Impact of Class Time on Student Learning

Time can be interpreted as a resource and, as such, the amount of time devoted to the education of children is often examined as a separate and central resource in the educational process (Baker, Fabrega, Galindo, & Mishook, 2004). However, despite its simplistic appearance, time in an educational setting is a complex issue. This is partially because the amount of time actually spent on instructional tasks and the efficiency of instruction are hard to determine—instructional time is dependent on its relationship to curriculum and instructional quality (Baker et al., 2004). However, discussions regarding education and the notion of time typically gravitate toward a focus on the school year and on the school day, and it is from this perspective that the concept is examined.

Procedures

In searching the literature for studies on the impact of class time on student achievement, the following terms were used in a search of EBSCO's Academic Search Elite database and ERIC: "school" AND "time on task," "schedule" AND "student achievement," "class instructional time," and "block scheduling." ERIC was also searched using their descriptor, "Time Factors (Learning)." Wilson's database, Education Full Text, was searched using combinations of "student achievement" with "schedules" or "time allotments" (the controlled vocabulary terms for that database). The American Psychological Association's PsychINFO database was searched using various combinations of these terms: "class time," "instructional time," "academic achievement," and "student achievement." Internet searches included "school time," "time on task" and "instructional time" combined with "student achievement."

The first searches focused on research completed within the last 10 years. When reference lists from the retrieved papers were reviewed, however, it was noted that some older research was repeatedly cited in current works. These papers were subsequently retrieved, and some were determined to contain information that was of seminal value to the query, hence the citation of publications prior to 2001.

Limitations

This briefing paper on class time and student learning includes the following limitations:

- Scientifically based research on the effects of class time on student achievement is difficult due to the number of additional factors that affect student learning, ranging from a teacher's effectiveness to the education policy of a district, state, or nation. Thus, what works in one setting may not hold true in a different setting.
- Most of the research reviewed involved case studies, not randomized control trials.
- Lengthening the time spent in the classroom does not automatically translate into more time spent on learning.

QUESTION:
What does the research say about the correlation of class time with student learning?

Summary

The impact of class time lengths on student achievement is a complex issue with multiple extraneous factors and without definitive answers. A major theme across many of the studies reviewed is that the amount of instructional time is not so important as how that time is spent..

Key Points

- The commonly held conception that students in other countries outperform U.S. students because they spend more time in school is not supported by research.
- Neither increased days/year nor hours/day have been shown to increase student learning significantly except in special circumstances.
- Studies on block scheduling have reported mixed results.

- Due to the abbreviated length of this document, a limited number of research sources are cited.

Inclusion of programs or processes within this paper does not in any way imply endorsement by SEDL.

Findings From the Literature

One of the problems with instructional time is that education lacks a comprehensive national profile of the range and incidence of the policies and practices that describe in-school learning time (Kolbe, Partridge, & O'Reilly, 2011). According to Kolbe and colleagues, the Schools and Staffing Survey (SASS) is the only nationally representative data source available for identifying variations in time across schools. For their study, the researchers used data primarily from the 2007–08 administration but also used 1999–2000 and 2003–04 administrations to look at trends over time. Education is still chiefly a state and local responsibility, and in most states, requirements for the public school calendar are articulated in state law and regulation (Kolbe et al.). Most districts and schools in the United States have settled on a school calendar ranging from 170 to 180 days, five days a week, six and a half hours a day; this has remained the standard since the 1960s (Silva, 2007). Although school years range from 160 days in Colorado to 186 days in Kansas, according to Kolbe et al., there is considerably more variation in state polices for school day length than in the length of the school year.

The performance gap between American students and their global peers, primarily on international examinations in mathematics and science, has prompted investigations focused on instructional time. According to Silva (2007), the current focus stems from the perception that students in other countries outperform American students because they have longer school years, thus more instructional time. However, extensive review by Baker et al. (2004) indicates that the research does not show a strong relationship at the cross-national level between achievement test scores and amount of instructional time. The correlation between length of schooling and math achievement for eighth, ninth, and tenth grades is weak or non-existent in most nations; likewise, for the majority of countries, studies show little to no evidence of a strong association between total time of instruction and science achievement (Baker et al.). International test results show that American students are lagging behind, but it appears that instructional time may not be the primary factor in the achievement gap. Closer inspection reveals that international comparisons are difficult because the amount of time spent in school is only one factor among several that influence student outcomes. Teaching practices, student culture and curricula, and general educational philosophy also play important roles in learning, and these may vary widely from one country to another (Silva).

