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Not Just About Time: Instructional Practices and Productive Time in School

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Student learning is a pervading concern for national governments, states, and local school boards. Additional time is commonly seen as a potent administrative lever to affect student learning. One administrative premise equates allocated time with productive time, assuming that students take advantage of the time resources available to them. This study uses an innovative measurement strategy to show that students are disengaged a large portion of the time in academic classes, and that the current array of instructional methods and strategies produces low rates of productive time, especially for minority students. The study concludes that instructional reforms rather than the simple addition of time may be more productive in raising standards and in bringing about greater social equality in education.

During the past few years, states, local districts, and schools have begun to experiment with school structures and classroom practices to make more time for academic instruction. These reforms respond to the report of the National Commission on Excellence in Education (NCEE), *A Nation at Risk* (1983), and to the agenda set by the National Education Commission on Time and Learning (NECTL) in its report *Prisoners of Time* (1994). Following the recommendations of the reports, innovative manipulations of time have

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become prime strategies in educational policy. For example, some schools have begun to use lunch breaks for tutoring programs. Busing was rescheduled to allow students time to prepare their homework in school. In several places, sports and other extracurricular activities were cut back to allow more academic time. Nowadays, block scheduling is used more extensively to minimize the loss of precious time between lessons (Mathews, 1999). There is little doubt that under tight budgets and demands for excellence, policies about the use of time are likely to continue attracting much attention in educational policy and research.

This study provides new evidence about the gap between allocated and productive time in academic classes. This gap is conceptualized in terms of students' rates of engagement with instruction; these rates are instructionally produced and socially distributed. By comparing the effects of different instructional practices on student engagement and by focusing on racial differences in student responsiveness to instruction, this study aims to provide policy analysts and decision makers with more tools to evaluate time agendas in school reform.

Educational Policy and Time

Historically, national governments, states, and local educational authorities have indeed regarded time as a major policy vehicle for affecting student learning (Adler, 1996). Viewing time as a unique additive resource, policy makers debate about the number of school days or the number of hours per day (Sagness & Salzman, 1993; Seever, 1992; Virginia State Department of Education, 1992). Some decision makers have also tried juggling the proportion of learning to nonlearning hours during school or allocating more time to academic domains. In many places, extra time for learning is offered as an administrative panacea for educational ills or problems of national development (NCEE, 1983; World Bank, 1990).

Policy makers usually regard school time as a potent lever in raising achievement standards and reducing social inequalities in education (Adler, 1996; Rossmiller, 1983). Consequently, minority students are often provided with additional study hours relative to White and Asian students. Schools implement homework-at-school programs, enrichment programs, and extra academic or language classes to allow minority students to catch up more easily with their majority peers. Indeed, educational and political activists join forces in attempting to secure more funds (hours) for these programs, viewing time to learn as a most valuable asset in reducing ethnic, racial, and social inequalities in education.

From an administrative point of view, the allocation of time for learning is a simple, albeit costly, means of affecting student outcomes and achieving social equality in education. However, decisions about the allocation of time practically exempt decision makers from stepping into the realm of instruction and learning. Until the 1990s, the gap between allocated and productive time in classrooms and the fact that this gap was instructionally produced in classrooms escaped serious consideration by policy makers (Walberg, 1988). For example, *A Nation at Risk* (NCEE, 1983)—still the most influential report in the history of educational reform—advocated the use of time as an administrative tool to uproot mediocrity from the American educational system. By virtually correlating the number of school days with academic achievement, the report suggested that the academic advantage of students in south Asia in math and science could be attributed to the fact that they study up to 240 days a year compared with about 180 days for American students (Stevenson & Stigler, 1992). To advance the collective human capital of America, the NCEE (1983) recommended adding more time for academic studies. For example, *A Nation at Risk* called for the addition of an extra school hour per day and up to 40 extra days per school year. Furthermore, it advocated for greater efficiency in the use of time at both the school management level and the student level. This hegemonic discourse fully ignored microlevel instructional characteristics that erode productive time into a fraction of allocated time.

Political debates about the pros and cons of time as an administrative vehicle for affecting student learning parallel academic discussions about the empirical effects of time on student learning. Following the studies of the International Educational Assessment, which brought to light the importance of opportunities to learn, interest grew concerning time as an essential factor in any model of opportunity to learn. Pursuing this, the National Institute of Education invested effort in studying the distribution, use, and effects of time (Denham & Lieberman, 1980). The evolving body of research on time (Arlin, 1984; Berliner, 1979; Borg, 1980; Gaskins, 1998; Karweit, 1983; Keith, 1982; Levin, 1988; Link & Mulligan, 1986; Rosenshine, 1980; Walberg, 1988; Wayne & Walberg, 1980) seems to have reached two contradictory conclusions.

On one hand, the Coleman report (Coleman et al., 1966) suggested that the addition of "brute" resources to schools is not likely to significantly affect student outcomes. Furthermore, based on a comprehensive review of studies on time, Karweit found "little evidence to support the view that increasing time in school in and of itself will be an effective strategy for increasing achievement" (Karweit, 1988, p.32). In light of such results, policy makers had little incentive to add more time for school learning.

On the other hand, developments of Carrol's model of learning (Carrol, 1963; Wiley & Harnischfeger, 1974), suggested that time may indeed be a potent vehicle for educational improvement. Studies in this vein posit that when students attend classes, time is spent mostly on learning. Such studies posit that the addition of time for learning is bound to increase student outcomes. For example, Rosenshine (1980) shows that students are engaged with learning most of the time, especially in teacher-directed activities (Gaskins, 1998; Rosenshine, 1979, 1980). Similar impressions arose in a recent investigation that used more accurate estimation methods (Schneider, Csikszentmihalyi, & Knauth, 1995). In response to Karweit's critical analyses of studies on time (e.g., Karweit, 1983), leading figures claimed that, "It is inconceivable that more schooling, other relevant variables being constant, will not produce more learning" (Harnischfeger & Wiley, 1976, p. 18).

