


# Block and Traditional Schedules: Effects on Students With and Without Disabilities in High School

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*The purpose of this study was to compare the effects of traditional and block schedules on the academic achievement of high school students with and without disabilities. Achievement data were collected from the cumulative records and Individual Education Plans of 160 students with disabilities and the cumulative records of 460 students without disabilities. Achievement was measured by students' GPA; state-mandated tests in reading, language, math, science, and social studies; and college entrance ACT. Results showed no difference on all comparisons between students with disabilities attending block-scheduled high schools and students with disabilities attending traditional-scheduled high schools. Similar results were found for students without disabilities. Teachers on both schedules reported high levels of satisfaction and comparable amounts of time on instructional activities.*

 Twenty years ago the U.S. Secretary of Education Terrel Bell declared the United States “a nation at risk” (National Commission on Excellence in Education, 1983), and since then a steady stream of recommendations has urged teachers and administrators to improve education (e.g., *Goals 2000: Educate America Act*, U. S. Department of Education, 1994; *What Work Requires of Schools: A SCANS Report for America 2000*, U.S. Department of Labor, 1991). As a result of these pressures, all 50 states, the District of Columbia, and Puerto Rico have established standards to which local school districts must align their curriculum and instruction (Assistance to States for the Education of Children with Disabilities and the Early Intervention Program for Infants and Toddlers with Disabilities, 1999). Many states have adopted test-based requirements for high school graduation (Bond, Braskamp, & Roeber, 1996), and some states require students to demonstrate what they have learned in projects, portfolios, and demonstrations (e.g., Minnesota Department of

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Children, Families and Learning, 2001). Higher achievement is also the goal of content area organizations such as the National Council of Teachers of Mathematics (NCTM, 2000) and the International Technology Education Association (ITEA, 2000).

At the same time, new government regulations and reform-oriented instructional approaches have focused on improving the performance of students with disabilities, who generally have greater problems in school and higher dropout rates that lead to fewer positive outcomes (Blackorby & Wagner, 1996). For example, the reauthorization of the Individuals with Disabilities Education Act (IDEA) Amendments of 1997 (20 U.S.C. § 1400 et seq.) provides that students with disabilities have opportunities to learn challenging curricula alongside their peers without disabilities. This change in the law has generated new and intense research efforts to find strategies for supporting and enhancing the learning of students with disabilities in general education classrooms. For example, researchers have studied collaborative strategic reading approaches to help students comprehend and remember what they read (e.g., Vaughn, Klingner, & Bryant, 2001), direct strategy instruction to improve writing performance (e.g., Troia & Graham, 2002), whole-school projects to include students with learning and emotional disabilities in general education science classrooms (e.g., Cawley, Hayden, Cade, & Baker-Kroczyński, 2002), and enhanced anchored instruction approaches to improve math achievement (e.g., Bottge, Heinrichs, Mehta, & Hung, 2002). In addition, in 1995 the *NASSP Bulletin* devoted an entire issue to innovative scheduling (see volume 79, number 571).

One way that school leaders responded to these pressures was to redistribute the school day into longer and more flexible blocks of time. For example, in its report, *Prisoners of Time*, the National Commission on Time and Learning (NCTL) recommended implementing block schedules to give teachers more time to engage students in activity-based learning opportunities (NCTL, 1994). These changes, some predicted, would eventually result in higher expectations, substantial curricular changes, and improved learning experiences (Cawelti, 1994).

These new ways of scheduling the school day became known collectively as block schedules. In the A/B block schedule, or “alternate day” plan, the school day is organized around four 90-minute periods, with eight classes meeting over 2 consecutive days for the entire school year. In the 4 x 4-block schedule, the school day is divided into 90-minute periods, but classes meet every day and run for only one semester. Thus, most students on 4 x 4 schedules take four classes rather than the five to six classes they would typically take on traditional schedules. Across the United States, the prevalence of block schedules in high schools ranges from 25% to 40% (American Federation of Teachers, 1999; Cawelti, 1994). In some states, the percentage of secondary schools on

block schedules is as high as 74% (North Carolina Department of Public Instruction, 1998).

