IES Institute of Education Sciences

APPENDIXES
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Regional Educational Laboratory Central
At Marzano Research

How Legacy High School Students Use Their Flexible Time

Appendix A. Literature review

Appendix B. Sample flexible mod schedule

Appendix C. Methods

Appendix D. Supporting analyses

Appendix E. Legacy High School student time log

See the full report on the Institute of Education Sciences website.

Appendix A. Literature review

This appendix provides a brief review of the research on personalized education and describes how this research informed the development of the flexible mod schedule at Legacy High School.

Schools and districts are exploring ways to personalize education (Pane, Steiner, Baird, & Hamilton, 2015). Although the definition and implementation vary from site to site, personalized education recognizes that students have different skills and aptitudes and may need varying amounts of time or support to master course learning objectives (Patrick & Sturgis, 2013). A personalized approach, which often begins with innovation at the school or district level, offers students space and time that they can use to master learning objectives. This opportunity might not otherwise be available in a traditional classroom where personalization may be limited (Brophy, 2004).

Providing students with choice and flexibility regarding when, where, and how they learn has the potential to improve not only their academic achievement but also their motivation, engagement, agency, and expectations of success (Bernacki & Walkington, 2018; Cordova & Lepper, 1996). Conversely, students' lack of control over their learning has been associated with diminished motivation (Eccles et al., 1993). Academic motivation and engagement have been shown to be positively correlated with multiple facets of learning. Increases in motivation have been associated with improved academic achievement (Bernacki & Walkington, 2018; DiPerna, Volpe, & Elliott, 2005; Evans, 2004); academic persistence (Martin, 2002); and increased cognitive engagement, conceptual understanding, expectations for success, and perceptions of value in learning (Marzano & Pickering, 2011; Murdock & Miller, 2003; Pintrich, Marx, & Boyle, 1993; Singh, Granville, & Dika, 2002).

Offering students choice in their learning can also support academic growth by promoting the development of self-regulation skills. Self-regulation includes the ability to observe, judge, and react to one's environment in order to develop appropriate behaviors (Bandura, 1986). There is evidence that students need opportunities and scaffolding to strengthen self-regulation and to successfully transition from teacher-based instruction to independent learning (Schunk, 2008). Additionally, providing students with choice and opportunities to develop self-regulation skills in high school has been shown to be related to college persistence and postsecondary performance (Kitsantas, Winsler, & Huie, 2008; Sciarra, Seirup, & Sposato, 2016; Zimmerman & Kitsantas, 2014).

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Appendix B. Sample flexible mod schedule

This appendix provides an example of a Legacy High School flexible mod schedule. The open blocks in the schedule represent student flex-time.

Table B1. Sample of a Legacy High School student's flexible mod schedule, 2018/19

Day	Mod 01	Mod 02	Mod 03	Mod 04	Mod 05	Mod 06	Mod 07	Mod 08	Mod 09	Mod 10	Mod 11	Mod 12	Mod 13	Mod 14	Mod 15	Mod 16	Mod 17	Mod 18	Mod 19	Mod 20	Mod 21	Mod 22
M	Spanish I FLA131.840012 Room: A011			Global Studies SST101.840023 Room: A212				Algebra I MAT111.840024 Room: B014			PE 9/Health PED111.840045 Room: D001-N				Physical Science SCI101.840076 Room: A201				Chamber Orchestra MUS413.840017 Room: F008			
T	English 9 ENG101.840021 Room: A111			Algebra I MAT111.840024 Room: B014							Physical Science (Lg Group) SCI101g.840012 Room: F101		PE 9/Health PED111.840045 Room: D001-N			Physical Science SCI101.840076 Room: A201						
W	English 9 ENG101.840021 Room: A111				Algebra I MAT111.840024 Room: B014				Global Studies SST101.840023 Room: A212						Art I ART111.841068 Room: E001				Chamber Orchestra MUS413.740017 Room: F008			
TH	Spanish I FLA131.840012 Room: A011				English 9 ENG101.840021 Room: A111				Guidance Freshman GEN100.841135 Room: A112				PE 9/Health PED111.840045 Room: D001-N		Physical Science SCI101.840076 Room: A201				Art I ART111.841068 Room: E001			
F	Spanish I FLA131.840012 Room: A011				Global Studies SST101.840023 Room: A212				Algebra I MAT111.840024 Room: B014				Global Studies (Lg Group) SST101g.84001 Room: F101		English 9 (Lg Group) ENG101g.840015 Room: F101		Chamber Orchestra MUS413.740017 Room: F008		Art I ART111.841068 Room: E001			

Source: Authors' analysis of 2018/19 school year data provided by Bismarck Public Schools.

Appendix C. Methods

This appendix provides further details about the study setting, sample, data, and analysis methods used to conduct the study.

Setting

Legacy High School (LHS) is a neighborhood public school in the suburbs of Bismarck, North Dakota. One of four high schools in Bismarck Public Schools (BPS), LHS opened in 2015 to serve the district's growing student population. Whereas BPS has an open enrollment policy that allows students to attend any school in the district, most students attend the high school that is closest to their home. LHS has a student population of approximately 1,100, with 17 percent of students eligible for the national school lunch program, 9 percent receiving special education services, and 13 percent having ethnic/racial minority status (including 7 percent American Indian).

Sample

The sample for the study included LHS students who were in grades 9–12 during the 2018/19 school year. To administer the student time log, LHS staff selected courses (for example, English language arts) that were required of all students (that is, not elective classes) and specific class periods for these courses that were scheduled near the end of the day for ease of data collection. This sampling helped ensure that students would complete the time log only once a day and that the student sample would not be a skewed representation of the student population (for example, only honors students or students with specific interests). In all, the student time log was administered in 14 classes during the fall semester and 15 classes during the spring semester. All of the classes were yearlong courses, 13 of which had the same teachers for both semesters.

The student time log was administered three times during each of five one-week blocks across the 2018/19 school year. Thus, students could complete up to 15 time logs. This schedule was selected because students' flex-time use was expected to vary across the year, and this approach would help account for this variation. All students in the participating classes were asked to complete the time log on the days it was administered. As LHS classes meet three times a week, students had the opportunity to complete the time log three times during each one-week block. A total of 568 students were registered in the selected classes. Of these students the study sample consisted of the 495 students (87 percent) who completed the time log at least once, representing approximately 45 percent of the entire LHS student population.