In its scientific review of studies in the field, the NECTL (1994) concluded that time cannot be used as a simple administrative lever to produce excellence and equality in education. Building on Walberg's distinction between allocated and productive time (Walberg, 1988; Wayne & Walberg, 1980), the NECTL carefully noted that schools and teachers are active in producing the gap between inputs of time and student outputs or between opportunities to learn and student achievements. Furthermore, it stressed that equal opportunities in school are bound to produce social inequality. By pointing out the design flaw in schools (students receive roughly equal time to learn although they require different amounts of time to reach similar results), the NECTL suggested that schools are inherently unequal. They not only produce gaps between opportunities and outcomes, they also create greater gaps for socially disadvantaged students. To close these gaps, the Commission recommended using more direct instruction, decreasing the time devoted to seatwork, decreasing the emphasis on rote learning, improving curricular demands, and using more technology in classrooms.

In addition to these clear recommendations, the NECTL also registered several concerns that merit further study. A major domain for investigation was the gap between allocated and productive time in classrooms. Aware of the role of schools and teachers in affecting this gap, the Commission posed urgent questions, such as: What are the instructional characteristics that affect the gap between opportunities and outcomes? Under what conditions can schools use time for productive learning? Given a fixed amount of time, what teaching practices promise to increase productive time in class? Furthermore, under what conditions can schools mitigate the inherent tendencies to social reproduction in education?

This study aims to supply initial answers to these important questions.

Theoretical Orientation

Expanding on the research agenda set by the NECTL (1994), this study investigates the effects of instructional practices on student engagement. It assumes that students' engagement with instruction (i.e., attention or concentration) decides the extent to which allocated time is effectively used. This phenomenological point of view assumes that attending to the "paramount reality" of instruction (Berger & Luckman, 1967) is a necessary condition for learning, whatever a teacher's strategy may be.

To learn, students must be engaged with instruction whether in teacher-centered, traditional instruction; in Socratic, inquiry-based strategies; or in group work and authentic instruction (Arlin, 1984; Newmann, Marks, & Gamoran, 1996; Rosenshine, 1979). If students do not pay attention to the immediate instructional context, they are most likely to shut off educational opportunities even if instruction is extremely relevant to them and the teacher is a skilled professional. Indeed, students will only benefit from instruction if they attend to academic work (Doyle, 1986). If they do attend to instruction, they are likely to learn something, even if they find the subject matter boring and irrelevant and the teacher awful.

Students' disengagement from instruction is unproductive for learning. Paying attention to things other than instruction can produce little in terms of scholastic learning. In accordance with the abundant literature on time on task (Karweit, 1983; Wayne & Walberg, 1980; Wiley & Harnischfeger, 1974), this study assumes that higher rates of time on task are likely to eventuate in more learning. However, it is expected that higher rates of disengagement with instruction will culminate in lower rates of learning. Conceptually, student engagement reflects the efficiency of instruction and determines the gap between allocated and productive time.

Based on this reasoning, this study focuses on student engagement with instruction and investigates instructional characteristics that determine the rates of student engagement. I assume that instructional factors, and not the accuracy and validity of instructional contents, differentially determine engagement, or cognitive focus. Accordingly, it is possible to teach the same curricula with different methods and strategies, and that these will determine retention rates and learning. From these premises, and based on the results of the study, I will advocate the use of more engaging methods and strategies to maximize learning and minimize the gap between allocated and productive time.

One criticism of this approach is that students may learn more not through an activity that they engage in at a higher rate but rather from lower

engagement in an activity that is more inherently conducive to learning. For instance, they might learn more from lower engagement in a lecture as opposed to higher engagement in group work. Furthermore, high student engagement with flawed curricula is also not conducive to knowledge acquisition. With these caveats in mind, the following paragraphs propose tentative hypotheses about the effects of three distinct instructional factors on student engagement: instructional methods, instructional strategies, and subject matter.

The first factor focuses on formal aspects of instructional methods. Simmel (1950) was perhaps the first to point out that formal aspects of social relationships affect individuals' consciousness within them. For example, presence in a dyad is much more demanding of mutual recognition and acknowledgment than is a triad or any larger group. In expanding on this structural approach, sociologists of education have pointed out differences between instructional methods (e.g., Bidwell & Kasarda, 1980; Bossert, 1979) and suggested that such differences affect student learning. Along these lines, it is hypothesized that different instructional methods may affect students' rates of engagement with instruction. Based on previous studies (Block, 1984; Bossert, 1979; Kutnick, 1988), I hypothesize that more individuated and active instructional methods (e.g., work in small groups or in laboratories) will demand greater student involvement than would teacher-directed methods. Against the direct instruction approach, it is suggested that teacher-centered instructional methods that aim for greater "panopticon control" (Foucault, 1977) of students may actually produce the highest levels of student disengagement from instruction.

The second factor depicts effects of instructional strategies on student disengagement. Studies on student motivation have disclosed significant effects of structural characteristics of instructional tasks on student motivation (Ames, 1992; Blumenfeld, 1992). Educational researchers, psychologists, and sociologists agree that instruction will have positive effects on student learning if (a) it is based on authentic or relevant situations (Sizer, 1992), (b) it uses a wide array of students' skills and interests (Gardner, 1993), (c) it poses real challenges for students (Csikszentmihalyi, Rathunde, & Whalen, 1993), and (d) it allows for student choice or autonomy (Kahane, 1975; Passe, 1996). This study investigates the effects of four instructional strategies: (a) providing challenging activities, (b) making instruction relevant to the students' lives, (c) giving students a choice of different tasks, and (d) using students' personal skills.

The third factor that may affect the gap between allocated and productive time is subject matter. School subjects may elicit varying degrees of student engagement irrespective of instructional method or strategy. Following previous studies in this domain (e.g., Stodolsky, 1988), I suggest that hierarchical school subjects (e.g., mathematics, natural sciences) will be more demanding of students' engagement than horizontally structured school subjects (e.g., literature, social sciences). In other words, I expect that students' disengagement with instruction will be more prevalent in the softer domains of school curricula, because inattention to one part of the lesson may have minor detrimental effects on overall achievements. In hierarchical school subjects, however, missing a small part of class can inhibit further accumulation of knowledge. This does not suggest that students like hierarchical and demanding school subjects. Nonetheless, they must pay more attention to them. In contrast, students are likely to favor softer school subjects but at the same time be reluctant to pay them considerable attention.