A decision to extend either the school year, school day, or both is often based on the assumption that more time in school should result in more learning and better student performance. However, as just stated, the relationship between time and learning is complicated. Current research suggests that improving the quality of instructional time is at least as important as increasing the quantity of time in school (Silva, 2007). Nevertheless, the debate continues over how best to extend learning time.

Extended Class Time

Extending learning time is not a new idea. The federal government spends millions of dollars on out-of-school, afterschool, and expanded-learning opportunities through such programs as the Supplemental Educational Services (SES) and the 21st Century Community Learning Centers initiative (Silva, 2007). SES funds are used to extend out-of-class learning opportunities for students in schools that are designated by No Child Left Behind guidelines as "in need of improvement." In addition, districts and schools across the country have become pioneers in expanding learning time, with charter schools in particular being at the forefront of the expanded time movement. A majority of charter schools rely on significantly more time as part of their educational model (Farbman, Christie, Davis, Griffith, & Zinth, 2011).

According to Kolbe et al. (2011), more than 180 days is considered an extended school year and seven or more hours per day is considered an extended day. The Center for American Progress has suggested that expanded learning time be defined as the lengthening of the school day, school week, and/or school year for all students in a given school by at least 30% (Rocha, 2008). In addition, the center suggests that for policy purposes, that extended learning time be aimed at high-poverty, underperforming schools and that "to be effective, the concept of expanded learning requires the complete redesign of a school's educational program in a way that combines academics with enrichment for a well-rounded student experience and that supports teachers by giving them more time for planning, training, and professional development" (Rocha, pg. 2). Such a perspective calls for a common definition of expanded learning time that goes beyond the idea that school doors are opened after normal school hours

or the simple existence of an afterschool program, tutoring, or homework assistance. According to Rocha, those ideas "overlook three critical components of effective expanded learning time programs—whole-school redesign, inclusion of all students in a school, and alignment of academics and enrichment with curriculum and standards" (pg. 41).

Educators in schools that use an extended-time model operate under a philosophy that more time enables them to broaden and deepen the curriculum, to address the learning needs of individual students, and to build in opportunities that enrich students' educational experiences (Farbman et al., 2011). However, a review of the literature on extended learning time by Patall, Cooper, and Allen (2010) reveals that the research in this area is weak and that it is difficult to make strong causal inferences. They report there are no controlled studies that allow researchers to draw definitive conclusions about how extended time affects student performance over time. Furthermore, Silva (2007) notes that most schools that have lengthened time for student learning have not done so in isolation, but as part of a larger reform effort. This makes it difficult or impossible to isolate the effects of extending the school day or school year on student achievement.

Despite those shortcomings, the research does reveal a critical common theme that supports consideration of extended learning time strategies. Patall et al. (2010) indicate that the research suggests that extending school time can be a particularly effective means to support student learning for students who are most at risk of school failure. Because poor and minority students are less likely than their more affluent peers to have educational resources outside of school, they may benefit more from increased school time (Silva, 2007).

The U.S. Department of Education has adopted as a strategic initiative the addition of more learning time to the school year or day. Rather than increasing time in all schools, extra time is targeted at boosting learning and achievement in schools that serve students who have fewer opportunities for enrichment outside of school and are most at risk for academic failure (Kolbe et al., 2011). Examples of federal programs' considerations for extended time can be found in guidelines for several American Recovery and Reinvestment Act grant programs, including Race to the Top and Investing in Innovation (i3), as well as the Title I School Improvement Grant (SIG) funds (Kolbe et al.). Expanded learning time has emerged as a recurrent theme among several winners of Investing in Innovation (i3) grants (Farbman et al., 2011).

Unfortunately, such factors as politics and the cost of extending time make adoption of such a model in many contexts an unattainable reality. Silva (2007) found that the additional days and hours are expensive, and that "changing the school schedule affects not only students and teachers, but parents, employers and a wide range of industries that are dependent on the traditional school day and year" (pg. 1).

