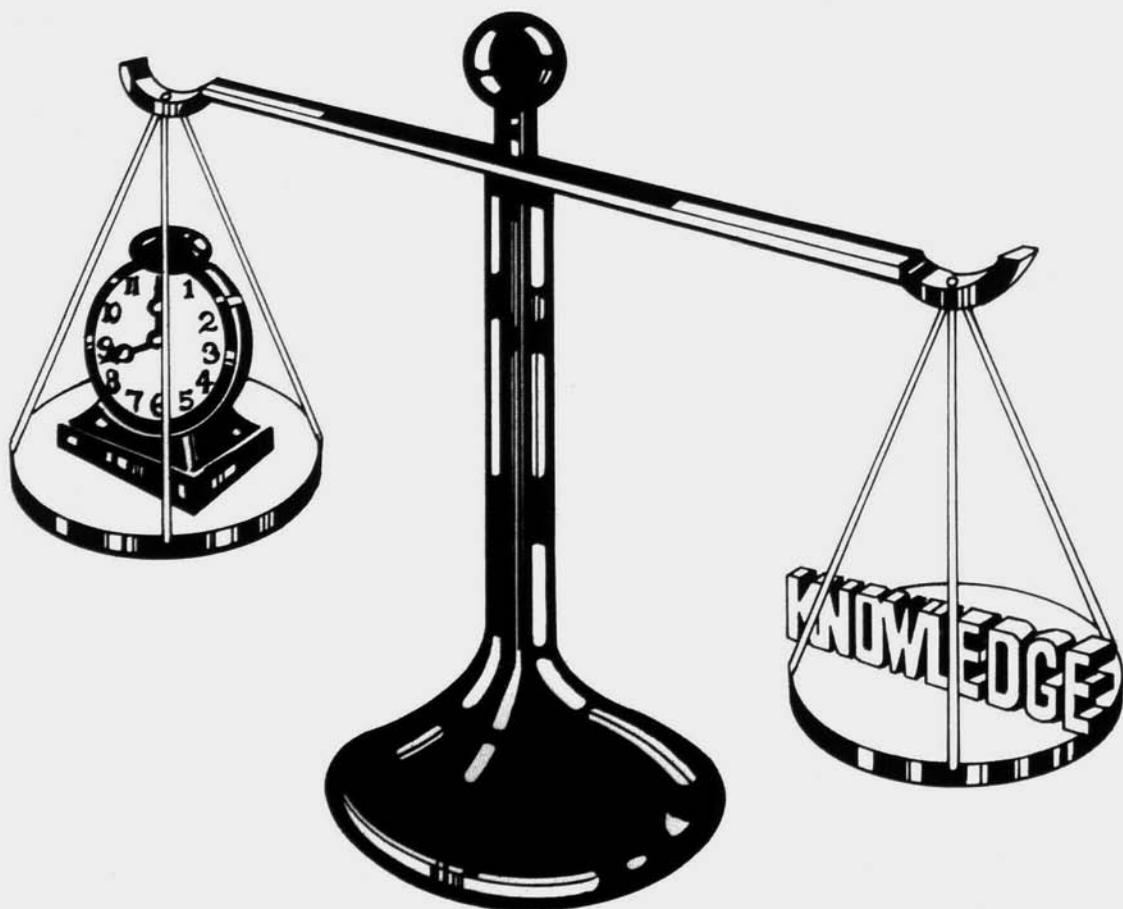


# Time-on-Task Reconsidered:

*Synthesis of Research on  
Time and Learning*



Much attention has been given recently to the use of time in school. Most prominent is the recommendation of the National Commission on Excellence in Education to consider lengthening the school year to as many as 220 days and the school day to seven hours. What can we predict, based on empirical studies of time and learning, about the likelihood that these changes would result in substantial improvement in student achievement?

Time is a necessary, but not sufficient, condition for learning. Learning takes time, but providing time does not in itself ensure that learning will take place. More time *may* result in more learning—if adequate time was the major cause of the problem in the first place. If other factors were the real cause, then providing more time will not be an effective strategy.

These truths may be obvious, but they are often forgotten in the press to locate manipulable and potent variables for improving school practice. Early time studies, based on small and unrepresentative samples, proclaimed impressive effects for differences in the quantity of schooling (for example, Wiley and Harnischfeger, 1974). These claims, coupled with a dearth of knowledge about effective school practice and growing criticism of the schools, helped promote time as an almost magical elixir for school improvement.