This investigation uses a high-tech methodology to measure students' engagement in academic classes and assess between-group variations in student engagement. By focusing on overall trends of engagement and on between-group differences in disengagement rates, this investigation may provide new ground for assessing educational policies about time and instruction. By looking at the instructional production of the gap between allocated and productive time, this study may provide preliminary answers to some of the important questions posed in *Prisoners of Time* (NECTL, 1994).

Sample and Data

The study is based on secondary analyses of data collected during the first year of the Sloan Study of Youth and Social Development, a U.S. national longitudinal study begun in 1993, that investigated how adolescents think about their future lives (Bidwell, Csikszentmihalyi, Hedges, & Schneider, 1992). Twelve communities were selected for the study. Site selections were made to satisfy variations in urbanity, labor force composition and participation, and race and ethnicity. The sites were geographically distributed across the United States and represent urban, suburban, and rural areas. Data was collected at both elementary and secondary schools nested within these communities, resulting in a sample of 33 schools across the 12 communities. The sample includes 13 high schools, five K-6 schools, three K-8 schools, and 12 middle schools (mostly Grades 6-8). Students were randomly selected from class lists in Grades 6, 8, 10, and 12, stratified by gender, race, and ability level.

In this study, an innovative use was made of a unique data-gathering technique known as the Experience Sampling Method (ESM). The method was designed and tested by Mihaly Csikszentmihalyi at the University of Chicago (see Csikszentmihalyi & Larson, 1987; Csikszentmihalyi, Reed, & Prescott, 1977; Larson, 1989). The ESM is used for capturing objective aspects of experience (what students are doing, where they are located at specific times, with whom they are interacting, etc.); it also allows for an assessment of subjective aspects of experience (mood, motivation, sense of success, etc.). This technique "bridges the precision of paper-and-pencil measurement and the ecological validity of on-site observational techniques. Its contextual immediacy avoids the biases and distortions to which more global self-report measures are sometimes prone" (Csikszentmihalyi et al., 1993, p.49). Furthermore, in the current use of the questionnaire, the ESM can more accurately assess time on task than external classroom observations. The rationale behind this measurement strategy is that one cannot trust external behaviors (e.g., sitting in class) to testify for cognitive activities. Therefore, to verify the net time of learning, the current study asked students about their cognitive whereabouts while sitting in academic classes. Despite its advantages, ESM unavoidably relies on students' self-reports, which, in certain contexts, may be inaccurate (e.g., Rosenbaum, 1980).

Though expensive and demanding of students' cooperation, ESM methodology opens up many possibilities for educational studies. Current uses have served to assess adolescents' lives more intimately (Csikszentmihalyi & Larson, 1986), to assess conditions that allow students to develop their talents (Csikszentmihalyi et al., 1993), and to assess the provision of quality instruction in schools (Schneider et al., 1995). The method, however, merits greater use, as it can be used to assess major policy debates from students' points of view (e.g., assessing school reform assumptions, deciding on priorities about home vs. school intervention, etc).

In this investigation, sampled students were provided with digital wristwatches that were programmed to emit signals (beeps) eight times a day (from 7:30 a.m. to 10:30 p.m.), at random, for a week. Start and finish hours were equal across schools, and the determination of students' location at each beep (e.g., school, work, home) was based on students' open-ended response to the question, "Where were you at the time of the beep?" When beeped, the students were requested to answer a short questionnaire about their experiences at the time of the beep. (The ESM questionnaire is reproduced in the appendix.) The students were asked about the activity they were engaged in, their mood at the time of the beep, and their level of engagement. Originally, 865 students provided data on 28,193 daily experiences. Of the 12,000 beeps

that occurred within school, only academic school experiences were used, culminating in 3,562 learning experiences with full data (students with missing data on school grades—about 10% of the cases—were omitted). It is important to note that "academic beeps" constitute only about one third of the signals occurring within school hours (the majority of experiences occur while on breaks, at lunchtime, attending extracurricular activities, etc.). This suggests that most of the time in school is dedicated to other than academic instruction (Rossmiller, 1983). As the findings will show, the small proportion devoted to academic learning is further diminished by the ecology of instruction in American classrooms (see Schneider et al., 1995, for preliminary analyses in this direction). Because the beeps were randomly distributed throughout the day, some students were signaled more times while in school, others outside school. However, other analyses of this data set show that within-person variation is much greater than between-person variation. This suggests that if there is bias, it should minimally affect the results. Future ESM studies of schools and schooling should guarantee a greater number of data points for each student and have a greater number of students responding at the same time (to provide more reliable contextual variables).

The Measurement of Engagement

The dependent binary variable in this study is student engagement, denoting whether students are cognitively attending to their lessons or are actually disengaged from learning. ESM asks students the following questions: "Where were you at the time of the beep?" "What was on your mind?" "What was the main thing you were doing?" and "What else were you doing?"

To distinguish between engagement with instruction and disengagement, the research staff coded students' answers to the "place," "thought," and "doing" questions. The coding system allows for a comparison between students' places while being signaled and their thoughts and doings at the time. Because there were no predesignated codes in the questionnaire, the research staff developed activity codes for the nature of the activity (thought and doing questions). The codes were constructed from students' responses taken verbatim from the questionnaire. This procedure culminated in a comprehensive list that also allowed for the construction of different independent variables (e.g., instructional method). The lists were compared for consistency with previous ESM studies (Csikszentmihalyi & Larson, 1986). Studies using these procedures report on rates of interrater reliability with approximately 95% agreement levels (Csikszentmihalyi et al., 1993).

Based on this procedure, engagement was operationalized by giving a value of 1 to every experience in which students' thoughts or doings directly reflected their place (e.g., thinking about mathematics in a math lesson) or referred to academic work (e.g., doing group work). A value of 2, reflecting disengagement, was assigned to an experience if a disjuncture was evident between place and thought and doing. In cases of doubt (when students referred in thought to nonacademic work but in doing to academic work, or vice versa), a value of 1 was assigned. Consequently, estimates of student engagement may be somewhat upwardly biased.

