



MEASURING AND EVALUATING THE ADEQUACY OF THE SCHOOL LUNCH PERIOD

A PUBLICATION FOR CHILD NUTRITION PROFESSIONALS FROM THE NATIONAL FOOD SERVICE MANAGEMENT INSTITUTE

OVERVIEW

The meals provided by foodservice operations participating in the National School Lunch Program (NSLP) serve as an important source of daily nutrients for many school children. Lunches planned by NSLP are intended to provide approximately one-third of the Recommended Dietary Allowances (RDA) for specific nutrients. In addition, the schools participating in the NSLP are now required to offer lunches that meet the Dietary Guidelines for Americans (DGAs). To realize the full benefits of the NSLP meal, however, children must consume it.

Recent government studies suggest that a portion of the food served in schools may be wasted because of inadequate time scheduled for lunch. Concerns about adequate eating time for school children also have been voiced by school foodservice personnel on MEALTALK, an electronic discussion group that focuses on school meal issues. An appropriate action to address these concerns is to conduct a time study.

RESEARCH

Time studies traditionally have been used to determine the length of time required for an employee to perform a specific job task. However, the method also can be used to determine the time required by a customer to receive service. An example of this type of time study was conducted by Nettles (1995) to determine the time required for children to move through the serving line in a school cafeteria. While this study provided initial data about the time required for waiting in the serving line, a comprehensive study was needed to address the concerns about the adequacy of the entire school lunch period. The National Food Service Management Institute (NFSMI), Division of Applied Research contracted with Texas Tech University to explore this issue. This publication of *INSIGHT* describes that time study, its findings, and how school foodservice directors can use the information to conduct their own studies.

OBJECTIVES

The purpose of this time study was to investigate the adequacy of the school lunch period. The specific objectives of the time study were to

- identify the average time required for elementary, middle/junior high, and high school students to consume a lunch meal.
- compare this eating time with other segments of the time scheduled for lunch in each school setting.

METHOD

HOW WAS THE TIME STUDY SET UP?

The first step in conducting this time study was to select and define the segments within the time scheduled for the lunch period and the time components for each segment. The three segments identified and defined were

- 1) *speed of service*, defined as the time required to serve the school lunch;
- 2) *time at table*, defined as the time available for eating in the cafeteria; and
- 3) *busing of dishes*, defined as the time required to carry dishes from the dining table to the disposal containers.

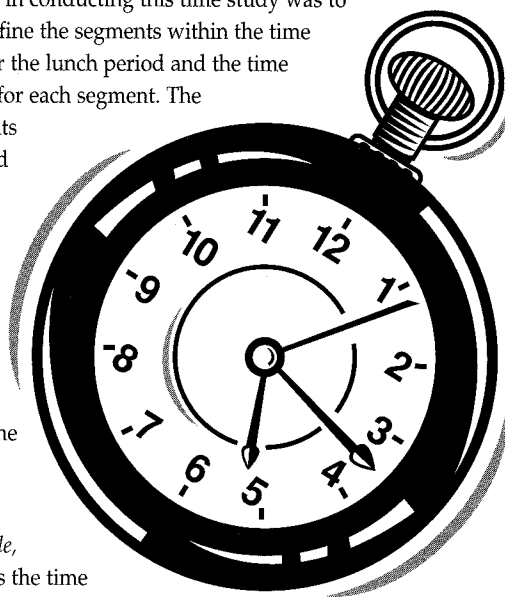
Speed of service was further divided into the time components for

- *waiting in service line*, defined as the time required to stand in line and receive lunch;
- *waiting in cashier line*, defined as the time required to stand in line for the cashier; and
- *travel time to eating area*, defined as the time required to walk from the cashier stand to the dining table.

Time at table was subdivided into the time components for

- *eating time*, which was the focus of the study and was defined as the time required to actually consume the meal; and
- *non-eating time*, defined as the time spent at the dining tables on activities other than eating.

Next, the methods for collecting data were developed, including a definition of the start and end of each of the components defined above. Sixteen research assistants were trained for the time study, and a pilot study was conducted to test the accuracy of data collection techniques.



HOW WERE DATA COLLECTED AND ANALYZED?