#### A Long History

The interest in time as an educational variable is scarcely new, however, finding counterparts in studies of school and classroom efficiency of the 1920s and student attention in the 1940s (Callahan, 1962; Shannon, 1941). Numerous studies conducted over the last 50 years have examined the effects of time on learning. School time has been taken broadly to include years of schooling (Hyman and others, 1975), days or hours per school year (Butler, 1925; Crider, 1929; Douglas and Ross, 1965; Finch and Nemzek, 1940; Levanto, 1973; Lindsay, 1976; Karweit, 1973, 1976; Odell, 1923; Rozelle, 1968; Summers and Wolfe, 1975; Ziegler, 1928) and time engaged in learning (Bell and

Davidson, 1976; Cobb, 1972; Edminston and Rhoades, 1969; Fisher and others, 1978; Everson and others, 1980; Karweit and Slavin, 1981; Lahaderne, 1967; Smith, 1979). Not surprisingly, given the broad range of time measures and differences in methodological approaches, studies have produced a fairly wide spectrum of estimates for the effect of time on learning. The zero-order correlation between time and learning across these studies range from .10 to .70. When controls are introduced for prior knowledge or ability, the partial correlations become .09 to .60. (For reviews of time and learning, see Walberg and Frederick, 1983, and Karweit, 1983).

These studies are useful in a general way, but not well suited for predicting how specific changes in school time might affect student achievement. That requires more detailed data on classroom activities and student engagement, from studies using a rigorous pre-test, observation, and post-test research design. But because studies often report different statistics and use different types of achievement and time measures, comparisons are difficult within this narrower range of study designs. Elsewhere (Karweit, 1983), I examined eight different studies of time-on-task and attempted to provide comparable statistics across these studies (Bell and Davidson, 1976; Cobb, 1972; Edminston and Rhoades, 1969; Everson and others, 1980; Fisher and others, 1978; Karweit and Slavin, 1981; Lahaderne, 1967; Smith, 1979). Two statistics were computed—the partial correlation of time and post-test scores controlling for pre-test, and the proportion of unique variance accounted for by the time measure.

In general, these studies produce a positive association between time and learning. Many of the studies find a statistically significant effect of engaged time on learning. But all the studies have problems with inconsistency and strength.

#### Problems of Inconsistency

For example, consider the findings from the Beginning Teacher Evaluation Study (BTES). This carefully designed and implemented study examined the effects of academic learning time (ALT) on language arts and mathematics achievement of 122 5th graders and 139

2nd graders. Academic learning time was operationalized collectively as allocated time, engagement rate, and percent of low error and high error activities. Borg (1980) presents a summary table of the regression analyses conducted by the BTES. Across the 29 subtests, the different components of academic learning time had significant regression coefficients in 41 of the 116 possible instances, or about 35 percent of the time. Eighteen of the 29 subtests had significant increases in the variance explained in the post-test by the addition of the four ALT variables. However, when only the two time factors (time allocated and engagement rate) were added to the regression, nine of the 29 subtests yielded significant increments to the variance explained. This indicates that the sheer amount of instructional time does not very consistently explain differences in achievement, a point often neglected in popularization of the BTES results to imply that more time will produce more achievement.

Also, the fact that the ALT construct performs better than the time alone variables can be interpreted in two ways. High and low error can be seen as indicators of the quality of instruction, and thus ALT becomes a measure both of how much time was spent and how appropriately it was used. But these success rate variables can also be seen as alternate measures of the dependent variable, post-achievement. From that standpoint, their inclusion amounts to measuring the dependent variable twice. This latter interpretation suggests that changing teaching practice on the basis of these "effects" would not produce the desired achievement results.

There is probably truth in both these views of success rate. The important point for practice is that there is both a silliness and a danger in interpreting these results too literally.

The other studies had similarly inconsistent and often weak effects. In terms of the partial correlation with controls for initial ability, the scores are in the range .10 to .40. In terms of the proportion of variance uniquely attributable to time effects, this figure ranges between 1 and 4 percent. Translating this into residual variances, the range was between 1 and 15 percent.

These inconsistent and modest results are surprising given the acceptability of the "more time produces more learning" hypothesis. The simplest explana-

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tion is that Carroll's formulation of learning as a function of time spent and time needed is correct, but empirical studies have yielded inconsistent results because they have not paid attention to time *needed* as well as time spent.

#### Reasons for Caution

Even if every study found significant effects on every subtest, there are additional reasons to be cautious about interpreting these results. Other factors, which covary with time but which are not measured, may be responsible for the observed effects. For example, effective use of time may go along with an orderly student population, a respected principal, and competent teachers. Providing more time for schools that do not meet these conditions will not increase achievement because the enabling factors are absent.

A related difficulty is that not all the variation in time use is open to manipulation. Students vary in the extent of time they are on task. Similarly, teachers vary in their skill and competency in using classroom time effectively. Some portion, but not all, of these differences is open to manipulation.

Also, extrapolating findings from present time studies to situations where school time is greatly extended is problematic because present conditions may not necessarily hold with a longer school day. For example, longer school days may require additional recess or other break time, thus reducing the actual time available. With or without breaks, students and teachers may find fatigue a problem, so that additional available time is not used effectively.