Preliminary analyses showed that students' use of flex-time, specifically the proportion of flex-time students chose to use for academic activities, did not vary by the number of time logs they completed [$F(14, 480) = 1.173$, $p = .292$)] or by the number of weeks in which students completed logs [$F(4, 490) = .582$, $p = .676$)]. This finding suggests that students' use of flex-time did not vary significantly across the school year. Therefore, all data from all students who completed at least one time log were included.

There were slightly more grade 10 students (32 percent) than students in the other grades in the study sample (table C1). About 86 percent of the students were White, with American Indian students making up the next largest group (7 percent). Forty-five percent of students were female, less than 1 percent were English learner students, about 4 percent were receiving special education services, and about 17 percent were eligible for the national school lunch program. When compared with the overall school population, the study sample had a statistically significant difference in the proportion of grade 10 students, of grade 12 students, and of students receiving special education services ($p < .05$ for all analyses). Additionally, a somewhat greater proportion of grade 9 students, students receiving special education services, and students eligible for the national school lunch

program had no time log entries. These differences might limit the generalizability of the findings to these groups. Due to the small number of students with disabilities who participated, no findings are reported for this subgroup.

Table C1. Demographic characteristics for respondents, study sample, and school population, Legacy High School, 2018/19

	Study sample		Full sample		School population
Demographic characteristic	Number	Percent	Number	Percent	Percent
Total	495	100	568	100	na
Grade					
9	130	26.3	160	28.2	25.1
10*	156	31.5	172	30.3	23.7
11	106	21.4	128	22.5	22.4
12*	103	20.8	108	19.0	28.8
Race/ethnicity					
American Indian	35	7.1	44	7.7	6.0
Asian	4	0.8	5	0.8	< 1.0
Black	14	2.8	16	2.8	3.0
Hispanic	12	2.4	17	3.0	3.0
Pacific Islander	3	0.6	4	0.7	1.0
White/non-Hispanic	427	86.3	482	84.9	87.0
Female students	223	45.1	251	44.2	47.9
English learner students	3	0.6	5	0.9	< 1.0
Students receiving special education services*	19	3.8	29	5.1	9.0
Students eligible for the national school lunch program	82	16.6	109	19.2	17.0

* indicates that the difference between the study sample and the school population is significant at $p < .05$.
na is not applicable.
Source: Authors' analysis of 2018/19 school year data provided by Bismarck Public Schools.

Data

The study team used data provided by LHS and BPS to address the research questions. Three types of data were provided.

Student time log data. BPS staff provided de-identified data collected from a time log developed on the SurveyMonkey platform. Students accessed the time log on laptops provided by LHS or on their cell phones during five one-week periods in the 2018/19 school year. The time log was created by LHS and the Regional Educational Laboratory Central and pilot tested with a sample of LHS students during the 2017/18 school year.

Students completed the time log independently, reporting how much flex-time they had on a specific day and how much of this time they spent on various activities (for example, academic activities and extracurricular activities). The time log prompted students to record the following:

- How many minutes of unscheduled or flex-time they had during the day.
- Who determined how they spent that time (the student or a teacher).
- Whether they used the time for academic or nonacademic activities.
- What academic activities they engaged in.

- What academic subjects they focused on, if relevant.
- Whether they remained on campus while engaged in nonacademic activities.

The time log is included in appendix E.

Student demographic data. BPS staff provided de-identified student demographic data for all students who were registered in the selected class periods at any time during the 2018/19 school year. These data included grade level, race/ethnicity, gender, English learner status, special education status, and eligibility for the national school lunch program. The study team recoded race/ethnicity into a dichotomous White/non-White variable because the individual categories of American Indian, Asian, Black, and Hispanic had too few members in the sample to use in analyses. English learner and special education status were also omitted from the analyses because of the small subgroup sample sizes.

Student academic achievement data. BPS staff provided de-identified academic achievement data for all students who were registered in the selected classes at any time during the 2018/19 school year. Math and reading academic achievement scores from the administration of assessments in spring of the previous year (2017/18) were collected for these students. The following assessments are administered to students in grades 8–10:

- Grade 8: Measures of Academic Progress (MAP); provides data for entering grade 9 students.
- Grade 9: ACT Aspire.
- Grade 10: ACT Aspire.

The study team used district assessment data to identify students who were struggling, meeting grade expectations, or excelling academically in either math or reading. Students were also classified as struggling in both subjects, meeting grade expectations in at least one subject, or excelling in both subjects. Assessment data were available for students at grades 8, 9, and 10, enabling students in grades 9, 10, and 11 to be categorized. Each assessment provides recommended cutscores that are used to place students into different performance categories. The MAP is used to identify students who are performing below grade level, at grade level, and above grade level. The ACT Aspire uses four categories: in need of support, close, ready, and exceeding. For this study, LHS students in the below grade level (MAP) and in need of support (ACT Aspire) categories were designated as struggling, students in the at grade level (MAP) and close and ready (ACT Aspire) categories were designated as meeting grade expectations, and students in the above grade level (MAP) and exceeding (ACT Aspire) categories were designated as excelling. Because the regular ACT, which is administered to grade 11 students, provides only a dichotomous student categorization (below/above benchmark), data from the regular ACT were not used. That means that no students entering grade 12 during the 2018/19 school year were included in the analyses for research question 3 (How does student use of flex-time differ by academic achievement level?).

This categorization of the academic achievement data classified 78 percent of students in the sample as meeting grade expectations or excelling in math and 80 percent of students as meeting grade expectations or excelling in reading in 2017/18 (table C2). About 18 percent of students in the sample excelled in both subjects. These achievement levels are aligned with the percentages for the entire LHS population: 82 percent of LHS students met grade expectations or excelled in math, whereas 85 percent met grade expectations or excelled in reading. To determine the influence of academic achievement on students' use of flex-time, individual analyses were conducted using math achievement and reading achievement separately and achievement across both subjects.

