The Four-Day School Week: Impact on Student Academic Performance

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Authors Note

Paper presented at the National Council of Professors of Educational Administration Annual Summer Conference, Washington, D.C., August 4, 2010.

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Abstract

The Four-Day school week originated in 1936, however it was not widely implemented on a wide-spread basis until 1973 when there was a need to conserve on energy and operating costs. This study investigated how schools with a Four-Day school week compared on achievement tests scores to schools with a traditional Five-Day school week. The study focused on student performance in Colorado where sixty-two school districts operated on a Four-Day school week. The results of the Colorado Student Assessment Program (CSAP) were utilized to examine student performance in reading, writing, and mathematics in grades 3 through 10. The data reflected the assessment of 37,325 students. The mean scores for the Five-Day week exceeded those of the Four-Day week in 11 of the 12 comparisons. However, the differences were slight with only one area revealing a statistically significant difference. This study concludes that a decision to change to the Four-Day week should be for reasons other than student academic performance.

Introduction

Approximately one-third of public school students attend rural schools with one in five students attending school in a community with less than 2,500 (Beeson & Strange, 2003). Howley, Theobald, and Howley (2005) claimed that the mainstream of society often believe that rural schools are, by their very nature, ineffective. Yet rural schools may be more innovative and creative than their suburban and urban counterparts. D'Amico and Nelson (2000) found that rural communities have a long tradition of pulling together to do whatever needs to be done to benefit students. Many times the innovations implemented in rural schools don not get a great deal of publicity as the rural community does what is necessary to insure quality education for their children.

One such innovation embraced primarily by rural schools is the four-day school week. Wilmoth (1995) found that of 84 school districts on a four-day week all but 13 districts identified themselves as rural. He also found that 73 of the 84 school districts had enrollments of less than 1,000 and 70% of the total had an enrollment under 500. The amount of time American public school students spend in school has been an issue of on-going discussion for decades. Critics of public education are often crying for public schools to lengthen the school year and the school day to match what are seen as more effective programs within the international community, specifically Europe and Asia.

On the domestic front, the highly popular and widely touted Knowledge is Power Program (KIPP) charter schools have implemented a school day that runs from 7:30 am until 5:00 pm each day (Henig, 2008). This longer day is combined with a school year that requires students to attend every other Saturday and for three weeks during the summer. Although

conventional wisdom might conclude that the more time a student spends in school the more the student will learn, this assumption may be not be valid. Cuban (2008) reports that there is little research to support that increasing the length of the day or the school year will produce any change in academic performance. According to Cuban, "In the past quarter century of tinkering with the school calendar, cultural changes, political decisions, or strong parental concerns trumped research every time" (p. 243).

In an era marked by a drive to increase the number of days and the lengthen the school year, there is a group of primarily rural school districts in several states that are operating contrary to the trend by decreasing the number of days that students attend school, from the traditional five-days per week to a four-day school week. The focus of this study will be on the educational impacts of the four-day school week to determine how student achievement is affected by this mainly rural innovation.

Review of Literature

The earliest four-day school week, according to Hunt (1936), may have been in the Madison Central School District, Madison, South Dakota in 1931. This unique program scheduled the required academic subjects for four days a week and then scheduled extra-curricular activities on the fifth day. Although not exactly the format of the modern four-day schedule it offered an alternative. Stemmock (1975) claimed that the first four-day schedule to receive national recognition was Unity Elementary school in the Maine Administrative District # 3 in the early 1970's. It was reported that Unity saved $13,000 in operating costs in the first five months of implementation. Other districts in the Northeast experimented with a variety of schedules. At Shrewsbury High School, Massachusetts, they offered three alternative schedules

to students including an extended day four-day schedule. In 1973 the Arab Oil Embargo caused many school districts throughout the Northeast and across the nation to look at energy saving alternatives. Johnson (1977) reported that by switching to a four-day week, schools could save 20% on energy costs from savings in transportation and utilities. One of the pioneers in the utilization of the four-day week is the Cimarron School District in New Mexico. The district began the program to save on energy costs and then became complacent and lost its focus on reducing costs and saving money. Recently the district has decided to get back to its original intent and refocus on cost cutting. The district has been continuously operating on a four-day week since 1973, also in response to the Arab Oil Embargo (J. Gallegos, personal communication, July 14, 2009).