This measurement strategy is neither perfect nor ideal. It divides experiences into clear-cut engagement with instruction versus disengagement, whereas focus should perhaps be given to the extent or depth of engagement. Furthermore, it may be argued that this strategy simplifies cognitive and emotional realities, wherein individuals' consciousness can be at the same time present and absent, at different levels. Consequently, some may posit that learning can take place even when individuals are not fully aware of the instructional context. I acknowledge these possibilities and suggest that if this study proves to be productive, future designs of ESM studies should seek means to advance the measurement of this unique variable.

Independent Measures

Two major groups of independent variables were used to assess causes of variation in students' engagement with instruction. The first refers to students' background variables, measured as follows. Gender: girls coded 0, boys coded 1. Race: Asians coded 0, Whites, 1; Hispanics, 2; African Americans, 3. Grade level: according to grade, 6th, 8th, 10th, or 12th. Achievements (grades on last report card): "mostly A" coded 1, "half A, half B," 2; "mostly B," 3; "half B, half C," 4; "mostly C and below," 5. This variable exhibited a skewed distribution: In their self-report of their school grades, 35% of the students coded "mostly A," whereas only 8% coded "mostly C and below."

The second group of variables refers to instructional characteristics, measured as follows. Subject matter: mathematics coded 1; English, 2; reading, 3; natural sciences, 4; foreign language, 5; and social science classes, 6. Instructional methods: teacher lecture coded 1; class discussion, 2; work in laboratory, 3; group work, 4; individualized work, 5; classroom presentations, 6; TV and video, 7. Instructional strategies: four main independent measures are used to predict student engagement. Relevance—the extent to which an activity is important for students' immediate and long-term aims—was measured by two items that referred to the importance of the

activity. The two items ("Was this activity important to you?" and "How important was it in relation to your future goals?") were combined into a single measure (Cronbach's alpha = 0.73). Skills—the extent to which an activity requires students to exhibit high skill levels—were measured by a single item (a 10-point scale worded "Your skills in the activity," ranging from *low* to *high*). Challenge similarly measures the extent to which the activity challenges the students. Finally, choice is a five-point measure that was constructed from students' responses to a single item: "Were you doing the main activity because (a) you wanted to; (b) you had to; (c) you had nothing else to do". The combinations of a + b, a + c, and b + c were all recoded. The lowest choice, b, was coded 1, the highest choice, a, was coded 5. Because skills, challenge, and choice were measured with a single item, it is impossible to statistically estimate their reliability. Future studies should elaborate the ESM variables to allow for a more robust estimation of measures of instructional structures. Such ventures should also collect more objective data such as attendance, classroom composition, and students' general attitudes toward education.

Analyses

Because the dependent variable in the current study is dichotomous (engagement vs. disengagement), I used a logistic regression analysis to estimate the effects of the independent variables on the probability of students' engagement with instruction. Like ordinary least squares regression, logistic regression allows the estimation of the relative contribution of independent variables in the model, keeping other variables in the model constant. Because the dependent variable is binary, logistic regression uses a probabilistic rationale in comparing estimates, using log-odds ratios (see Menard, 1995; Wright, 1995).

FINDINGS

The findings are presented in three parts. To provide initial impressions about the data, the first part describes a simple breakdown of nominal independent variables by students' engagement. It shows that student engagement with instruction is significantly correlated with instructional methods, subject matter, gender, race, and grade level. The second part presents the findings from the logistic regression, allowing an estimation of the relative contribution of background and instructional variables to student engagement. Presenting a cleaner analysis, the second section focuses on the relative

contribution of the independent variables in accounting for students' rates of engagement with instruction. Based on these findings, the third section shows a relationship between current provision of instructional methods and strategies in these 33 American schools and low rates of student-reported productive time.

Student Engagement Rates

Because this investigation is innovative in using the ESM methodology to define and measure student engagement with instruction, this section provides a benchmark description of main breakdowns of the independent variables on student engagement. The raw, independent distributions are presented in Table 1.

A major fact looms large in Table 1: On average, students reported engagement in their lessons only 53.8% of the time. This implies that students attend to half of the time resources that schools provide for academic instruction; they only pay attention to half the opportunities to learn with which their teachers supply them. In other words, Table 1 reveals a high rate of student disengagement from instruction, suggesting that the net time of learning from the students' perspectives is significantly lower than previously estimated rates of time on task (e.g., Berliner, 1979; Rosenshine, 1979, 1980).

Table 1 shows that boys tend to be more attentive to instruction than girls. They reported engagement with their lessons 55.4% of the time in comparison with 52.7% for girls. The difference, however, is not statistically significant. Race proves to be a stronger predictor of student reports of engagement. African American students reportedly were disengaged from instruction 51.2% of the time, and Hispanic students 52.1% of the time. In contrast, Whites and Asian Americans noted engagement with their lessons 6% to 10% more often than their African American and Hispanic peers.

Table 1 also shows a linear reduction in student engagement with grade level. Although sixth grade students claimed engagement in learning 62.3% of the time, their peers in the 12th grade reported only about 47.7% engagement. A possible explanation for this difference in student reports is that as students grow up they tend to be more preoccupied with self, peers, and romantic concerns. Overall, these findings suggest that as students mature, teachers may have greater difficulties in securing their attention. In other words, student disengagement becomes more prevalent as students reach high school, and the things on their minds also change form and prevalence.