Table C2. Academic achievement levels for Legacy High School students in the study sample, 2017/18

Achievement level	Number	Percent
Math achievement		
Struggling	82	22.5
Meeting grade expectations	163	44.8
Excelling	119	32.7
Reading achievement		
Struggling	70	20.1
Meeting grade expectations	185	53.0
Excelling	94	26.9
Overall achievement		
Struggling in both subjects	36	10.3
Meeting grade expectations in at least one subject	248	71.3
Excelling in both subjects	64	18.4

Source: Authors' analysis of 2017/18 school year data provided by Bismarck Public Schools.

Analysis methods

To address research question 1 on how Legacy High School students use their flex-time, the study team conducted a descriptive analysis of the student time log data. Descriptive statistics (means and standard deviations) were calculated for each of the following time log categories:

- **Average flex-time minutes per day**. The average number of unscheduled/flex-time minutes that students had per day.
- **Total flex-time minutes**. The cumulative number of unscheduled/flex-time minutes that students reported over the span of the study.
- **Percentage of teacher-determined flex-time and percentage of student-determined flex-time**. The percentage of total flex-time minutes during which teachers required students to engage in specific activities, and the percentage of total flex-time minutes during which students engaged in activities of their choosing. Students responded in one of three ways to the survey: I decided the use of all my time, the teacher decided the use of all my time, or I decided some and the teacher decided some. If students chose the third category, they were asked to report how much of their time they determined and how much the teacher determined. Follow-up questions (for example, how the time was spent) were asked separately for the student-determined and teacher-determined time. This additional information allowed for aggregation into the dichotomous category of teacher-determined or student-determined flex-time.
- **Percentage of academic-focused flex-time and percentage of nonacademic flex-time**. The percentage of total flex-time minutes and the percentage of student-determined flex-time minutes spent on academic pursuits and the percentage spent on nonacademic pursuits.
- **Percentage of flex-time spent on specific academic activities**. The percentage of total flex-time minutes and the percentage of student-determined flex-time minutes students chose to engage in the following specific academic activities: studying in school learning centers, completing coursework outside of the centers, meeting with teachers, receiving guidance or counseling, practicing art/music, participating in extracurricular activities (including sports and clubs), and working in internships.
- **Percentage of flex-time spent on identified academic subjects**. The percentage of total flex-time minutes and the percentage of student-determined flex-time minutes students chose to engage in any of the following

academic subjects: math, science, English language arts, social studies, art/music, foreign languages, and physical education.

- **Percentage of nonacademic flex-time spent on and off campus**. The percentage of total flex-time minutes and nonacademic flex-time minutes students spent on and off campus.
- **Percentage of flex-time that teachers required students to spend on specific academic activities and identified academic subjects.** The percentage of total flex-time minutes and the percentage of teacher-determined flex-time minutes students spent on specific academic activities and identified academic subjects.

To calculate these statistics, student-level aggregated scores were first developed for each time log category. The total flex-time minutes and total flex-time spent on each category were calculated across all available time log entries for each student. Then, the total percentage of flex-time spent on each activity was calculated for each student. Results in the report are presented as the average percentage of flex-time, across all time log entries and across all students, that students spent on each activity. In this way, variation can be examined across students rather than across time log entries. Although results are presented as the average percentage of flex-time that students reported spending on a given activity, some proportion of students may have spent none of their flex-time on the activity.

Notably, the percentage of flex-time within a given time log category (for example, student-determined academic-focused flex-time) may not sum to 100 because of rounding, student nonresponse to particular time log questions, or student data entry errors. When students were prompted to record how much of their flex-time they spent on specific academic activities, they were presented with the total number of minutes they had reported spending on academic activities and asked to enter the number of these minutes they spent on each specific activity. In some cases, the numbers students entered did not add up to or exceeded the total minutes they had reported. While these errors were noted, the analyses included all students' data as they were reported by students.

To address research question 2 on how students' use of flex-time differs by grade level and student demographic characteristics, the time log descriptive statistics were disaggregated by grade level and demographic group (race/ethnicity, gender, eligibility for the national school lunch program). Specifically, separate frequencies, measures of central tendency, and measures of variation were calculated for each demographic group and time log category. Tests of the statistical significance (for example, *t*-tests) of group differences were also conducted. For multiple groups, *F*-tests were used to detect significant differences, and then tests of pairwise comparisons (with Bonferroni corrections for multiple comparisons) were used to identify the groups between which these differences existed.

To address research question 3 on how student use of flex-time differs by academic achievement level, three separate analyses were conducted. First, students were categorized as struggling, meeting grade expectations, or excelling separately in math and reading based on their 2017/18 assessment scores. Time log descriptive data were then separately disaggregated by reading achievement level and math achievement level Next, the assessment data for both subjects were used to categorize student achievement level across both subjects and to disaggregate the time log descriptive statistics by the following three groups: students struggling in both subjects, students excelling in both subjects, and all other students (for example, students excelling in one subject and meeting grade expectations or struggling in the other). This analysis was conducted to determine whether students who were generally struggling or excelling (in both subjects) used their flex-time differently than other students. For each of the three analyses (for reading, math, and cross-subject achievement), analyses of variance were conducted for each time log category to determine whether students' flex-time use differed significantly by achievement level. Post hoc analyses (pairwise comparisons) using Tukey corrections for multiple comparisons were conducted to determine which achievement groups (for example, struggling versus excelling students) had statistically significant group differences in flex-time use.

Appendix D. Supporting analyses

This appendix provides supporting analyses and detailed results for the findings presented in the main report, including the average percentage of time students spent on each activity and academic subject during their flex-time for all students in the sample and disaggregated by student demographic characteristics and academic achievement levels.

Flex-time spent on academic and nonacademic activities

Statistics were computed to describe the ways students spent their flex-time. Descriptive statistics are presented as percentages of total flex-time, student-determined academic-focused flex-time, and teacher-determined academic-focused flex-time (tables D1 and D2).