Financial Factors

There are numerous factors that motivated school districts to change to a four-day school week. However, the most prevalent factor motivating the implementation of the four-day weeks is the potential for financial savings. Proponents cite savings in transportation and utilities costs as the main advantage. The savings vary, however, depending on whether the school stays open on the fifth day for extracurricular activities, professional development or tutoring (Smith, 2009).

According to Chmelynski (2003). most schools implementing the four-day week are small, rural school districts. Several studies (Achen, 2009; Chmelynski, (2003);Griffin, 2009; Shoemaker, 2002; Truesdale, 2009) reported that cost savings necessitated by cuts to the annual budget were the major factor prompting the shift to the four-day week. The premise is that operating one less day per week a school district can save on utilities by not heating the buildings and reduce transportation costs by not operating buses one day a week. Despite the motivation

to save on costs, the savings are often not as great as first anticipated. In 2003 the Webster County School District in Western Kentucky had to cut almost 20% from their budget in response to a fiscal crisis in the district. According to Yarbrough and Gilman (2006), the district of 1,800 students responded by implementing a four-day school week. However, over a three-year period Webster County School District realized an annual savings of two percent, or $200,000 annually by moving to the four-day week. Chmelynski reported that the Morrow County School District in Lexington, Oregon, experienced a savings of an estimated $250,000 in a $14 million budget. This is a savings of slightly less than 2%. The Maccray Public schools in west-central Minnesota voted to switch to a four-day week with the anticipation of saving 10% on transportation costs. Grau and Shaughnessy (1987) looked at 10 New Mexico school districts on a four-day week and found a cost savings of 10-25% on fuel, electricity, and transportation. The Custer School District in Rural South Dakota implemented a four-day calendar in 1995 with the intent to reduce its budget by $70,000. Durr (2003) reported that the expectations and the savings were lower than the estimated target. When the Cunningham School District in Cunningham, Kansas, received approval to implement a four-day calendar for the 2009-10 school-year, Truesdale (2009) reported they anticipated a savings of $45,000 on busing, utilities, and some labor costs. This is a savings of 1.4% on their $3.2 million operating budget.

The cost savings will vary greatly from district to district depending on the fidelity with which they seek cost savings. If the school facilities are completely shut down on the non-school day the savings will be greater than if the buildings are open for meetings and student activities. The costs savings are therefore predicated on how highly controlled and diligent the cost cutting elements are implemented.

Improved Attendance, Discipline, and Participation

Financial savings were the main factor motivating the initiation of the four-day week. However, other factors emerged which have proven to be equally powerful in promoting a shift to, or maintaining the four-day week. Several authors reported (Shank, 2009; Shoemaker, 2002; Smith, 2009; Truesdale, 2009) that student and staff absences were reduced as a result of the four-day week. The day that school was not in session allowed students and staff to make business or medical appointments that normally would have required them to miss school. This change resulted in a decline in the need for and overall cost of substitute teachers. Truesdale also found that the extra day allowed more time for teachers to plan. Chmelynski (2003) found that fewer disciplinary incidents were reported as a benefit of the four-day week as well as a reduction in the weekly time spent commuting by both students and staff. At Midland High school in Midland, Louisiana, students with failing grades are required to attend mandatory three hour academic sessions on Friday, a policy which has motivated students to work harder during the four-day week. Disciplinary infractions can also result in the student attending school on Friday to participate in an on-campus work program. It has also been reported by Durr (2003) that participation in extra-curricular activities increased when the Custer School District in Rural South Dakota implemented the four-day week.

Popularity

Initially, the concept of a four-day week is viewed negatively. Based on a Gallup Poll, Ray (2003) found that only 25% of Americans support the idea of a four-day week as a means of saving money while, 74% oppose it. Support is low among people with children in school as well as people without children in school. Ray believed that support was low due to a lack of

understanding as to how the shortened week actually worked. York (2009), a critic of the four-day week, states;

> Because a four-day week means that at least one more hour, possibly one and a half, would be added to each of the four days school is in session, it's almost a given that this extra time will be wasted on "brain-dead" students and teachers. That is not an efficient approach to education. (p. 3)