The reality of reform that centers on extended time is that there are a multitude of implementation challenges. According to Rocha (2008), the problematic issues include the following:

- The amount of learning time added to the school calendar varies greatly across efforts, which makes evaluation of effectiveness difficult at best.
- Long-term funding is a critical issue because the level of funding can lead to partial implementation and otherwise affect the quality of the outcomes.
- Multiple evaluations of expanded learning time efforts have not been conducted, which makes it difficult to learn from mistakes, challenges, or successes of implemented efforts and to discern correlations between more learning time and academic achievement.
- Teacher burnout is a legitimate concern in schools with a longer day, week, or year.

It should be evident that many factors must be in place for an extended-time strategy to be effective. For example, the strategy would likely be unsuccessful in a poorly managed school with ineffective teachers. In order for extended time efforts to engage students in productive learning, essential elements—strong leadership, rigorous and continuous professional development, a focus on teacher quality, a positive school culture, and strong family engagement—must be in place within the school system (Patall et al., 2010). Expanding learning time is especially problematic at the high school level because it often entails building partnerships with organizations outside the school, such as employers, cultural institutions, community-based organizations, and college and universities (Pennington, 2006). An inherent fiscal challenge is that the optimal added time, that balances costs and benefits, is unknown. This places a burden on education researchers to determine when, for whom, and under what conditions added school time will yield the greatest benefits (Patall et al.).

Pennington (2006) suggested that if extended-time school models prove successful, state education agencies could handle the differential costs by adopting a weighted student funding formula that would provide extra resources for students in greatest need and would specify that an allowable use of funds would be to expand learning time. Unfortunately, the current fiscal climate is one of an economic downturn with significant cuts in federal and state education spending. Rather than extending the school year or school day, schools and districts are forced to consider moving in the opposite direction. In order to balance their budgets, some districts have resorted to stop-gap measures such as furloughs and hiring freezes, which often involve cutting days from the school year. That means that in some locations, the school year is shrinking, not expanding (Farbman et al., 2011).

Economics and research may dictate a focus on improving existing learning time rather than using an extending time model. An important consideration in this era of accountability is that mandated testing in English/language arts (ELA) and mathematics has impacted instructional time. Approximately 62% of districts reported that they have increased time for ELA and/or math in elementary schools since school year 2001–02, and more than 20% reported increasing time for these subjects in middle school. The consequence of these increases has been cutting time from other subjects, such as social studies and science (McMurrer, 2007). This detracts from those subjects in order to support a strategy that has not been proven to benefit student learning.

Another issue with the current school calendar is summer vacation. According to Pennington (2006), the biggest problem with summer vacation may be its impact on the academic achievement of low-income students, because those students lose significant academic ground compared to their more advantaged peers. Cooper, Nye, Charlton, Lindsay, and Greathouse (1996) determined that over time the summer learning loss ultimately increased gaps between middle class and poorer students. This had a particularly detrimental effect on low-income students. Even in those cases where disadvantaged students attended some type of traditional summer program, Silva (2007) found that they "provide only remedial, intermittent support to students and suffer from low academic expectations, limited advanced planning, teacher fatigue, discontinuity between the summer curriculum and the regular-school-year curriculum, a lack of emphasis on core academic skills, and poor attendance among older students" (pg. 7).

Modified School Calendars

Modified school calendars are those in which the number of school days remains constant, but the full summer vacation is eliminated. Instead, shorter, more frequent breaks are taken throughout the school year. Year-round schools are a good example of this type of modification. Modified calendars are increasingly popular in overcrowded schools and districts where groups of students can rotate through a multi-track schedule with a certain portion vacationing at any given time. In this way a school building can ultimately accommodate more students throughout the school year. In other instances, single-track schedules are implemented not to alleviate overcrowding, but to diminish the negative effects of long summer breaks on learning. In this model, all students are on the same track with frequent, short breaks.

One report (Cooper, Valentine, Charlton, & Melson, 2003) summarizes the pros and cons of modified school calendars. Proponents indicate that modified school calendars can save money, alleviate teacher burnout, and provide parents with more one-on-one time with children on different tracks. Cooper et al. report that opponents (Coleman & Freehorn, 1993) make three claims: 1) cost savings do not occur until school population grows to 115% of building capacity, 2) modification of the calendar leads to teacher burnout for those who teach intersessions—time that teachers would normally use for a break, and 3) modified calendars can disrupt extra curricular activities.