Students' school achievements are not linearly correlated with engagement in learning. Not surprisingly, high-achieving students tend to be engaged

TABLE 1
Breakdown of Student Engagement on Select Nominal Variables (in percentages, N = 3,562)

Variable	*Category*	*Engaged*	*Disengaged*	χ^2	p
Total		53.8	46.2		
Gender	Girls	52.7	47.3		
	Boys	55.4	44.6	2.49	.061
Race	Asians	57.4	42.6		
	Whites	55.1	44.9		
	Hispanics	47.9	52.1		
	African Americans	48.8	51.2	11.99	.007
Grade	6th	62.3	37.7		
	8th	54.6	45.4		
	10th	52.7	47.3		
	12th	47.7	52.3	31.14	.000
Grades on last report	Mostly A	54.8	45.2		
	Half A, half B	54.8	45.2		
	Mostly B	55.9	44.1		
	Half B, half C	51.2	48.8		
	Mostly C & below	47.2	52.8	8.54	.074
Subject	Mathematics	62.7	37.3		
	English	48.3	51.7		
	Reading	54.9	45.1		
	Natural sciences	56.2	43.8		
	Foreign language	51.3	48.7		
	Social sciences	48.1	51.9	47.10	.000
Instructional method (n = 1,955)	Lecture	49.8	50.2		
	Discussion	62.4	37.6		
	Work in labs	73.8	26.2		
	Group work	70.6	29.4		
	Individualized	65.8	34.2		
	Presentations	69.7	30.3		
	TV/video	57.5	42.5	67.91	.000
N		1916	1646		

with their lessons more than low-achieving students. Low-achieving students, especially students with mostly Cs and below, report significantly more nonschool preoccupations, thus illustrating a vicious cycle of school deterioration. This finding reiterates that high-achieving students take more advantage of every opportunity to learn (Sorenson, 1989; Sorenson & Hallinan, 1977).

Moreover, the subject matter taught in class also affects student engagement. As conjectured, mathematics leads in its holding power of students' attention with 62.7% of instructional time reportedly engaged by students. The natural sciences are second with a holding power of 56.2%, whereas reading ranks third with 54.9% of reported engaged time. English, foreign languages, and the social sciences evince the lowest holding power of students' attention. These findings suggest that from these students' perspectives, hierarchical school subjects are more efficient in producing a smaller gap between allocated and productive time.

Instructional characteristics also affect student-reported engagement rates. Table 1 shows that students' claims of engagement with their lessons varied significantly with instructional method. During teacher lectures, students reported engagement in their lessons only 49.8% of the time. In contrast, while in laboratories, students said they attended their work for almost 73.8% of the time. Similarly, while being involved with presentations, whether individually or in groups, students reported attending to their work almost 69.7% of the time. Group work and individualized instruction also seem to hold students' attention for most of the time (70.6% and 65.8%, respectively). The results suggest that students' active participation in class is the main cause of their perceptions of high engagement rates. The more active the instructional method, the higher the rates of student reports of engagement. These findings contradict the direct instruction approach, which claims that teacher-centered methods exhibit the highest rates of productive time (Rosenshine, 1979,1980).

Conditions for Engagement

Table 1 presented the effects of instructional methods, subject matter, and grade level separately. Therefore, it does not allow for a comparison of the relative contribution of these independent factors on students' probability of engagement in lessons. Furthermore, up to this point only nominal variables were used, neglecting the effects of instructional strategies, which were measured with continuous variables. To estimate the relative contribution of each factor, controlling for the effects of other independent variables, I use a logistic regression analysis. The findings of this analysis are presented in Table 2.

Table 2 presents estimated coefficients for each predictor (*B*), the standard error of the estimate (*SE*), the Wald statistical test, significance level (*p*), and the expected odds ratios (Exp [B]). For categorical variables, the expected odds ratios reflect the different odds of a specific category in comparison with the reference category (ref.). For continuous variables, expected odds

TABLE 2
Logistic Regression of Engagement on Student Background and Instructional Characteristics

Variable	*Category*	β	SE	*Wald*	p	*Exp(B)*
Constant		–.095	.246	1.14	.700	—
Gender	Boys	.188	.081	5.30	.021	1.20
Race	Whites (ref.)					
	Asians	.140	.153	.842	.358	1.15
	Hispanic	–.282	.147	3.65	.055	.753
	African American	–.313	.123	6.48	.010	.731
SES		–.034	.038	.786	.575	.966
Grade	6th (ref.)					
	8th	–.059	.121	.235	.627	.942
	10th	–.261	.121	4.61	.031	.770
	12th	–.338	.127	7.06	.007	.713
Grades on last report	Mostly A (ref.)					
	Half A, half B	.019	.098	.039	.842	1.02
	Mostly B	.037	.130	.084	.772	1.03
	Half B, half C	–.325	.130	6.23	.012	.722
	C & below	–.170	.144	1.40	.236	.842
Subjects	Mathematics (ref.)					
	English	–.557	.117	22.54	.000	.573
	Reading	–.302	.244	1.53	.214	.738
	Natural sciences	–.201	.119	2.84	.091	.817
	Foreign languages	–.512	.145	12.41	.000	.598
	Social sciences	–.510	.123	17.02	.000	.600
Instructional methods	Lecture (ref.)					
	Discussion	.733	.200	13.40	.000	2.08
	Work in labs	.769	.314	5.99	.014	2.15
	Group work	.813	.416	3.82	.050	2.25
	Individualized	.533	.117	20.48	.000	1.70
	Presentations	.643	.406	2.50	.011	1.90
	TV/video	.712	.166	18.44	.000	2.03
Instructional strategies	Relevance	.120	.018	43.80	.000	1.12
	Challenge	.100	.015	41.47	.000	1.10
	Skills	–.015	.017	.814	.366	.984
	Choice	–.226	.028	68.05	.000	.796
Correct classification		65.64%				
Deviance (–2 LOG likelihood): 3878.70						
Goodness of fit: 3120.53						

NOTE: Wald = Wald statistical test; Exp(B) = expected odds ratio; ref. = reference; SES = socio-economic status.

ratios represent the change in odds for every one point change of the independent variable.

Table 2 shows the significant effects of students' background characteristics on engagement. First, boys tend to report more attention to instruction than girls. Keeping other variables constant, the odds of boys' claims of engagement with their lessons are 21% higher than those of girls. Second, race proves to be a strong predictor of student engagement reports. The odds of African American students' self-reports of engagement are 26.9% lower than the odds of White students (the reference group). Similarly, the odds of Hispanic students' reports of in-class engagement are 24.7% lower than the odds of White students. Asian students do not significantly differ from Whites in their reports of engagement with their lessons. It should be noted that controlling for student race, the social status of the community has no effect on students' self-reports of engagement.