Truesdale (2009) found that when the Cunningham School District in Cunningham, Kansas implemented the four-day week in 2008, a survey of parents prior to implementation revealed a 5 to 1 ratio for support. This higher level of support was the result of a concerted effort on the part of the school leadership to inform the community of the benefits of the four-day week. Richburg and Wood (1982) postulated that before implementing the four-day week there should be support from 90-95% of the teaching staff. They found that 95% of the teachers who had taught on the four-day week schedule for a least one year strongly favored the schedule. In the Cimarron School District, which first started the four-day week in 1973, repeated polls of parents have resulted in a support rate ranging from 95% to 96% (J. Gallegos, personal communication, July 14, 2009). In an interview with John Briley, Principal of Midland High School in Louisiana, Chmelynski (2003) found that the students and parents loved the four-day school week. Initially parents were concerned, but after one year of operation there was not a single complaint. Koki (1992) reported that schools implement a modified calendar or schedule to meet specific student needs and that although there is often initial resistance, parents and teachers are usually pleased with the results.

Implementation and Structure

When deciding on which day of the week to eliminate to implement the four-day week, the option is normally between dropping Friday or Monday. Schank (2009), as well as Yarbrough and Gilman (2006) recommend that Monday be dropped because federal holidays or three day weekends usually fall on Mondays and therefore reduce the need to add additional make-up days later in the year. When the decision as to which day should be eliminated from the five-day week, Richburg and Wood (1982) gave the benefits of eliminating either Friday or Monday. Eliminating Friday from the school week allows extra-curricular activities to take place without students missing school for distant athletic events.

The implementation of the four-day week in Colorado was originally implemented with four, 7.5 hour days. According to Richberg and Sjogren (1982), this was the overall time equivalent of a six hour per day, five day schedule. In fact, students on a four-day week may have more instructional minutes. To insure that students on a four-day week and a five-day week have an equivalent amount of instructional time, Richburg and Wood (1982) recommended that elementary schools should have a 7 hour day for 144 days for a total of 1,008 hours. This would contrast to the 5.5 hour schedule for 180 day which provides 990 or the minimum required by Colorado state law. Secondary schools with a 7.5 hour day for 144 days provide 1,080 hours, which is the minimum required under Colorado state law.

According to an article in State Legislatures (Smith, 2009), 23 states and the District of Columbia currently prohibit schools or districts from having four-day school weeks because these states require a minimum number of instructional days per year, in most cases 180.

Another 20 states give districts and school's the flexibility to move to a four-day week by measuring the instructional time requirements in hours rather than days.

Teachers and the Four-Day Week

Yarbrough and Gilman (2006) found that teachers reported that the additional time devoted to planning and preparation helped them connect instruction and planning in a more effective manner. Teachers also reported assigning homework in a more focused and efficient manner. They found that teachers reported that there was a lot of wasted time on the five-day school week and that the four-day week made them focus instruction to a much higher degree. When it comes to the coverage of academic content, Durr (2003) found that teachers reported covering more content than they did under the traditional five-day week. Blankenship (1984) reported that teachers and students will apply themselves more effectively when they feel they only have four days. The increased focus may actually increase the time on task students spend on their class work. Although cost savings may be a major incentive for looking at a four-day week, Kimmet (1986) believed that the demands on teachers to do extra duties in small schools made the four-day week an attractive alternative because the additional time made available would allow teachers to have valuable in-service time. He proposed a four-day week with a half day on Friday with the remaining time utilized for in-service training. More critical than the length of the day or school year is how time is actually used in the classroom. Cuban (2008) points out the critical nature of time utilization when he states:

> The crude policy solutions of more days in the year and longer school days do not even begin to touch the deepest truth that what has to improve is the quality of "academic learning time." If policy makers could open their ears and eyes to student and teacher

> perceptions of time, they would learn that the secular Holy Grail is decreasing interruption of instruction, encouraging richer intellectual and personal connections between teachers and students, and increasing classroom time for ambitious teaching and active, engaged learning. (p. 247)