Proponents of block schedules have cited several advantages for students such as more uninterrupted class time and fewer classes in one semester. Advantages for teachers parallel those for students and include longer periods of instructional time, fewer classes to prepare for, and fewer students to teach in one day (Canady & Rettig, 1995; Cawelti, 1994). However, critics of block schedules have noted several problems, such as difficulty in holding students' attention over longer class periods, the accelerated pace of courses, and the inability to offer sequential courses such as world languages in consecutive semesters (Lindsay, 2001; Queen & Isenhour, 1998).

Despite the popularity of block scheduling, research findings are mixed and show no clear advantage of one schedule over the other. For example, some studies have uncovered positive outcomes for students on block schedules (Bugaj, 1998; Hottenstein, 1999; Rettig & Canady, 1999; Shortt & Thayer, 1999; Weller & McLeskey, 2000), whereas other studies have reported no benefits (Akins, 2000; Davidson, 2001; Hart, 2000; Jenkins, 2000; Killough, 2001; Pliska, Harmston, & Hackmann, 2001; Richardson, 2000), and some reported mixed results (Trenta & Newman, 2002). Positive findings in favor of block schedules included higher academic achievement (Queen, 2000) and lower failure (Mutter, Chase, & Nichols, 1997) and dropout rates (Hottenstein, 1999). Other studies have reported that block schedules help engage students in classroom activities (Queen, Algozzine, & Eaddy, 1997) and reduce the number of courses that students must make up after missing school (Queen & Isenhour, 1998). The inconsistency of these results leaves school administrators with no clear direction about whether they should stay on traditional schedules or risk changing to one of the block schedule variations (Viadero, 2001).

Several of the studies referenced previously relied on questionnaire responses (e.g., Bugaj, 1998) or qualitative research methods (e.g., Weller & McLeskey, 2000) to determine which schedule teachers preferred. To date, no empirical study has examined the effects of block schedules on the academic performance of students with disabilities, either separately or as a subset to the overall data analysis (e.g., Canady & Rettig, 1996; Fritz, 1995; Spaulding, 1998). In this article we compare the achievement of students with disabilities and students without disabilities from high schools on traditional and block schedules that were randomly selected for study. We also describe teachers' satisfaction with each type of schedule.

## Method

From a total of 379 high schools in a state located in the upper Midwest, 12 small schools (less than 299 students), 6 medium schools (300 to 699 students), and 6 large schools (699 or more students) were randomly chosen

to participate in the study. To be included in the sample, schools needed to be on a traditional schedule or a block schedule for a minimum of 4 years. Researchers provided school officials with detailed instructions about how to randomly choose students for the study; secure informed consent from students, parents, and staff members; and prepare the students' cumulative records and Individual Education Plans for review. When the administrative staff completed these tasks, they notified researchers who then visited each school and collected the information.

Table 1 shows the number of schools and students in high schools on traditional and block schedules. In the first year of the study, 4 small, 2 medium, and 2 large schools on each type of schedule were randomly chosen, which yielded a total of 8 schools on block schedules and 8 schools on traditional schedules. In the second year of the study, 8 additional schools were randomly selected for the cross-validation sample. In all, 12 block schools and 12 traditional schools participated in the study (with 160 senior students with disabilities and 460 senior students without disabilities). All the schools served students in grades 9–12. They also had similar attendance rates (93.3% for block schools and 93.1% for traditional schools) and graduation rates (94.4% for block schools and 93.0% for traditional schools). They also reported equal amounts of class time per day (361 minutes for block schools and 364 minutes for traditional schools) and the same students-to-staff ratio (12:1).