Another extrapolation problem is that most of the time studies pertain to elementary school students with roughly average ability in self-contained classrooms. Few studies exist of time use in junior high/middle schools and secondary schools. Few studies examine the relationship between time and learning for low or high ability students. Although time factors may play the same role for different ability groups, for different age groups, and for students in differently organized schools, this needs to be empirically studied and not just assumed.

One might ask, "Why quibble over effect sizes and results of a variable so well-intentioned and benign as time?" Trying to improve time-on-task is clear-

ly a worthwhile objective that schools *should* pursue. But researchers need to be clear about where the true effects really are. If schools improve time-on-task, achievement results may or may not improve. It all depends on whether the time was needed or irrelevant, used appropriately or totally wasted.

There is also the very real danger of enshrining practices that seem to produce relatively high time-on-task while condemning those that do not. For example, one frequently cited finding is that students are off-task more during seatwork than they are during teacher-directed portions of the lesson. This implies that seatwork is a "bad" practice that should be avoided. Although there are bad applications of seatwork, there are many situations for which independent seatwork is desirable. A reasonable strategy would be to ensure that seatwork is appropriately designed and connected to the lesson and not simply busywork.

#### Important Information

Nonetheless, studies of how schools use time provide important information that can serve as a base for school improvement. First, there is strong agreement among the studies that, at most, about half of the school day is actually used for instruction. Particular estimates are

lower or higher, but planned and unplanned noninstructional activities are on about equal footing with instructional ones. Whether this distribution of time can be, or should be, changed is unclear, but it is clear that instruction is often not the major activity of the school day.

It is also clear that appreciable variation exists in the amount of exposure to schooling. In particular, rates of high student absenteeism, coupled with disruptive classrooms and closings of schools due to teacher strikes, lack of fuel, or other crises severely curtail instructional time in many school districts.

Third, these studies indicate that the instructional focus and time allocations differ markedly from classroom to classroom. For example, one 4th grade teacher may spend an hour and a half on math instruction daily while a teacher across the hall will spend 50 minutes. What is taught in a subject also differs from teacher to teacher within this scheduled time. Differences in focus may reflect the teacher's response to instructional needs of the students or may be rather arbitrary.

Fourth, the studies of time use underscore the fact that there are multiple sources of educational time allocation and use. The amount of active learning

## Highlights of Research on Time and Learning

Studies of the way time is used in schools have established that:

- Only about half the time in the school day is ordinarily used for instruction.
- There are great differences in the amounts of time students are exposed to learning activities.
- Time allocations differ markedly among classrooms.
- Many sources determine how time is used in schools.

In general, research studies show a positive association between time and learning, but differences in achievement are not consistently explained by differences in the amount of instructional time. In many studies, the proportion of variance in achievement uniquely attributable to time varies from 1 to 15 percent.

Educators should not necessarily expect more time to produce more learning because:

- Other factors that co-vary with time may be the real cause of the higher achievement found in research studies.
- Variations in the way available time is used cannot be completely controlled.
- Findings of studies conducted with the present school day and year may not apply to a longer day or year.

time on a particular topic is determined by the length of the school year and day, by the orderliness of the school, by teacher decisions concerning what to teach, by the mode of instruction and teacher managerial skills, and by the students' attendance and attentiveness. Problems with time use may vary from situation to situation, and individual schools need to be clear about where they should direct their energies to improve the situation. In a smoothly run, well-organized school, it is probably appropriate to try to improve student attentiveness. In a school with a 60 percent attendance figure—where whole days, weeks, and months are lost to instruction—it would surely be more productive to try to improve attendance.

Besides examining existing practices, administrators and teachers should weigh the merits of any changes in practice in terms of their effects on instructional time. Many changes in practice take away from instructional time and make questionable contributions in return. A guiding question might be: is the quality of instruction improved enough to make up for the losses in instructional time? For example, in a departmentalized elementary school, it takes time to get students ready to move to another classroom, to actually move them, and then to resettle the students into the new classroom. Is the quality of instruction from the specialized math or English teacher sufficiently better to compensate for this time lost?

The actions of administrators also help determine whether students and teachers perceive instruction as the number one priority. Constant interruptions for nonessential reasons send a message that classroom instruction isn't important. Changes in the school schedule, such as putting all extra-curricular activities at the end of the week, are one way to alleviate this problem.

### A Meaningful Strategy

In summary, time spent is not so consistently related to achievement as it may seem. This generalization suggests that oversimplified policies regarding time are likely to be misguided and produce disappointing results. It does not mean that focusing on time as a vehicle for school improvement is misguided. Getting teachers to think seriously about how their activities contribute or detract

from intended educational goals is a critical part of any meaningful school improvement strategy. □

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