Table D1. Descriptive statistics for Legacy High School students' use of student-determined flex-time, 2018/19

	Percent of total flex-time		Percent of student-determined academic-focused flex-time	
Flex-time category	Mean	Standard deviation	Mean	Standard deviation
Student-determined	97.1	11.0	na	na
Academic	18.6	20.5	na	na
Activity				
Learning center	1.7	6.5	7.3	20.8
Outside of learning center	12.8	16.7	71.4	40.7
Meeting with teacher	0.5	2.0	3.3	13.7
Guidance/counseling	0.1	1.2	0.6	4.5
Practicing art/music	0.4	2.4	3.0	19.3
Extracurricular activities	0.5	2.6	2.6	12.8
Internship	> 0.0	0.3	0.2	3.0
Other academic activities	1.6	5.9	9.6	32.1
Subject				
Math	4.0	9.3	20.9	32.2
Science	3.3	8.2	17.9	29.2
English language arts	2.8	7.3	16.3	29.6
Social studies	2.2	7.3	11.3	25.6
Art/music	0.6	3.5	4.4	21.9
Foreign languages	0.5	2.1	4.2	15.6
Physical education	0.9	4.4	4.8	17.9
Other subjects	2.1	7.7	12.3	37.3
Nonacademic	78.0	22.9	na	na
On campus	44.3	34.5	na	na
Off campus	32.7	36.2	na	na

na is not applicable.

Note: *n* = 495 for total flex-time and 353 for student-determined academic-focused flex-time. Percentages do not sum to totals because of rounding and student reporting errors.

Source: Authors' analysis of 2018/19 school year data provided by Bismarck Public Schools.

Table D2. Descriptive statistics for Legacy High School students' use of teacher-determined flex-time, 2018/19

	Percent of total flex-time		Percent of teacher-determined academic-focused flex-time	
Flex-time category	Mean	Standard deviation	Mean	Standard deviation
Teacher-determined	2.8	10.7	na	na
Academic activity				
Learning center	1.0	5.3	41.8	47.9
Meeting with teacher	0.2	2.0	12.5	29.2
Other academic activities	1.2	7.8	27.9	42.4
Academic subject				
Math	0.5	2.8	24.0	39.0
Science	0.3	2.5	10.7	26.1
English language arts	0.2	1.9	6.3	21.6
Social studies	0.1	2.3	3.0	14.4
Art/music	0.1	0.8	6.2	22.3
Foreign languages	> 0.0	0.5	3.4	18.0
Physical education	0.1	1.0	3.2	15.1
Other subjects	0.5	6.2	10.5	29.3

na is not applicable.
Note: *n* = 495 students for total flex-time and 61 students for teacher-determined flex-time. Percentages do not sum to totals due to rounding and student reporting errors.
Source: Authors' analysis of 2018/19 school year data provided by Bismarck Public Schools.

Differences in students' use of flex-time by grade level

Results of analyses examining how flex-time use varied across grade levels are presented in table D3.

Table D3. Descriptive statistics for Legacy High School students' use of flex-time, by grade level, 2018/19 (percent of total flex-time, except where otherwise indicated)

	Statistical results			Grade 9 (*n* = 130)	Grade 10 (*n* = 156)	Grade 11 (*n* = 106)	Grade 12 (*n* = 103)
Flex-time category	Degrees of freedom	*F* value	*p* value	Mean (standard deviation)	Mean (standard deviation)	Mean (standard deviation)	Mean (standard deviation)
Minutes per day	494	37.88	.00	61.77 (25.18)[a,b,c]	75.31 (29.47)[a,e]	76.24 (42.94)[b,f]	108.67 (39.80)[c,d,f]
Student-determined	494	1.08	.36	96.4 (13.7)	97.6 (10.1)	96.0 (12.5)	98.3 (5.7)
Academic	494	1.73	.16	19.6 (19.1)	17.3 (20.3)	21.8 (24.1)	16.0 (18.1)
Nonacademic	494	2.94	.03	75.9 (23.2)	79.8 (22.2)	73.9 (26.5)[f]	82.1 (18.8)[f]
On campus	494	67.31	.00	74.1 (23.4)[a,b,c]	39.5 (31.8)[a,e]	34.3 (33.0)[b]	24.2 (27.1)[c,e]
Off campus	494	72.97	.00	1.2 (4.3)[a,b,c]	38.9 (34.1)[a,e]	38.3 (37.4)[b,f]	57.4 (34.2)[c,e,f]
Teacher-determined[g]	494	1.19	.31	3.5 (14.0)	2.0 (9.1)	4.0 (12.5)	2.0 (5.8)

Note: *n* = 495. Percentages do not sum to totals because of rounding and student reporting errors. Superscript letters a–f indicate statistically significant differences across columns within a row. Results were generated from post hoc analysis of variance tests that adjusted for multiple comparisons.

a. Between grades 9 and 10.
b. Between grades 9 and 11.
c. Between grades 9 and 12.
d. Between grades 10 and 11.
e. Between grades 10 and 12.
f. Between grades 11 and 12.
g. Teacher-determined flex-time activities and subjects are not included in the analyses because of inadequate sample sizes.

Source: Authors' analysis of 2018/19 school year data provided by Bismarck Public Schools.

Differences in students' use of flex-time by gender

Results of analyses examining how flex-time use varied by gender are presented in table D4.

Table D4. Descriptive statistics for Legacy High School students' use of flex-time, by gender, 2018/19