Academic arguments also exist for and against modified calendars (Cooper et al., 2003). Proponents posit that learning is lost during long summer breaks and that long periods of review are required at the beginning of each school year. These negative effects have greater implications for students already struggling academically such as English language learners and students with special needs. Opponents point out that changing the calendar does not impact instructional and curricular issues that have greater bearing on student learning. They also presume that frequent breaks provide more opportunities for students to forget what they have learned.

Cooper et al. (2003) synthesized the research on modified school calendars and found the quality of evidence to be poor. However, they made some claims with reservations. Research on summer learning loss indicates that all students, regardless of gender, ethnicity, IQ, and socio-economic level, are affected. Differences in levels of loss were tied to economic level. However, the authors of this report confess that simply modifying the schedule does not ensure that learning loss during breaks does not occur.

In the majority (62%) of the districts they studied, schools on a modified calendar outperformed those on traditional calendars. However, the effect size was very small (d=.04), and results were confounded by other school factors. Cooper and colleagues also examined longitudinal data, which revealed a possibility that modified school calendars result in diminishing gains over time. The greatest gains linked to modified calendars occur for students who are struggling academically or come from disadvantaged homes. Additionally, elementary school students reap more gains (although only slightly different from zero, d=.09) than secondary school students (not significantly different from zero). Finally, the authors state, "…it would be inappropriate to suggest that the current evidence indicates that modified calendars have a significantly positive impact on achievement, in the practical sense" (pg. 43).

The Harvard Family Research Project recently published a study (Deschenes & Malone, 2011) examining year-round learning that focused on "intentional, community-based efforts to connect school, afterschool, and summer learning" (pg. i). It reported on several programs that have shown promise, falling into four categories of models: organizations providing both afterschool and summer components, community-based programs serving cohorts of students, school-initiated programs, and community or district models that link school and out-of-school opportunities. The programs range from one serving a single county, the Sunflower County Freedom Project in Mississippi, to an international one, Big Picture Learning.

Block Scheduling

If extended time is not economically feasible and traditional summer programs are typically not effective, educators must improve the use of time in the current school year and school day. One typical approach employed to make better use of class time is block scheduling, in which the typical class period is extended in time.

Block scheduling is defined as a restructuring of the school day into periods longer than the traditional 50-minutes (Gruber & Onwuegbuzie, 2001). Lewis, Dugan, Winokur and Cobb (2005) further describe common types of block scheduling. The 4 X 4 model is the most common type of block scheduling found in U.S. high schools (Lewis, et al.). In this model, students attend the same four 90-minute classes every day of the week, completing a year-long course in one semester. Another common format for block scheduling is known as alternate day or A/B scheduling. Here, students attend three or four 90–120 minute classes on alternate days for the entire academic year.

Studies from the 1990s indicate that block schedules have generally been seen as a method to alleviate student stress caused by an abundance of academic material, sets of class rules, class assignments, and disjointed curricula (Carroll, 1990). Additionally, Zepeda and Meyers (2006) cited studies reporting increased student attendance (Duel, 1999; Khazzaka, 1998; Queen, Algozzine, & Eaddy, 1996, 1997, & 1998; Snyder, 1997) and decreased disciplinary referrals (Evans, Tokarczyk, Rice, & McCray, 2002; Khazzaka, 1998; Stader, 2001) subsequent to implementation of block scheduling, as a possible reflection of student satisfaction with the altered class time. Furthermore, with a decreased number of class periods per day, teachers had more opportunities to implement creative teaching strategies to meet the needs of students (Canady & Rettig, 1995) and had more one-to-one time for interactions with students (Shortt & Thayer, 1999).

More current studies examined for this briefing paper reveal mixed results from comparisons among different types of block schedules and from block schedules compared to traditional schedules. Nearly all of the studies mention the difficulties in making generalized statements about the effectiveness of block scheduling because of confounding factors such as instructional styles, classroom assessment and other measures, and districts contexts (Mattox, Hancock, & Queen, 2005; Nichols, 2005; Lewis et al., 2005; Gruber & Onwuegbuzie, 2001; Zepeda & Mayers, 2006).