Table 2 shows a linear reduction in reports of engagement by grade level. The odds of 12th-grade students saying they are engaged are 28.7% lower than the odds of 6th-grade students, the odds of 10th-grade students are 23.0% lower than the odds of 6th-grade students, and the odds of 8th-grade students are 5.8% lower than their younger colleagues (although the effect of this last contrast is not statistically significant). This linear trend may reflect the effect of age, as the topics that students think about when disengaged change with age. For example, 10th- and 12th-grade students may be preoccupied with themselves, with peers in general or romantic interests, sports, or just wishing to go home. Younger students reported doing nothing or thinking about nothing more than other students. Note that this self-report may have more to do with the relative ease, for younger students, of writing "nothing" than a more extended answer. Overall, these findings suggest that as students mature, teachers have greater difficulties in securing their attention.

Replicating the evidence in Table 1, and controlling for other variables in the model, mathematics and the natural sciences exhibit a greater capacity to solicit students' reports of engagement relative to other academic school subjects. The odds of student reports of engagement in social science lessons are 40.0% lower than the odds of cognitive engagement during math lessons. Similarly, the odds of students' claims of engaging with instruction in English and foreign language lessons are 42.7% and 40.2%, respectively, lower than those evident in math lessons. Relative to math lessons, natural science and reading lessons do not show statistically significant differences in student engagement. Where the students claimed high engagement, they seemed to be in classes where the curriculum is hierachically organized in a stage-like manner. In contrast, during the school subjects that have modular and diffuse curricula, students reported disengagement.

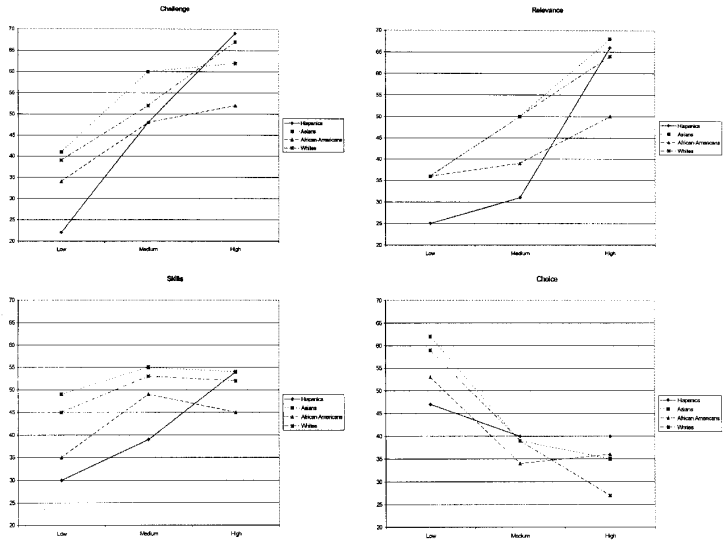
Table 2 further exposes significant effects of instructional methods on students' engagement. For example, the odds of students' claims of minding

their lessons are 115% higher while working in laboratories than the odds in teacher lectures. Similarly, presentations increase the odds for self-reports of concentration by 90%, whereas the odds of group work and the use of TV or video rise by 125% and 103%, respectively. Individualized instruction also raises the odds for self-reports of minding lessons by 70% (in comparison with teacher lectures). Teacher lectures, the most prevalent strategy in many U.S. schools (constituting 72.5% of all the units of observation in this study), exhibit the lowest rates of student-reported engagement.

These average effects conceal significant interactions of strategies of instruction with student race. The odds of students engaging in the classes they deem "most relevant" (score of 9 on the scale) are 108% higher than in the classes the students dubbed the "least relevant." Similarly, the odds of students engaging in their lessons in what they named the "most challenging" are 90% higher than the odds in the lessons students identified as "least challenging." Obviously, when students report challenges, they also report engagement. It stands to reason that dull and nonrelevant instruction may alienate students to the extent that their minds wander from their physical space, the classroom.

Figure 1 shows that as students' views of challenge, skills, and relevance go up, so do students' claims of engagement with their lessons (although engagement decreases with more choice). When school lessons are deemed boring and irrelevant, Hispanic students claimed very low rates of engagement with instruction. In contrast, when Hispanics noted instruction as of high quality, they topped all other groups in engaging with their lessons. This suggests that Hispanic students are highly sensitive to the perceived quality of instruction they receive in school. On the other hand, African American students exhibit a flatter slope, suggesting lower responsiveness to perceived quality of instruction. When teachers provide dull, nonchallenging lessons, African American students evince similar engagement rates to those of Asian or White students. However, they claimed a relatively decreasing rate of engagement in high-quality lessons. Actually, as the students' reports of quality of instruction increased, so did the gap between African American students and all the rest in reports of student engagement.

One possible interpretation of the effects of race on student engagement suggests that the results are possibly confounded by cultural values. It is suggested that African American students tend to exhibit distance from the student role, fearing to seem "White" among their peers. However, other data from the current ESM study show that relative to White and Asian students, African American and Hispanic students reported higher motivation levels and mood while learning. At the same time, however, they reported higher



	For Challenge		
	High	*Medium*	*Low*
Hispanics	69	48	22
Asian	62	60	41
African American	52	48	34
Whites	67	52	39
		For Relevance	
Hispanics	66	31	25
Asian	68	50	36
African American	50	39	36
Whites	64	50	36
		For Skills	
Hispanics	54	39	30
Asian	54	55	49
African American	45	49	35
Whites	52	53	45
		For Choice	
Hispanics	40	40	47
Asian	35	39	62
African American	36	34	53
Whites	27	39	59

Figure 1: Student Engagement Rates by Race and Instructional Strategies
NOTE: Coordinates should run from 20 to 70 (Y-axis). X-axis with three levels (low, medium, and high) for each of the four variables.

rates of cognitive disengagement with instruction. Based on these diverging results, a cultural explanation would require further research.