Table 2 describes the students with and without disabilities whose records were reviewed. Almost two-thirds of the students with disabilities were identified as having a learning disability. Identification of a learning disability includes a severe delay in classroom achievement, a significant discrepancy between intellectual ability and academic achievement, and a processing deficit that is linked to the delays in classroom achievement and the significant discrepancy between intellectual ability and academic achievement. About 20% of the students with disabilities had a cognitive disability, which means that they were significantly subaverage in intellectual functioning and had concurrent deficits in adaptive behavior that adversely affected their educational performance.

Teachers in the participating schools were also surveyed as to the amount of time they spent in various instructional activities, their satisfaction with their school schedule, their confidence in teaching students with disabilities, and the extent they collaborated with one another. Of the 281 teachers who completed the survey, 223 were general education teachers, 57 were special education teachers, and one did not specify his or her professional focus.

**Table 1. Number of Schools and Students by Schedule Type**

School size	Block			Traditional			Students ( <i>M</i> )
	Schools ( <i>n</i> )	WD	WOD	Schools ( <i>n</i> )	WD	WOD	
Small	5	11	62	7	21	93	187
Medium	4	22	75	2	10	49	156
Large	3	51	107	3	45	74	277
Total	12	84	244	12	76	216	620

Note. WD = students with disabilities, WOD = students without disabilities.

## Results

### *Students*

An analysis of variance (ANOVA) was used to compare the achievement of students with disabilities on block and traditional schedules. The same weighted means analysis was conducted on students without disabilities. Because of the possibility that the composition of block and traditional scheduling schools may differ in terms of relative ability of students with and without disabilities, the effect of schedule was examined separately for each group of students. The pooled mean square (*MS*) between schools within each type of schedule was used as the error term to reduce the likelihood of making Type I errors (Barcikowski, 1981; Blair, Higgins, Topping, & Mortimer, 1983; Hopkins, 1982; Levin & Serlin, 1993; Walsh, 1947). A series of two-tailed *t* tests was used to compare the mean differences between the traditional and block scheduled cohorts. The family-wise significance level ( $\alpha$ ) for each set of dependent variables was divided by the number of variables in the set. The number of degrees of freedom for this analysis was 18, based on the number of schools on each schedule and school size combination. The test statistic is:

$$\frac{\bar{Y}_{Block} - \bar{Y}_{Traditional}}{\sqrt{MS(\frac{1}{N_B} + \frac{1}{N_T})}}$$

where

$N_B$  = number of students in block schedule

$N_T$  = number of students in traditional schedule

*MS* = mean square between schools within type of schedule.

An arcsine transformation was used for frequency data to apply the weighted means analysis.

**Table 2. Summary of Demographic Data on Students**

Description	Block		Traditional	
	<i>n</i>	%	<i>n</i>	%
<b>Students with disabilities</b>	84	52.50	76	47.50
<b>Ethnicity</b>				
No information	12	14.30	5	6.60
White	64	76.20	66	86.80
Non White	8	9.50	5	6.60
<b>Gender</b>				
Male	61	72.60	54	71.10
Female	23	27.40	22	28.90
<b>Disability identifier<sup>a</sup></b>				
Autism	3	3.57	0	0
Cognitive disability	19	22.62	11	14.47
Emotional disturbance	9	1.71	10	13.16
Hearing impairment	0	0	4	5.26
Learning disability	51	60.71	55	72.37
Orthopedic impairment	5	5.95	0	0
Other health impairment	1	1.19	5	6.58
Speech or language impairment	1	1.19	1	1.32
Traumatic brain injury	0	0	0	0
Visual impairment	1	1.19	0	0
Significant developmental delay	0	0	1	1.32
<b>Students without disabilities</b>	244	53.04	216	46.96
<b>Ethnicity</b>				
No information	9	3.69	26	12.03
White	223	91.39	183	84.72
Non White	12	4.92	7	3.24
<b>Gender</b>				
Male	103	42.20	114	52.80
Female	141	57.80	102	47.20

<sup>a</sup>Some students had more than one disability identifier.