Educational Achievement and the Four-Day Week

Although the potential for long term cost savings has been the major factor in the implementation for the four-day week, the most important question that must be addressed is whether the four-day school week increases, decreases, or has a neutral impact on student achievement. Shoemaker (2002) states that; "Experts have documented increased attendance, improved morale, and fewer disciplinary problems in four-day schools. However, according to what little research has been done, the four-day week has no measurable effect on student achievement" (p. 9). Dam (2006) later supported this conclusion by stating; "The jury is out on the question of student performance. If performance is measured by standardized test scores, only one study has been completed comparing districts. It was conducted in the early 1980's by Colorado State University" (p.8). The study referenced by Dam was conducted by Daly and Richburg (1984) who examined scores in five rural Colorado school districts on the Iowa Test of Basic Skills for a period of four consecutive years. They identified two cohorts of (n=62 and n=45) students and followed their scores for four years. The students were taught on a five-day week for the first two years and then switched to a four-day week for the next two years. They found that the switch to the four-day week had no effect on student achievement. There are studies of limited scope that point to an improvement in performance utilizing the four-day week. Yarbrough and Gilman (2006) examined the Comprehensive Test of Basic Skills (CTBS)

scores in the Webster County School District from the Spring of 2002 and 2003, when the district was on a traditional five-day calendar, and the Spring 2004 and 2005 CTBS scores when the district utilized a four-day calendar. Looking at grade 3 and grade 9 scores on reading, math and language they found that scores went up in all areas, including Total Battery. However, they also pointed out that test scores in the district had been on an upward trend before the four-day week was implemented. They concluded that the four-day week may have had a positive impact on the improvement, but at the very least it didn't have any negative effect on student performance. Chmelynski (2003) reported that at Merryville High School in Merryville, Louisiana the ACT scores rose from an average of 18.7 the four years before implementing the four-day week to an average of 20 since the implementation of the schedule. School officials also reported that grades had increased and the number of honor roll students had doubled in the junior and senior high school. Grau and Shaughnessy (1987) found that in 7 New Mexico school districts with a four-day week the academic performance of students on standardized achievements tests were comparable to the state averages and that the schools had a collective drop-out rate of only 3.3% compared to 8.1% for the rest of the state. They further found that in 12 Colorado school districts there were some gains and some loses but no clear evidence existed that students on a four-day week performed better or worse than their five-day counterparts. In a study of the overall tests score gains in 10 New Mexico school districts on the four-day week, McCoy (1983) reported that student achievement was not negatively affected and many school districts reported gains. Overall, students on the four-day week scored at least as well as students on a traditional five-day week. Wilmoth (1995) found that of 84 school districts surveyed, 75% of the school districts reported an increase or no change in student performance while only 6% of the school districts reported a decrease in student standardized test performance. In an interview

with James Gallegos, Superintendent of the Cimarron School District (J. Gallegos, personal communication, July 14, 2009), students are performing as well as students in comparable districts and the school is meeting all the Adequate Yearly Progress requirements of the No Child Left Behind Act. Richards (1990) studied nine rural school districts in New Mexico with average daily membership below 400 that had been on a four-day week for eight years. The schools were then compared to nine school districts that utilized a traditional five-day week and had a comparable average daily membership per square mile. Looking at CTBS total battery scores for grades five and eight for the eight year period, the four-day week students scored significantly higher (<.01) than the five-day week students. When then scores were disaggregated by grade and year, a slight significant difference (<.065) favoring the four-day week was found.

In a larger review of the four and five-day week, Lefly and Penn (2009) looked at 55 school districts in Colorado on the four-day week and compared them to similar districts on a five-day week. They concluded that overall, there appears to be little difference in student performance based on the percentage of students who score at the proficient or advanced level. The results of this review on the impact of the four-day week on student performance appear to be limited in scope and not conclusive. The review conducted by Lefly and Penn utilized a larger population, however, since it was a technical review the methodology was not defined and the level of statistical significance was not reported. This study will attempt to examine in a more rigorous and comprehensive manner the impact of the four-day week on student academic performance.