Two studies examined longitudinal data to compare student achievement before and after transitioning to a block schedule. Mattox, Hancock, and Queen (2005) compared achievement scores in mathematics in five middle schools across five years as the schools transitioned from traditional schedules to block schedules. They confirmed that teachers reported that they tried new approaches to teaching and that student learning was enhanced because of those approaches. They also reported that increased time allowed teachers the opportunity to determine specific learning needs of their students. Additionally, students increased enrollment in higher-level math courses. Mathematics scores did not significantly increase the first year after the transition to block scheduling, however scores demonstrated a significant increase in years following, with effect sizes ranging from .21 to .73. In the second study, Nichols (2005) explored English-content-area student data from five high schools implementing one of two types of block scheduling over several years, comparing pre-block and post-block scores. Nichols concluded that block

scheduling resulted in slight gains in English and language arts achievement and increases in the number of students enrolled in and completing language arts courses. However, few gains materialized for low-income and minority students as a result of implementing block scheduling. Nichols qualified his study by explaining confounding factors that might influence interpretation of his data (e.g., diverse instructional styles, classroom assessment issues).

Lewis et al. (2005), in a correlational study, compared the 4 X 4 model (students enroll in four extended classes for a full semester) with the A/B model (students enroll in eight classes for the full school year and take four classes each on alternating days). They found evidence suggesting that 4 X 4 block scheduling gave high school students an advantage over those in A/B block or traditional scheduling. However, due to conflicting findings by other researchers, they stressed that "it is difficult to draw definitive conclusions about the most effective format" (pg. 85). Gruber and Onwuegbuzie (2001) compared students in high schools using 4 X 4 block scheduling with students in schools following traditional scheduling, looking at grade point averages and performance on the Georgia High School Graduation Test (GHSGT). This comparative study found no statistically significant difference in grade point averages or in scores on the writing portion of the GHSGT. However, there were significant differences in scores on the language arts, mathematics, social studies, and science portions of the GHSGT: students in the 4 X 4 block scheduling received lower scores than students in traditional scheduling.

Finally, Gruber and Onwuegbuzie (2001) conducted a causal-comparative study to examine effects of scheduling on two groups of high school students—one graduating in 1997 under a traditional schedule and one graduating in 2000 under a block schedule. Students were deemed to be similar with respect to a number of variables. Results indicate that there were no statistically significant differences in scores between the two groups on the writing portion of the state graduation test. However, students on the traditional schedule had significantly higher scores on the language arts segment (effect size = .34), the mathematics segment (effect size = .52), social studies segment (effect size = .51) and science segment (effect size = .46), with $p < .01$. These authors concluded that block scheduling does not have a positive effect on academic achievement among high school students.

An analysis of the research on block scheduling conducted by Zepeda and Mayers (2006) found similarly mixed results. The authors found some evidence that teachers and students like block scheduling. Students believed they received better grades and, in fact, the literature suggests that student grades and grade point averages increased with a block schedule while discipline problems decreased. However, no clear reasons exist that explain why the results occurred. No support for claims of improved test results, attendance, or teacher practices materialized. Importantly, the authors qualified their findings with the following statement:

> Our analysis revealed a body of research characterized by inconsistent findings reported in studies that in many cases did not provide the kind of information about settings, populations studied, and methodologies expected in scholarly writing. Moreover, much of the research was based on limited data collected at schools where block scheduling had only recently been implemented. The research failed to provide the evidence necessary to declare unequivocally that teachers' practices and student learning had changed . . . In fact, the research provided little at all that could be definitively said about block scheduling. (pg. 163)

Conclusion

The impact of class time lengths on student achievement appears to be a complex issue with no definitive answers. A major theme across many of the studies reviewed is that the amount of instructional time is not so important as how that time is spent. In their revised introduction to the Prisoners of Time (National Education Commission on Time and Learning, 2005), Goldberg and Cross state, "We call not only for more learning time, but for all time to be used in new and better ways" (pg. 2). Another theme is that more time is not a silver bullet; alone, extended learning time is not enough to change educational outcomes because it must be accompanied by other practices, many of which are complex to implement (Pennington, 2006). However, supported by the implementation of research based-educational practices, extended learning time can be used effectively as a strategy for improving the performance and learning of disadvantaged and minority students.

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