Flex-time category	Statistical results			Male students	Female students
	Degrees of freedom	*t* value	*p* value	Mean (standard deviation)	Mean (standard deviation)
Student-determined (percent of total flex-time)	493	–0.46	.65	96.9 (11.9)	97.3 (9.8)
Academic (percent of total flex-time)	472[a]	2.19	.03	16.8 (20.3)	20.8 (20.6)
Activity (percent of student-determined academic-focused flex-time)					
Learning center	351	–0.73	.47	8.1 (22.1)	6.5 (19.5)
Outside of learning center	351	0.40	.69	70.5 (41.8)	72.2 (49.7)
Meeting with teacher	254[a]	1.75	.08	2.0 (8.5)	4.5 (17.4)
Guidance/counseling	351	–0.92	.36	0.8 (5.9)	0.4 (2.5)
Practicing art/music	247[a]	1.07	.29	1.9 (11.5)	4.1 (24.8)
Extracurricular activities	351	0.41	.69	2.3 (10.7)	2.9 (14.7)
Internship	176[a]	–1.42	.16	0.5 (4.2)	0.0 (0.0)
Other academic activities	351	0.01	.99	9.6 (33.3)	9.6 (30.9)
Subject (percent of student-determined academic-focused flex-time)					
Math	339[a]	–1.95	.05	24.3 (35.0)	17.6 (29.0)
Science	351	1.70	.09	15.3 (27.8)	20.6 (30.4)
English language arts	351	0.74	.46	15.1 (29.9)	17.5 (29.2)
Social studies	327[a]	–1.88	.06	13.8 (28.8)	8.7 (21.7)
Art/music	268[a]	1.10	.27	3.1 (14.7)	5.7 (27.3)
Foreign languages	326[a]	1.29	.20	3.1 (13.3)	5.3 (17.6)
Physical education	351	–0.81	.42	5.7 (18.7)	4.0 (17.0)
Other subjects	351	0.35	.73	11.6 (45.1)	13.0 (27.5)
Nonacademic (percent of total flex-time)	493	1.93	.05	79.8 (23.2)	75.8 (22.5)
On campus	493	1.26	.21	46.1 (35.6)	42.1 (33.0)
Off campus	493	–0.06	.95	32.7 (36.5)	32.8 (36.0)
Teacher-determined (percent of total flex-time)	493	0.33	.74	2.9 (11.5)	2.6 (9.7)
Academic activity (percent of teacher-determined flex-time)					
Learning center	59	–1.00	.32	47.4 (49.5)	35.1 (45.9)
Meeting with teacher	59	–0.43	.67	14.0 (30.9)	10.7 (27.7)
Other academic activities	59	1.01	.32	22.8 (39.2)	33.9 (45.9)
Academic subject (percent of teacher-determined flex-time)					
Math	59	0.16	.88	23.2 (40.2)	24.8 (38.2)
Science	46[a]	–1.59	.12	15.3 (32.4)	5.4 (14.7)
English language arts	59	–0.88	.38	8.6 (24.3)	3.7 (18.0)
Social studies	28[a]	1.39	.18	0.4 (2.5)	6.0 (20.9)
Art/music	30[a]	1.55	.13	1.9 (7.5)	11.3 (31.5)
Foreign languages	59	0.18	.86	3.0 (17.4)	3.9 (18.9)
Physical education	59	–0.77	.44	4.6 (19.2)	1.5 (8.1)
Other subjects	59	–0.04	.97	10.6 (30.0)	10.3 (29.1)

Note: *n* = 495 for total and student-determined flex-time, 353 for student-determined academic-focused flex-time, and 61 for teacher-determined flex-time. Percentages do not sum to totals because of rounding and student reporting errors.

a. Results are based on analyses in which equal variances were not assumed.

Source: Authors' analysis of 2018/19 school year data provided by Bismarck Public Schools.

Difference in students' use of flex-time by race/ethnicity

Results of analyses examining how flex-time use varied by student race/ethnicity are presented in table D5.

Table D5. Descriptive statistics for Legacy High School students' use of flex-time, by race/ethnicity, 2018/19

	Statistical results			White	Non-White
Flex-time category	Degrees of freedom	*t* value	*p* value	Mean (standard deviation)	Mean (standard deviation)
Student-determined (percent of total flex-time)	493	5.72	.00	98.2 (7.1)	90.2 (22.7)
Academic (percent of total flex-time)	493	–0.55	.58	18.8 (20.8)	17.3 (18.3)
Activity (percent of student-determined academic-focused flex-time)					
Learning center	351	0.66	.51	7.0 (20.3)	9.1 (24.2)
Outside of learning center	351	0.22	.82	71.2 (39.9)	72.6 (45.9)
Meeting with teacher	351	–0.07	.95	3.3 (13.9)	3.1 (13.1)
Guidance/counseling	56[a]	0.79	.43	0.5 (4.2)	1.2 (5.9)
Practicing art/music	351	0.37	.71	3.0 (19.9)	4.0 (15.7)
Extracurricular activities	351	0.59	.55	2.4 (12.1)	3.6 (16.4)
Internship	351	–0.57	.57	0.3 (3.2)	0.0 (0.0)
Other academic activities	149[a]	–2.81	.01	10.7 (34.0)	2.7 (14.7)
Subject (percent of student-determined academic-focused flex-time)					
Math	72[a]	–1.79	.08	22.0 (32.8)	14.2 (28)
Science	351	1.33	.18	17.1 (28.8)	23.1 (31.3)
English language arts	76[a]	–1.28	.20	17.0 (30.4)	12.1 (23.6)
Social studies	351	0.11	.91	11.2 (25.5)	11.6 (26.7)
Art/music	351	–0.11	.92	4.5 (22.7)	4.1 (16.2)
Foreign languages	351	0.13	.90	4.9 (15.5)	4.5 (16.3)
Physical education	351	–0.15	.89	4.9 (18.3)	4.5 (15.3)
Other subjects	50[a]	1.15	.26	10.5 (25.6)	23.3 (77.0)
Nonacademic (percent of total flex-time)	493	–2.03	.04	78.8 (22.3)	72.8 (26.3)
On campus	96[a]	0.87	.39	43.8 (35.0)	47.4 (31.1)
Off campus	99[a]	–2.25	.03	34.0 (36.8)	24.6 (31.4)
Teacher-determined (percent of total flex-time)	69[a]	3.01	.00	1.6 (6.5)	10.0 (22.7)
Academic activity (percent of teacher-determined flex-time)					
Learning center	59	–0.67	.50	44.7 (48.8)	35.8 (46.6)
Meeting with teacher	59	0.31	.76	11.7 (28.1)	14.2 (32.1)
Other academic activities	47[a]	–0.84	.41	30.8 (45.4)	21.9 (35.8)

Flex-time category	Statistical results			White	Non-White
	Degrees of freedom	*t* value	*p* value	Mean (standard deviation)	Mean (standard deviation)
Academic subject (percent of teacher-determined flex-time)					
Math	59	–0.04	.97	24.1 (40.2)	23.7 (37.4)
Science	59	0.45	.65	9.7 (25.5)	12.9 (27.6)
English language arts	40[a]	–2.33	.03	9.4 (25.9)	0.0 (0.0)
Social studies	59	0.77	.45	2.0 (8.4)	5.0 (22.4)
Art/music	25[a]	0.94	.36	4.0 (16.7)	10.8 (30.7)
Foreign languages	40[a]	–1.49	.14	5.1 (21.8)	0.0 (0.0)
Physical education	40[a]	–1.64	.11	4.7 (18.3)	0.0 (0.0)
Other subjects	30[a]	0.98	.34	7.7 (26.4)	16.3 (34.7)

Note: *n* = 495 for total and student-determined flex-time, 353 for student-determined academic-focused flex-time, and 61 for teacher-determined flex-time. Percentages do not sum to totals because of rounding and student reporting errors.
a. Results are based on analyses in which equal variances were not assumed.
Source: Authors' analysis of 2018/19 school year data provided by Bismarck Public Schools.