Overall, the findings in Table 2 and Figure 1 show that the effects of instructional variables on student-reported engagement are stronger than those of students' racial backgrounds. This finding suggests that disparities among racial groups may reflect the different opportunities to learn that they encounter in school more than any predisposition that they may bring into the classroom.

The Overwhelming Provision of Disengaging Instruction

To understand the low overall rates of student-reported engagement in these 33 American schools, this section presents evidence about the provision of instruction in classrooms. For example, teacher lectures, the most prevalent instructional method reported in the study's classrooms, was shown to consistently lose the battle for students' attention. Comprising 72.5% of all the units of observation, teacher lectures succeed in securing students' attention less than 50% of the time. Although individualized instruction tends to exhibit stronger effects on student-reported engagement relative to teacher-centered methods, it is still next to last in this regard. Comprising 13.6% of all the beeps, this method was not saving students from nonacademic temptations or external pressures that encroach on their attention. Overall, then, the two most disengaging instructional strategies comprised 86% of these students' daily instructional menu.

In contrast to this overwhelming dominance of traditional instructional methods, more active task-oriented methods like working in laboratories, giving presentations, and working in groups are conspicuously rare. Although they secure an engagement rate of almost 70%, these methods were reported only 7.9% of the time.

Furthermore, students' reports on the extent to which their lessons are relevant and challenging—the two most important strategies to affect engagement—show that there is room for improvement. The averages of these variables are 5.17 and 4.64, respectively (on a 9-point scale). This suggests that in students' eyes, many lessons are boring and nonrelevant, a good recipe for student disengagement. These findings suggest that the overwhelming provision of disengaging instruction constructs a large gap between allocated and productive time. When teachers use nonrelevant and unchallenging lessons, such as lectures, they are wasting precious resources for learning. Because Hispanic students are more sensitive to classroom effects, the provision of

dull instruction further inhibits some minority students' learning opportunities.

DISCUSSION

In its authoritative review, the NECTL (1994) suggested that to meet the challenges of modern economy and civic society, schools have to invest more time in academic instruction. While calling for the addition of more time for schooling, the Commission has pointed out that extant gaps between allocated and productive time in school are much too large. By proposing initial insights into the causes of these gaps, the Commission directed attention toward the role of instruction. However, to have more information about the instructional production of gaps between allocated and productive time, members of the Commission expressed their wish that the scientific community more fully open the black box of classroom instruction. The current investigation accepted this challenge and used innovative means to study the effects of instructional characteristics on student engagement. By opening the black box of instruction, this study provides key insights to means of bringing about more efficient use of time in school.

For example, the findings have vividly shown that active instructional methods and strategies elicit remarkably high student-reported engagement. In contrast, teacher-centered and individualized approaches—which superficially control students' engagement with instruction—actually produce the highest rates of student-reported disengagement. The current investigation also shows that the most prevalent instructional methods in many American classrooms are those that produce the lowest rates of productive time. Current school organizational and instructional practices (Elmore, 1995) produce high rates of student disengagement, undercutting the possible contribution of time as a viable resource. Indeed, variation in student engagement, accounted for by variation of instructional characteristics, suggests that instructional reform may be a potent vehicle in affecting student outcomes. Given the criterion of student engagement, such instructional reforms may provide more leverage for affecting student outcomes than the simple addition of more time.

The current study indeed suggests that only by securing students' active involvement with instruction can time agendas have an effect. The addition of more time for teacher-centered instruction may exacerbate student disengagement. From a policy perspective, such decisions may prove to be practically futile. Consequently, if an effort is to be invested in shrinking the gap between allocated and productive time, instructional reform should be the

first priority. Only by changing the current provision of instructional quality can greater efficiency with regard to time management be reached.

This position supports current efforts to reform American schools that focus on the professionalization of teachers and school faculty. Although accepting the general position that school change should capitalize on teachers' intrinsic avowal thereof, this study specifically focuses on the core technology of schooling: instruction. Allowing faculty more say in schoolwide decisions is commendable; demanding greater participation of small groups in shared decision making is also worthy of imitation (Lee & Smith, 1993, 1995). However, these organizational changes cannot replace subtler, less publicly visible changes within classrooms. Such instructional changes are indeed the only possible means for directly affecting students' thinking and engagement in school. Popular organizational reforms in education seek diverse ways to empower teachers, conceptualizing empowerment as a necessary step in affecting instruction in classroom.

However, I suggest that instructional reforms should not be conceptualized as by-products of organizational reforms. The opposite should be the case: Beginning from empirically supported theories of learning, educational leaders should look for organizational structures that maximize student engagement and motivation. Organizational means should serve as scaffolds for instructional strategies and methods that guarantee student engagement with academic learning.

Current attempts to decrease social inequalities in education are using time as an organizational lever. In many places, greater time to learn is allocated to disadvantaged groups to raise their achievements and attainments. Decision makers are keen to add extra school hours for minority students to provide them with enhanced opportunities to attain outcomes similar to those of nonminority students. For politicians, educational programs that span longer hours are publicly visible, and from a lay perspective, they must have overt outcomes. Politicians are well aware of this public attitude, using time agendas to build support for their offices or long-term goals. From an outcome perspective, however, simple strategies of time allocation vis-à-vis minority students may be more futile than they are for nonminority students.

This study indeed suggests that such extra hours may not really serve minority students in the United States. The extant provision of instruction in American schools is such that African American and Hispanic students may gain very little from instruction that is more of the same. If more school hours are to be added with current instructional practices left intact, students are most likely to be disengaged for the greater part of that time. Under such conditions, no substantive academic gains are likely to be effected by the addition of time. Consequently, without changing instructional policies vis-à-vis

minority students, strategies of time are likely to fail in closing racial inequalities in education.