The Schools. Six schools, two elementary schools, two junior high schools, and two senior high schools, were included in the study. The school foodservice operations provided offer versus serve and electronic point-of-sales (POS) systems with keypads for entry of student identification numbers. Elementary schools served students on a staggered release of classes over a 2.5-hour period. Each class was allotted 30 minutes, and travel time was allowed as needed. The serving lines in both schools were straight line, where students were offered traditional menus. One elementary school served approximately 330 students per day, while the other served approximately 580 students per day.

Both junior high schools utilized three straight lines, serving a traditional menu on one, hamburgers on the second, and pizza on the third. Each junior high scheduled students to eat during three set meal periods. One junior high served approximately 800 students each day and allowed 30 minutes per meal period, with 10 minutes for travel time. The second junior high served approximately 700 students each day and allowed 28 minutes per meal period, with 5 minutes for travel time.

Differences in meal service were greater between the high schools than between the elementary schools or junior high schools. One senior high served approximately 350 students each day during two 30-minute set meal periods, with 10 minutes for travel time. There were three U-shaped serving lines serving a traditional menu on one line, hamburger on the second, and pizza on the third. The second senior high school served approximately 300 students during one 40-minute block meal period, with 15 minutes for travel time. There were three straight lines serving a traditional menu on one line, hamburger on the second, and pizza on the third.

All elementary schools (1-6 grade) and junior high schools (7-9 grade) were closed campuses for lunch. Senior high schools (10-12 grade) were open campuses for lunch. Measurements were taken daily during two nonconsecutive weeks at each of the six schools.

The Students. Students included in the time study were selected from students participating in the school lunch program. Students who were timed in the study were randomly selected from the beginning, middle, and end of the serving line. An attempt was made, based on individual school schedules, to include an equal number of observations for each grade level.

The Process. Three to four research assistants recorded the time when individual students reached the serving line and the time they were actually seated at the dining tables. Four to five research assistants recorded the total time at the table, actual eating time, and the time for busing of dishes by individual students. A stopwatch reading for each time component was recorded. Several readings for each time component were taken so that effects of extremely long or short readings could be averaged. Comments on unusual observations were entered in a section reserved for remarks on the data collection form.

No significant problems were encountered during the data collection phase of the study. However, there were factors influencing the time required to eat that were not necessarily included in the study design. An example was the common practice of some teachers "cutting in line." Notes of such instances were recorded on the data collection forms.

Data Entry and Analysis. After each data collection session, results from the time studies were entered into an electronic spreadsheet. Observation comments by the research assistants were recorded in a notebook. Information from the time studies was analyzed to determine average times for each speed of service time component, total time at the table, actual eating time, and busing of dishes. The observation comments were sorted and categorized.

FINDINGS

WHAT WAS THE AVERAGE SPEED OF SERVICE?

The average speed of service for all schools is reported in Table 1. Waiting in the service line required an average of 4 minutes, 15 seconds and accounted for the largest percentage of this segment of the lunch period. Waiting in the cashier line and travel time to the eating area both required less than 30 seconds. The average total time for the service segment was 4 minutes, 58 seconds.



AVERAGE SPEED OF SERVICE

(NUMBER OF OBSERVATIONS = 8682)

COMPONENTS	AVERAGE TIME
Waiting in service line	4 min. 15 sec.
Waiting in cashier line	21 sec.
Travel time to eating area	22 sec.
TOTAL TIME FOR SERVICE	4 min. 58 sec.

Table 1

Figure 1 indicates that a majority (69.1%) of the elementary school students spent 3 minutes or less in the serving line. Only 3.5% of these students spent more than 6 minutes in the serving line. However, for the junior high school division, only 18.6% of the students were served within 3 minutes. The majority of the junior high school students (52.9%) waited more than 6 minutes; almost 5% of these students waited in the serving line for 15 minutes or longer. In senior high schools, 41.0% of students were served in 3 minutes or less, but 29.5% of these students waited more than 6 minutes. Less than 1% of high school students waited 15 minutes or longer to be served. That the elementary school students spent the least time in the service line can be attributed to the staggered release to the cafeteria of individual classes with fewer than 30 students. In the case of junior high and senior high schools, at least 200 students were released simultaneously to the cafeteria during each lunch period.