Differences in students' use of flex-time by eligibility for the national school lunch program

Results of analyses examining how flex-time use varied by student eligibility for the national school lunch program, an indicator of socioeconomic disadvantage, are presented in table D6.

Table D6. Descriptive statistics for Legacy High School students' use of flex-time, by eligibility for national school lunch program, 2018/19

Flex-time category	Statistical results			Eligible	Noneligible
	Degrees of freedom	*t* value	*p* value	Mean (standard deviation)	Mean (standard deviation)
Student-determined (percent of total flex-time)	493	1.93	.05	94.9 (1.7)	97.5 (9.7)
Academic (percent of total flex-time)	493	0.46	.65	17.7 (19.1)	18.8 (20.8)
Activity (percent of student-determined academic-focused flex-time)					
Learning center	71[a]	–0.83	.41	9.8 (25.5)	6.8 (19.8)
Outside of learning center	351	–0.46	.64	73.6 (47.1)	70.9 (39.4)
Meeting with teacher	351	–0.31	.76	3.8 (15.2)	3.2 (13.4)
Guidance/counseling	351	–0.70	.48	1.0 (5.1)	0.5 (4.4)
Practicing art/music	351	0.82	.42	1.2 (5.2)	3.4 (21.0)
Extracurricular activities	351	0.24	.81	2.2 (9.4)	2.7 (13.4)
Internship	61[a]	–0.79	.43	0.7 (5.3)	0.1 (2.3)
Other academic activities	351	0.62	.54	7.2 (36.8)	10.1 (31.1)
Subject (percent of student-determined academic-focused flex-time)					
Math	351	0.64	.52	18.5 (31.9	21.4 (32.3)
Science	351	–0.87	.39	21.4 (30.2)	17.3 (29.0)
English language arts	351	0.58	.56	14.2 (28.7)	16.7 (29.7)
Social studies	351	–0.02	.99	11.3 (24.9)	11.3 (25.8)
Art/music	351	0.48	.63	3.2 (15.7)	4.7 (22.9)
Foreign languages	351	–0.66	.51	5.4 (19.6)	42.8 (34.4)
Physical education	351	0.32	.75	4.1 (14.2)	4.9 (18.5)
Other subject	60[a]	–0.98	.33	20.1 (71.4)	10.8 (25.8)
Nonacademic (percent of total flex-time)	493	0.42	.68	77.0 (24.5)	78.2 (22.6)
On campus	493	–2.23	.03	52.0 (34.0)	42.8 (34.4)
Off campus	127[a]	3.04	.00	22.4 (33.0)	34.7 (36.5)
Teacher-determined (percent of total flex-time)	94[a]	–1.28	.20	4.6 (15.3)	2.4 (9.5)
Academic activity (percent of teacher-determined flex-time)					
Learning center	59	0.58	.56	34.5 (48.5)	43.5 (48.1)
Meeting with teacher	59	–0.68	.50	17.7 (31.2)	11.2 (28.9)
Other academic activities	59	–0.22	.83	30.4 (41.2)	27.3 (43.1)
Academic subject (percent of teacher-determined flex-time)					
Math	59	0.17	.87	22.2 (35.1)	24.4 (40.2)
Science	59	–0.67	.51	15.3 (31.3)	9.6 (24.8)
English language arts	48[a]	2.31	.03	0.0 (0.0)	7.9 (23.9)
Social studies	11[a]	–0.97	.35	9.5 (28.8)	1.4 (7.5)
Art/music	59	–0.37	.72	8.3 (28.9)	5.7 (20.7)
Foreign languages	59	0.73	.47	0.0 (0.0)	4.3 (20.0)
Physical education	59	0.81	.42	0.0 (0.0)	3.9 (16.8)
Other subject	13[a]	–1.07	.30	20.8 (4.0)	7.9 (26.1)

Note: *n* = 495 for total and student-determined flex-time, 353 for student-determined academic-focused flex-time, and 61 for teacher-determined flex-time. Percentages do not sum to totals because of rounding and student reporting errors.

a. Results are based on analyses in which equal variances were not assumed.

Source: Authors' analysis of 2018/19 school year data provided by Bismarck Public Schools.

Differences in students' use of flex-time by academic achievement level

Results of analyses examining how flex-time use varied by student academic achievement level are presented in tables D7–D9.

Table D7. Descriptive statistics for Legacy High School students' use of flex-time, by academic achievement in math and reading, 2018/19