Methods

Sample

Colorado began providing waivers that allowed school districts to utilize a four-day week in 1980. This study looked at student academic performance in the State of Colorado where 62 school districts out of a total of 178 school districts are on the four-day school week. Even though these districts make up approximately 34% of the school districts, the total enrollment is only 2.7% of the state's total enrollment which reflects the rural nature of the four-day school week phenomenon (Dam, 2006). The sample for this study consisted of districts in Colorado with a four-day school week, along with matched districts with a five-day school week. Matching was based on K-12 enrollments and the district percentage of students eligible for free and reduced lunch (FRL%). The distribution of enrollments was positively skewed, so before matching we transformed the enrollment variable by adding 50, then taking the natural logarithm. This transformation made the distribution of enrollments nearly normal. Substantively, this approach matches two districts based on the ratio of their enrollments rather than on the difference in their enrollments. For example, the difference between districts of size 200 and 300 is greater than the difference between districts of size 2200 and 2300. The distribution of FRL% satisfied a test of normality, so no transformation was necessary. The total student enrollment of the five-day week schools was 19,931 while the total student enrollment for the four-day week schools was 17,911.

To match the districts, the FRL% and the transformed enrollments were converted to z scores for each district, and the proximity measure for any two districts was calculated as the sum of the absolute values of the differences on the two pairs of z scores. Pairing was by a best-

match approach, starting with the four-day district with the closest matching 5-day district and continuing until no remaining matches were within 1 standard deviation on the proximity measure. Not every district had a match satisfying this criterion, and this approach gave 45 matched pairs of districts for overall achievement. When examining scores for reading, writing and mathematics the pairings were reduced at the middle and high school levels because of a lack of reportable scores due to small school size. Overall, districts that could not satisfy the match requirement were excluded from this study which accounts for the reduced the sample size from 62 school districts to 45.

Variables

The independent variable was the district schedule – four-day or five-day. Outcome variables for each district were the total percent of students classified as proficient or higher on the criterion-referenced exam scores for 2008 at the elementary, middle grades, and high school levels for all subject areas as posted on the *District and School Performanvce Reports* for the Colorado Department of Education (http://www.schoolview.org/SchoolPerformance/index.asp). The scores for reading, writing, and mathematics were the total percent of students classified as proficient or higher on the criterion-referenced exam scores for 2010.

Analysis

Three paired sample *t* tests compared the mean scores for elementary, middle, and high school levels for all subject areas combined, then nine additional tests compared the scores separately for Reading, Writing, and Mathematics (Table 1.). Tests were conducted at the .05 level of significance.

Results

For the combined analysis the mean levels of overall achievement were not significantly different between four-day districts and the matched five-day districts at any of the three school levels (Table 1). At each level, the five-day districts had slightly higher test scores than the matched four-day districts, with the greatest difference for elementary level students. For the separate analysis by level and subject area, Writing scores were significantly higher for elementary students in five-day schools (M = 60.44) than those in matched four-day schools (M = 54.57, $t(44) = 2.44$, $p = .02$, $d = .53$). The other comparisons found no statistically significant differences, although 8 of the 9 tests found higher scores for the matched schools with a five-day school week.

Table 1

Comparison of Mean Achievement Levels for Four- and Five-Day Districts

Subject	Level	*N*	Schedule	*M* ± *SD*	*t*	*df*	*p*	*d*
Combined								
	Elementary	45	5-day	67.86 ± 9.98	1.97	44	.06	0.43
		45	4-day	63.60 ± 9.87				
	Middle	45	5-day	56.36 ± 11.21	0.68	44	.50	0.11
		45	4-day	55.19 ± 9.52				
	High	45	5-day	51.05 ± 10.55	0.89	44	.38	0.16
		45	4-day	49.38 ± 10.15				
Reading								

Elementary	45	5-day	75.31 ± 10.10	1.36	44	.18	0.31
	45	4-day	72.09 ± 10.46				
Middle	38	5-day	69.71 ± 12.12	0.74	37	.47	0.15
	38	4-day	68.06 ± 9.64				
High	40	5-day	70.83 ± 11.16	-0.16	39	.87	-0.03
	40	4-day	71.15 ± 10.34				
Writing							
Elementary	45	5-day	60.44 ± 11.69	2.37*	44	.022	0.53
	45	4-day	54.57 ± 10.56				
Middle	38	5-day	57.56 ± 13.76	0.24	37	.81	0.04
	38	4-day	57.00 ± 11.12				
High	40	5-day	49.63 ± 13.90	0.09	39	.93	0.02
	40	4-day	49.40 ± 13.01				
Mathematics							
Elementary	45	5-day	72.70 ± 9.88	1.20	44	.24	0.27
	45	4-day	69.89 ± 11.07				
Middle	40	5-day	47.61 ± 12.60	1.05	39	.30	0.20
	40	4-day	45.41 ± 9.59				
High	43	5-day	32.88 ± 10.19	1.46	42	.15	0.26
	43	4-day	30.07 ±11.69				