Table 3 shows the cumulative GPA, ACT composite scores, and performance on the Wisconsin Knowledge and Concepts Exams (WKCE) for students with disabilities and students without disabilities in schools on block and traditional schedules. On every comparison, no differences were found between students with disabilities who were in schools on block schedules and students with disabilities in schools on traditional schedules. The same was true for students without disabilities.

**Table 3. Academic Performance of Students**

Student type and test	Block		Traditional		MD	MS <sup>a</sup>	t value	DF	Two-tail	
	n	M	n	M					significance <sup>b</sup>	Effect size
<b>Students with disabilities</b>										
Cumulative GPA	84	2.42	75	2.34	0.08	0.31	0.89	18	ns	0.11
ACT composite	8	21.00	15	19.87	1.13	25.05	0.52	18	ns	0.25
<b>WKCE</b>										
Reading	48	667.98	51	680.31	-12.33	884.48	-2.06	18	ns	-0.37
Language	48	667.96	51	671.78	-3.82	581.99	-0.79	18	ns	-0.14
Math	48	683.46	52	684.21	-0.75	5334.54	-0.05	18	ns	-0.01
Science	48	689.75	52	679.98	9.77	2375.19	1.00	18	ns	0.13
Social Studies	46	683.24	53	673.39	9.85	1831.13	1.14	18	ns	0.13
<b>Students without disabilities</b>										
Cumulative GPA	244	3.21	214	3.14	0.07	1.26	0.66	18	ns	0.10
ACT Composite	177	22.26	151	22.21	0.45	14.71	1.06	18	ns	0.11
<b>WKCE</b>										
Reading	228	721.56	206	720.02	1.54	2118.21	0.35	18	ns	0.05
Language	228	719.61	206	710.93	8.68	1974.43	2.03	18	ns	0.26
Math	228	746.20	206	746.60	-0.40	3795.24	-0.07	18	ns	-0.01
Science	228	724.45	205	722.04	2.41	1678.53	0.61	18	ns	0.08
Social Studies	226	716.11	205	715.88	0.23	1104.22	0.07	18	ns	0.01

Note. WKCE = Wisconsin Knowledge and Concepts Exam.

<sup>a</sup>Mean square between schools within schedule.

<sup>b</sup>Not significant.

## *Teachers*

As Table 4 shows, teachers on both types of schedules indicated they devoted more time working with students in small groups and individual students than lecturing. However, there were no differences in the amount of time teachers indicated they spent on lecturing, working with small groups, working with individual students, using media, facilitating discussion, or assigning independent work. Teachers on each schedule also expressed the same level of satisfaction with their job (3.85 for block schools and 3.74 for traditional schools).

When asked specifically about teaching students with disabilities, teachers were satisfied with the instructional materials available to them (2.31 for block schools and 2.31 for traditional schools) and reported a relatively high level confidence in their teaching ability (3.21 for block schools and 3.00 for traditional schools). As to the level of collaboration between general and special education teachers, there were no significant differences in the levels of collaboration between block and traditionally scheduled teachers (3.70 for block schools and 3.41 for traditional schools). Block scheduled teachers assigned a significantly higher level of value to collaborating (4.03 for block schools and 3.66 for traditional schools).

## **Discussion**

This study examined the effect of block and traditional schedules on the academic achievement of students with and without disabilities. We also investigated the instructional factors that may explain these findings. Analyses of achievement data (GPA, ACT, and WKCE) revealed no differences between students with disabilities who attended schools on block schedules or traditional schedules. Teachers' perceptions of their instructional practices helped to explain why there were no advantages for students on one schedule over the other. Teachers on both schedules were satisfied with their jobs and the school schedule and spent about the same amount of time in various instructional activities. Teachers also expressed similar confidence in their ability to meet the needs of students with disabilities and reported that the level of collaboration between general and special education teachers was about the same on both schedules. Teachers on block schedules valued more collaboration than did teachers on traditional schedules.