	Statistical results			Struggling in math and reading	Meeting grade expectations in math or reading, or both	Excelling in math and reading
Flex-time category	Degrees of freedom	*F* value	*p* value	Mean (standard deviation)	Mean (standard deviation)	Mean (standard deviation)
Student-determined (percent of total flex-time)	347	6.99	.00	91.0 (23.4)[a,b]	97.1 (10.2)[a]	99.8 (1.0)[b]
Academic (percent of total flex-time)	347	1.27	.28	14.6 (20.2)	19.9 (21.7)	17.1 (16.6)
Activity (percent of student-determined academic-focused flex-time)						
Learning center	245	1.82	.17	9.9 (20.6)	8.6 (23.1)	2.5 (9.9)
Outside of learning center	245	8.35	.00	46.7 (39.4)[a,b]	70.3 (43.4)[a,c]	88.6 (28.2)[b,c]
Meeting with teacher	245	2.18	.12	8.3 (26.4)	3.3 (14.5)	0.4 (2.5)
Guidance/counseling	245	0.25	.78	0.0 (0.0)	0.4 (2.5)	0.3 (2.0)
Practicing art/music	245	1.69	.19	1.2 (5.5)	3.7 (15.0)	0.0 (0.3)
Extracurricular activities	245	0.21	.81	1.1 (3.6)	2.3 (12.2)	1.5 (6.6)
Internship	245	2.03	.13	0.0 (0.0)	0.0 (0.0)	0.8 (5.7)
Other academic activities	245	5.26	.01	31.2 (69.3)[a,b]	7.0 (28.0)[a]	7.3 (23.1)[b]
Subject (percent of student-determined academic-focused flex-time)						
Math	245	0.40	.67	21.6 (34.4)	21.8 (33.7)	27 (32)
Science	245	1.15	.32	9.4 (16.9)	19.5 (31.3)	20 (27)
English language arts	245	2.56	.08	3.8 (14.6)	16.7 (29.9)	21.3 (31.9)
Social studies	245	2.21	.11	7.5 (22.9)	8.1 (21.2)	15.9 (30.2)
Art/music	245	1.19	.31	0.0 (0.0)	5.1 (18.9)	2.6 (9.8)
Foreign languages	245	0.02	.98	5.4 (21.9)	4.8 (17.2)	4.5 (9.1)
Physical education	245	0.71	.49	3.1 (12.5)	3.6 (15.6)	0.9 (6.0)
Other subject	245	0.77	.46	16.1 (32.4)	11.3 (44.5)	4.7 (16.9)
Nonacademic (percent of total flex-time)	347	1.98	.14	76.4 (28.7)	76.2 (24.0)	82.7 (16.6)
On campus	347	24.13	.00	40.1 (36.6)[a]	43.2 (33.9)[b]	73.8 (22.1)[a,b]
Off campus	347	13.50	.00	32.5 (39.3)[a]	32.1 (34.8)[b]	8.6 (20.2)[a,b]
Teacher-determined[d] (percent of total flex-time)	347	7.38	.00	8.9 (23.5)[a,b]	2.6 (9.6)[a]	0.2 (1.0)[b]

Note: *n* = 348 for total and student-determined flex-time and 246 for student-determined academic-focused flex-time. Percentages do not sum to totals because of rounding and student reporting errors. Superscript letters a–c indicate statistically significant differences across columns within a row.

a. Between students struggling in both math and reading and students meeting grade expectations in one or both topics.

b. Between students struggling in both math and reading and students excelling in both.

c. Between students meeting grade expectations in math, reading, or both and students excelling in both.

d. Teacher-determined flex-time activities and subjects were not included in the analyses because of inadequate sample sizes.

Source: Authors' analysis of 2017/18 and 2018/19 school year data provided by Bismarck Public Schools.

Table D8. Descriptive statistics for Legacy High School students' use of flex-time, by academic achievement in math, 2018/19

	Statistical results			Struggling in math	Meeting grade expectations in math	Excelling in math
Flex-time category	Degrees of freedom	*F* value	*p* value	Mean (standard deviation)	Mean (standard deviation)	Mean (standard deviation)
Student-determined (percent of total flex-time)	363	2.22	.11	95.7 (16.1)	96.1 (12.6)	98.8 (5.7)
Academic (percent of total flex-time)	363	0.64	.53	18.5 (20.8)	20.4 (23.2)	17.6 (17.4)
Activity (percent of student-determined academic-focused flex-time)						
Learning center	258	0.94	.39	10.1 (25.6)	5.6 (16.1)	7.3 (21.8)
Outside of learning center	258	2.63	.07	62.0 (41.6)	73.5 (44.3)	77.6 (36.2)
Meeting with teacher	258	0.24	.79	4.1 (17.9)	3.0 (13.9)	2.4 (11.7)
Guidance/counseling	258	0.40	.67	0.2 (1.7)	0.2 (1.5)	0.5 (3.8)
Practicing art/music	258	1.70	.18	1.3 (5.3)	4.3 (17.2)	1.4 (8.2)
Extracurricular activities	258	0.31	.73	1.6 (7.9)	2.3 (12.9)	3.2 (12.8)
Internship	258	0.94	.39	0.0 (0.0)	0.0 (0.0)	0.4 (4.2)
Other academic activities	258	0.53	.59	12.1 (43.8)	6.7 (30.3)	8.8 (25.7)
Subject (percent of student-determined academic-focused flex-time)						
Math	258	0.69	.50	18.7 (32.3)	24.1 (35.6)	25.1 (32.2)
Science	258	0.49	.61	15.3 (26.4)	19.4 (32.2)	20.0 (28.2)
English language arts	258	0.35	.70	14.3 (29.2)	14.9 (29.7)	17.9 (29.2)
Social studies	258	2.89	.06	5.5 (19.5)	8.9 (22.1)	14.8 (28.7)
Art/music	258	2.40	.09	1.2 (6.2)	6.4 (22.1)	2.8 (12.9)
Foreign languages	258	0.88	.42	3.2 (14.6)	4.2 (16.0)	6.7 (18.3)
Physical education	258	0.42	.67	2.7 (11.0)	2.2 (11.5)	4.0 (16.6)
Other subject	258	1.39	.25	14.4 (30.0)	11.8 (52.8)	4.6 (16.6)
Nonacademic (percent of total flex-time)	363	1.63	.20	77.0 (24.6)	75.2 (25.8)	80.3 (19.1)
On campus	363	18.23	.00	42.7 (33.4)[b]	42.1 (34.2)[c]	64.5 (30.9)[b,c]
Off campus	363	9.89	.00	32.0 (36.2)[b]	32.0 (35.1)[c]	15.5 (27.9)[b,c]
Teacher-determined[d] (percent of total flex-time)	363	2.28	.10	4.2 (16.1)	3.5 (11.9)	1.1 (5.4)

Note: *n* = 364 for total and student-determined flex-time and 259 for student-determined academic-focused flex-time. Percentages do not sum to totals because of rounding and student reporting errors. Superscript letters a–c indicate statistically significant differences across columns within a row.
a. Between students struggling in math and students meeting grade expectations in math.
b. Between students struggling in math and students excelling in math.
c. Between students meeting grade expectations in math and students exceeding grade expectations in math.
d. Teacher-determined flex-time activities and subjects were not included in analyses due to inadequate sample sizes.
Source: Authors' analysis of 2017/18 and 2018/19 school year data provided by Bismarck Public Schools.