* $p < .05$

Discussion

In one of the first major reform reports, A Nation at Risk (National Commission on Excellence in Education, 1983), lengthening the school day and school year was discussed as a way to reform American education. The report noted that students in other industrialized nations attended a longer school year and a longer school day than students in the United States. The report concluded that "school districts and legislatures should strongly consider 7-hour school days, as well as a 200- to 220 day school year" (p. 126). Given the interest in lengthening the school day and year provided by A Nation at Risk, the idea that a school district could reduce the number of school days in a calendar year would appear to contradict the recommended approach.

The initiation and institution of the four-day school week originally occurred out of a need by school districts to reduce expenditures for operations and transportation. Once in place additional benefits were discovered that made the option highly popular with parents and teachers. However, despite the potential cost savings and popularity there was little evidence regarding student academic performance as a result of reducing to a four-day week calendar.

This study focused on student academic performance in reading, writing, and mathematics at the elementary, middle and high school levels to determine if a four-day school week affected student performance. The results revealed that there was no statistically significant difference in overall student academic performance between students on a four-day week and students on a five-day week with the exception of writing at the elementary school level. However, there were differences in performance that should be reviewed.

Almost all of the differences were not statistically significant, however, students on the five-day week at the elementary, middle, and high school levels scored slightly higher on 11 out of 12 areas on mean scores than their counterparts on the four-day week. The students on the

five-day week at the elementary, middle, and high school levels also had a slightly larger standard deviation than their counterparts on the four-day week in almost all areas reflecting a greater variation in performance.

The mean scores for the elementary level were noteworthy in that the difference in the mean score was the largest of the three levels and was close (.06) to reaching the .05 level of significance as set for this study. Although the mean scores favor the five-day week at the middle and secondary level the levels of significance do not come close to the .05 level. It would appear that whatever factors might have impacted the elementary level, there is a moderating effect when students reach the middle and high school levels.

The technical report conducted by Lefly and Penn (2009), also on students in Colorado, used a different year of test scores but came to the same conclusion as this study. While they reported on some minor variations between school sizes, overall they found little difference between the four-day and five-day school week. Although they did not report methodology, including how schools were paired or the level of statistical significance that guided them to their conclusion, they found little difference in student achievement or achievement gains from the four-day and five day school week.

Limitations and Future Study

This study took a broad look at the four-day week and its impact on student academic performance. Since there was only one reasonably large scale study in this area, this examination was important to determine if there was a statistically significant difference on student performance between the four-day and five day week school calendar. However, there is a need to now go into greater depth and explore the various nuances that are inherent within the four-day week.

The four-day week began primarily as a means to save money on transportation and operations by closing down the school one day each week. However, some school districts chose to continue to operate during the fifth day with remedial and enrichment programs. A further examination might be needed to determine if a difference in student academic performance exists among school districts based on the way the fifth day is utilized.

For this study, the data were not disaggregated by traditional subpopulations such as ethnicity, English language learners, and students with individualized educational plans. Due to the small size of the schools and districts in this study, the schools did not have sub-populations large enough to make a valid statistical comparison for these sub-populations. The extension of this study to these subpopulations would be of future interest.

Conclusion

The study examined the impact on student performance of a four-day week and five-day week. Although the total number of days in a school year is reduced in the four-day week, the total number of minutes per day is increased for the four-day week schedule so the students are attending school for the same amount of total time as students who attend on the five-day week. The question addressed by this study is; do students on the four-day week perform academically as well as students on the traditional five-day week? The evidence in this study was that the five-day schools did lightly better than the four-day schools, with 11 of 12 achievement results favoring five-day schools, with one statistically significant finding of higher Elementary Writing scores for five-day schools.

From a policy perspective, a decision to change to a four-day school week should be made on the basis of cost savings or stakeholder preference rather than to increase test scores.

Conversely, it does not appear that concern over student academic performance should be used as a reason not to implement a four-day school week.

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