These findings support the premise that moving from a more traditional schedule to one of the block schedules does not necessarily lead to instructional modifications or academic benefits, especially for students with disabilities. Consistent with this study, researchers have found few if any differences in teachers' instructional strategies in block versus traditional schedules (e.g., Jenkins, Queen, & Algozzine, 2002). Teachers in schools on block schedules



**Table 4. Teachers Perception of Block Versus Traditional Scheduling**

Type	Block		Traditional		MS <sup>a</sup>	t value	DF	Two-tail significance <sup>b</sup>	Effect size
	n	M	n	M					
<b>Instructional practice</b>									
Lecture to the class	122	2.30	108	2.37	-0.07	-0.94	18	ns	-0.09
Work with small groups of students	124	3.27	108	3.13	0.14	0.84	18	ns	0.13
Work with individual students	122	3.25	107	3.15	0.10	0.56	18	ns	0.09
Demonstrate a concept using media	122	2.54	109	2.73	-0.19	-1.34	18	ns	-0.11
Facilitate a discussion	123	2.93	108	3.06	-0.13	-1.11	18	ns	-0.12
Assign independent work to be completed in class	121	2.89	108	2.75	0.14	0.90	18	ns	0.12
1 (no time spent); 5 (entire class period)									
<b>Overall job satisfaction</b>	144	3.85	125	3.74	0.11	0.82	18	ns	0.11
1 (not satisfied); 5 (greatly satisfied)									
<b>Satisfaction with instructional materials</b>									
teaching students with disabilities	151	2.31	129	2.31	0.001	0.006	18	ns	0.001
1 (dissatisfied); 5 (fully satisfied)									
<b>Confidence in training and background</b>									
for teaching students with disabilities	133	3.21	119	3.00	0.21	1.18	18	ns	0.15
1 (not confident); 5 (fully confident)									
<b>Extent of collaboration between general and special education teachers</b>									
1 (does not exist); 5 (a great deal)	149	3.70	127	3.41	0.29	2	18	ns	0.27
<b>Value in collaborating between general and special education teachers</b>									
1 (no value); 5 (a great deal of value)	148	4.03	124	3.66	0.37	2.65	18	sig*	0.32

<sup>a</sup>Mean square between schools within schedule.

<sup>b</sup>Not significant.

\*  $p < .05$ .

did not use alternative instructional methods (e.g., extended problem-solving activities) more often than did teachers on traditional schedules.

Although the data set for each student was comprehensive, we temper our conclusions of this study with several limitations. First, although the sample was randomly drawn from schools throughout one state, it included only 160 senior students with disabilities in 24 schools. In our analyses, we used school rather than student as the unit of analysis, which protected us against making Type I errors. However, with 18 degrees of freedom available for the error term, power may have been somewhat less than ideal.

Second, we were only able to compare student achievement using students' GPA and their scores on two standardized measures. The WKCE is a state test administered to 10th grade students in the spring, which is in the middle of their high school experience. Differences in academic achievement may not yet have emerged because students experienced one schedule or the other for only 2 years of high school. The ACT is administered later in high school but few students with disabilities took it.

### *Implications for Practice*

The results of this study suggest that partitioning the school day into shorter 60-minute periods or longer 90-minute periods does not affect the academic achievement of either students with disabilities or students without disabilities. Perhaps this is to be expected because the teachers on each type of schedule indicated they used similar instructional strategies. Reasons other than academic achievement may justify school leaders' decisions to change from traditional to block schedules. However, if changing to block schedules does not meet the reform and legislative objectives of achieving higher academic performance, then the time and money used to make the change may be better used, for example, to develop and train teachers on more effective instructional methods. Of course, professional development may certainly be the key to making use of the blocking times the way they were intended.

Student and teacher satisfaction with longer class periods and fewer classes may be adequate reasons to make the switch. However, school leaders and other school staff members must realize that student achievement may not depend so much on the school schedule as it does on what is accomplished in classrooms between student and teacher, regardless of how the school day is partitioned. 🐘

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