Table D9. Descriptive statistics for Legacy High School students' use of flex-time, by academic achievement in reading, 2018/19

Flex-time category	Statistical results			Struggling in reading	Meeting grade expectations in reading	Excelling in reading
	Degrees of freedom	*F* value	*p* value	Mean (standard deviation)	Mean (standard deviation)	Mean (standard deviation)
Student-determined (percent of total flex-time)	348	3.05	.05	94.0 (17.7)	97.5 (9.6)	98.1 (9.0)
Academic (percent of total flex-time)	348	0.49	.61	16.7 (22.5)	19.0 (20.9)	20.0 (19.3)
Activity (percent of student-determined academic-focused flex-time)						
Learning center	246	0.92	.40	10.5 (22.3)	7.8 (23.5)	5.1 (14.6)
Outside of learning center	246	12.16	.00	52.3 (42.6)[b]	68.9 (41.0)[c]	89.0 (36.2)[b,c]
Meeting with teacher	246	1.79	.17	5.7 (19.6)	3.7 (16.3)	0.7 (2.9)
Guidance/counseling	246	0.77	.46	0.8 (5.1)	0.2 (1.5)	0.3 (2.1)
Practicing art/music	246	2.20	.11	1.4 (6.0)	4.3 (16.9)	0.6 (3.4)
Extracurricular activities	246	0.50	.61	2.4 (7.2)	2.5 (13.5)	1.0 (5.4)
Internship	246	1.19	.31	0.0 (0.0)	0.0 (0.0)	0.5 (4.7)
Other academic activities	246	5.77	.00	24.5 (55.4)[a,b]	6.4 (28.4)[a]	5.0 (19.2)[b]
Subject (percent of student-determined academic-focused flex-time)						
Math	246	0.21	.82	20.0 (34.6)	22.6 (34.1)	24.2 (31.6)
Science	246	1.48	.23	11.9 (22.7)	20.8 (32.8)	18.5 (26.1)
English language arts	246	3.53	.03	5.5 (19.6)[a]	19.1 (31.8)[a]	18.1 (30.0)
Social studies	246	5.17	.01	7.9 (19.2)	6.1 (18.5)[c]	16.8 (31.1)[c]
Art/music	246	0.29	.75	2.7 (17.1)	4.1 (16.3)	5.1 (17.0)
Foreign languages	246	0.07	.93	4.0 (17.1)	5.1 (17.4)	4.6 (13.8)
Physical education	246	1.17	.31	5.9 (18.6)	2.8 (14.7)	1.8 (8.2)
Other subject	246	0.23	.80	10.0 (26.0)	9.0 (23.2)	12.9 (62.9)
Nonacademic (percent of total flex-time)	348	0.03	.97	77.3 (26.5)	77.3 (23.6)	78.0 (20.6)
On campus	348	29.50	.00	42.0 (36.5)[b]	40.1 (33.4)[c]	70.2 (24.5)[b,c]
Off campus	348	27.03	.00	32.6 (38.5)[b]	36.4 (34.6)[c]	7.2 (18.1)[b,c]
Teacher-determined (percent of total flex-time)	348	3.69	.03	6.0 (17.7)[a,b]	1.6 (8.5)[a]	2.0 (8.0)[b]

Note: *n* = 349 for total and student-determined flex-time and 247 for student-determined academic-focused flex-time. Percentages do not sum to totals because of rounding and student reporting errors. Superscript letters a–c indicate statistically significant differences across columns within a row.
a. Between students struggling in reading and students meeting grade expectations in reading.
b. Between students struggling in reading and students excelling in reading.
c. Between students meeting grade expectations in reading and students exceeding grade expectations in reading.
d. Teacher-determined flex-time activities and topics were not included in analyses due to inadequate sample sizes. Percentages do not sum to totals because of rounding and student reporting errors.
Source: Authors' analysis of 2017/18 and 2018/19 school year data provided by Bismarck Public Schools

Appendix E. Legacy High School student time log

This appendix shows the complete range of questions contained in the student time log. Note that the time log incorporated significant skip logic (not included here). Whether students saw certain questions depended on their responses to previous questions.

Students' Use of Unscheduled Time

This survey asks about how you used your unscheduled time during the school day today. Classes are scheduled from 8:10am to 3:30pm. Please think about the time during this period when you had NO scheduled classes. This includes time you may have been off campus at the beginning or end of the school day.

1. What is your student ID number?

2. How many minutes of unscheduled time (also called flex-time) did you have today?

3. Who decided how you spent your {{ Q2 }} minutes of unscheduled time today?

- ○ I decided all of it
- ○ A teacher decided all of it
- ○ I decided some and a teacher decided some

I decided

4. How did you spend your {{ Q2 }} minutes of unscheduled time today?

- ○ Doing school-related activities (for example, learning center, classwork, counseling, art/music)
- ○ Doing non-school-related activities (for example, relaxing, lunch, at home, job, appointments)
- ○ Doing both school-related and non-school-related activities

I decided – School

5. During the {{ Q2 }} minutes you spent on school-related activities, how many minutes were spent...

In a Saber Center (Math/Science, English/Social Studies, Art, FACS, PE)

Working on classwork outside of a Saber Center (for example, homework or a group project)

Meeting with a teacher

In guidance/counseling

Practicing art/music

Participating in extracurricular activities (for example, club or sports)

At an internship

Other

6. If other, what did you do?

7. During the {{ Q2 }} minutes you spent on school-related activities, how many minutes did you focus on each of the following topics? (*If you did not focus on a specific topic during this time, enter zero for each topic.*)

Math	
Science	
English language arts	
Social studies	
Art/music	
Foreign languages	
Physical education	
Other	

8. If other, what was the topic?

I decided – Non School

9. Where did you spend your {{ Q2 }} minutes of unscheduled time today?

- ○ On campus
- ○ Off campus
- ○ Both on and off campus

I decided – Both On/Off Campus

10. During your {{ Q2 }} minutes of unscheduled time today, how many minutes were you **on** campus?

11. During your {{ Q2 }} minutes of unscheduled time today, how many minutes were you **off** campus?