As the findings suggest, educational policy concerning minorities should focus efforts on instructional reform. We have seen that African American and Hispanic students exhibit high rates of disengagement in traditional teacher-centered instruction. To bring about greater equality, then, educational policy should encourage schools and teachers to use more active, student-centered approaches. To reduce ethnic inequalities, minority students should receive affirmative action with respect to the quality of instruction they receive, not just in terms of more time. Nonetheless, sociological studies of education provide many testimonials to the fact that minority students receive lower rates of high-quality instruction (Oakes, 1985; Oakes, Gamoran, & Page, 1992; Page, 1991).

As suggested earlier, the gap between allocated and productive time is larger among students of minority origin. African American and Hispanic students prove to be more vulnerable to mediocre instruction, as they exhibit greater propensity to be off task in academic classes than majority students do. Consequently, the simple addition of time will most likely allow majority students to reap more benefits from a universal addition of time. To set the stage for social equality, greater efforts should be invested in reforming instruction such that minority and majority students will have equally productive opportunities to learn.

The significant race effects found here deepen the understanding of inequality in education. Various studies have previously shown that Hispanic and African American students differ with regard to educational aspirations (Kao & Tienda, 1998) and academic achievements (Hallinan, 1996). The current analysis further provides telling evidence about microprocesses that join in producing the gaps between these groups. Relative to minority students, Asians and Whites tend to be more engaged in class up to 30% of the time. That means that out of every time unit, Asians and Whites reap greater benefits than do Hispanic or African American students. Only when the quality of instruction is high do we see lower racial gaps in student engagement, mainly with regard to Hispanic students. Therefore, to supply minority students with equally productive opportunities to learn, more than time adjustments is necessary. I suggest that by providing minority students with challenging and relevant instruction it may be easier for them to make the most of extant opportunities to learn. Under these instructional characteristics, the gaps between allocated and productive time will be smaller, and social inequalities in education are more likely to decrease.

Finally, this study should not be read as a wholesale attack against the addition of more time for learning in school systems. To the contrary, it advocates a better use of time, to give extra time or funding any utility whatsoever. The real issue is about priorities concerning the adoption of different means in reaching the same goals: raising students' school achievement and combating undue social inequalities in society. Given these goals, the evidence suggests that the first priority should be to reform instruction. Only after providing engaging opportunities to students is it worthwhile to add extra time for learning. Thus, major state or federal attempts to recharge education's social role should begin by allowing educators to pursue instructional reforms at the classroom level.

Furthermore, it should be acknowledged that time strategies have merits other than as a means to better student outcomes. The extension of school hours means that students are kept absent from troubled environments (the streets, problem families, unproductive work, etc.). Consequently, proposals to allocate more hours to schools should always consider such other social roles of schools. The main argument of this article applies only vis-à-vis input-output models where time is regarded as an input and student outcomes as an output.

APPENDIX 1
The ESM Questionnaire

Date_____Time you were beeped am/pm_____Time you answered _____a.m./p.m.

As you were beeped . . .
Where were you?

What was on your mind?

What was the main thing you were doing?

What else were you doing?

Was the main thing you were doing . . .
More like work ( ) More like play ( ) Both ( ) Neither ( )

(continued)

APPENDIX 1 Continued

	not at all									very much
How well were you concentrating?	0	1	2	3	4	5	6	7	8	9
Were you living up to expectations of others?	0	1	2	3	4	5	6	7	8	9
Was it hard to concentrate?	0	1	2	3	4	5	6	7	8	9
Did you feel self-conscious or embarrassed?	0	1	2	3	4	5	6	7	8	9
Did you feel good about yourself?	0	1	2	3	4	5	6	7	8	9
Did you enjoy what you were doing?	0	1	2	3	4	5	6	7	8	9
Were you living up to your expectations?	0	1	2	3	4	5	6	7	8	9
Did you feel in control of the situation?	0	1	2	3	4	5	6	7	8	9

Were you doing this activity because . . .

You wanted to ( ) You had to ( ) You had nothing else to do ( )

Describe your mood as you were beeped:

	very	quite	some	neither	some	quite	very	
happy	O	O	O	O	O	O	O	sad
weak	O	O	O	O	O	O	O	strong
passive	O	O	O	O	O	O	O	active
lonely	O	O	O	O	O	O	O	sociable
ashamed	O	O	O	O	O	O	O	proud
involved	O	O	O	O	O	O	O	detached
excited	O	O	O	O	O	O	O	bored
clear	O	O	O	O	O	O	O	confused
worried	O	O	O	O	O	O	O	relaxed
competitive	O	O	O	O	O	O	O	cooperative

Who were you with?

( ) alone
( ) mother
( ) father
( ) sister(s) or brother(s)
( ) other relatives
( ) others

( ) teachers
( ) classmates, peers
( ) strangers
( ) friend(s) How many?
( ) female ( )male

( ) if you were with friends, what were their names?

Indicate how you felt about the main activity:

	low								high
Challenges of the activity.	1	2	3	4	5	6	7	8	9
Your skills in the activity.	1	2	3	4	5	6	7	8	9
	not at all								very much
Was this activity important to you?	1	2	3	4	5	6	7	8	9
How difficult did you find this activity?	1	2	3	4	5	6	7	8	9
Were you succeeding at what you were doing?	1	2	3	4	5	6	7	8	9
Did you wish you had been doing something else?	1	2	3	4	5	6	7	8	9

APPENDIX 1 Continued

Was this activity interesting?	1	2	3	4	5	6	7	8	9
How important was it in relation to your future goals?	1	2	3	4	5	6	7	8	9

If you had a choice . . .
Who would you be with?
What would you be doing?

Since you were last beeped, did you do any: (estimate to nearest quarter hour)
(Please circle "0" if you haven't done the activity.)

TV watching	0	1/4	1/2	3/4	1	11/4	11/2	13/4	2 Hours
Chores, errands	0	1/4	1/2	3/4	1	11/4	11/2	13/4	2 Hours
Paid work	0	1/4	1/2	3/4	1	11/4	11/2	13/4	2 Hours
Hanging out with friends	0	1/4	1/2	3/4	1	11/4	11/2	13/4	2 Hours
Homework	0	1/4	1/2	3/4	1	11/4	11/2	13/4	2 Hours

. . . has anything happened, or have you done anything which could have affected how you feel?

Any comments?

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