Analysis of the comments recorded by the data collection team members revealed that students accounted for the majority of the additional factors that may affect the speed of service. Examples included students cutting in line, having difficulty making a selection or handling money, and talking to classmates in the serving line. Food service related issues included malfunctioning equipment, running out of food and serviceware, and leaving the serving line or cashier stand unattended. In addition, teachers cutting in line and parents attempting to prepay for their children also were identified as factors that affected the serving time. Regardless of the cause, long serving lines and delays encountered during service may result in the loss of participation of some students.



CASE STUDY • CONTINUED

DATA ANALYSIS

A team member will enter data from the recording forms daily, using a computerized spreadsheet. Averages for each of the three speeds of service components and busing of dishes will be calculated. Averages for eating time and non-eating time will be calculated by subtotaling eating time, then subtracting from the total time at the table to determine time spent on other non-eating activities. Final averages should be taken at the end of the 3-week menu cycle (15 days). Mrs. Smith developed recording forms and sample calculations to help team members collect data. Samples are provided below.

NOTE: If you are doing a study in a middle or high school, check mealtime schedules to determine when various grades are released for lunch. Then attempt to divide the total number of observations required between each grade in the school. This may be difficult in schools that release large numbers of students from more than one grade at the same time.

Speed of service: Sample of recorded data and calculations - Stopwatch (previously reset to 0) starts when the first student enters the cafeteria									
Subject	Wait in line		Time/time	Wait for cashier		Time/cashier	Travel to table		Time/travel
	Start	Stop	Seconds	Start	Stop	Seconds	Start	Stop	Seconds
Student A	0:00	0:40	40 seconds	0:40	0:55	15 seconds	0:55	1:15	20 seconds
Student B	0:40	1:45	65 seconds	1:45	2:05	20 seconds	2:05	2:30	25 seconds
Student C	1:15	2:10	55 seconds	2:10	2:25	15 seconds	2:25	2:38	13 seconds
Total time (Sum time)			160 seconds	50 seconds			58 seconds		
Ave. Time (Total ÷ # students)			53.3 sec.	16.6 sec.			19.3 sec.		

Eating time: Sample of recorded data and calculations for total eating time available (ET), non-eating activities, and time required to bus dishes.									
A	B	C	D	E	F	G	H	I	J
	SW#1				SW#2	SW#3	Calculations		
Subjects	Enter café	Seated table	Bus dishes	Leave café	Chewing	Chewing	ET	Non-eating	Busing dishes
A	0:00	5:48	27:05	27:38	4:10		21:17=1277 sec.	17:07=1027 sec.	0:33=33 sec.
B	0:00	11:00	27:45	27:45		6:05	16:05=965 sec.	10:00=600 sec.	0:40=40 sec.
Total time							2242 sec.	1627 sec.	73 sec.
Ave. Time							1121 sec.=18.68	813.5 sec.=13.56	36.5 sec.

Eating time available (ET) = column D - C
 Time on non-eating = column H - F for subject A and H - G for subject B
 Bus dishes = column E - D

ANALYSIS OF OTHER OBSERVATIONS

Comments and observations recorded by team members will be analyzed to identify additional factors influencing the time spent in each of the segments. Mrs. Smith is also interested in analyzing the amount of travel time to the cafeteria. She has defined this as the amount of time it takes a class to travel from the classroom to the cafeteria door. Mrs. Smith is concerned about those classes located at the opposite end of the building and whether or not they are allowed enough travel time. To factor this concern into her study, she assigned a team member to observe and

record the travel time of each class from their classroom door until they enter the cafeteria door.

GENERAL OBSERVATIONS

Preliminary observations by Mrs. Smith indicate that the present schedule of only 20 minutes for children to receive a meal, pass by the cashier for documentation of meal count, eat the school lunch, and return soiled dishes to the tray return is not enough time. She plans to use data from the study to discuss the problem with school officials.

FOR MORE INFORMATION

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TIME SPENT WAITING IN SERVICE LINE FOR ALL SCHOOL DIVISIONS

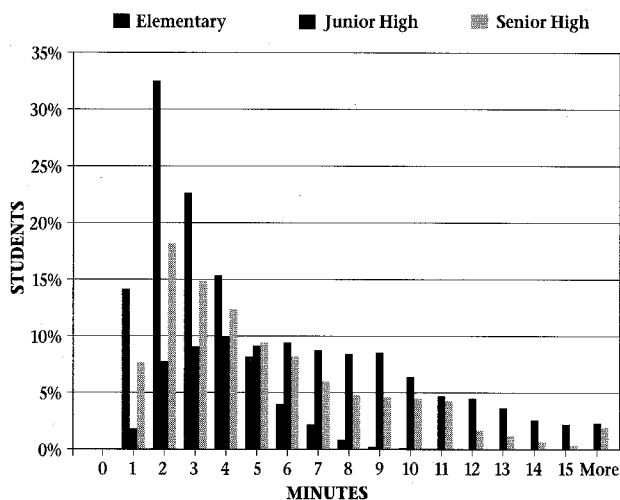


Figure 1

TIME SPENT FOR EATING FOR ALL SCHOOL DIVISIONS

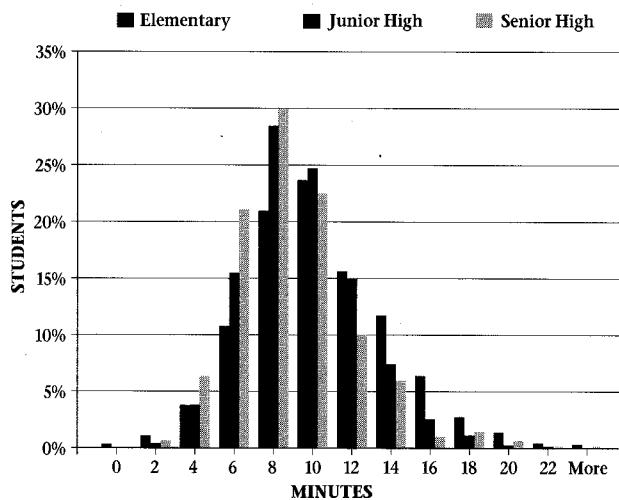


Figure 2

WHAT WAS THE AVERAGE TIME SPENT AT THE TABLE?

Table 2 provides information about the average time at the dining table and how much of the time was spent eating the school lunch. Students spent, on average, 8 minutes, 40 seconds actually eating their school lunch. More time was spent on non-eating activities (14 minutes, 27 seconds). Some students appeared to eat quickly so that they would have more time to socialize. The average total time at the table to eat was 23 minutes, 7 seconds.

AVERAGE TIME AVAILABLE TO EAT

(NUMBER OF OBSERVATIONS = 2924)

COMPONENTS.....	AVERAGE TIME
Eating time.....	8 min. 30 sec.
Non-eating time.....	14 min. 27 sec.
TOTAL TIME AT THE TABLE TO EAT	23 min. 7 sec.

Table 2

Figure 2 indicates that a majority of elementary school students (55.8%) spent between 6 and 10 minutes actually eating their school lunch. However, 39.2% needed more than 10 minutes to eat, with some students spending more than 20 minutes. This finding can be attributed, in part, to the observation that many of the younger elementary school students needed assistance with tasks related to

eating, such as opening their milk and applying condiments to menu items. The range for the majority of junior high school students (53.5%) to eat

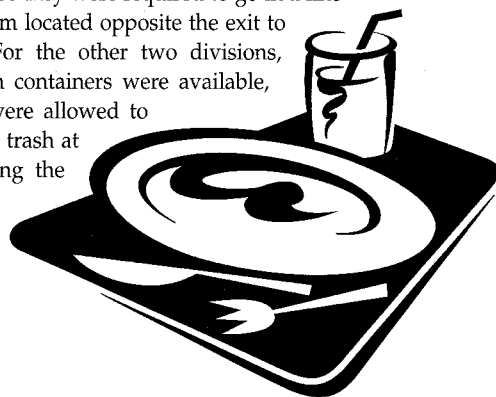
their school lunch was 8 to 10 minutes. Approximately 27.0% of these students needed more than 10 minutes for actual eating time. As illustrated by Figure 2, the majority of senior high school

students spent between 6 and 8 minutes for eating time, with only 19.6% requiring more than 10 minutes. Figure 2 illustrates that many elementary school students required more time than junior high and senior high school students to eat the school lunch.

Other factors affecting eating time were observed and recorded by the data collection team members. They included such actions as sharing food with classmates, leaving the cafeteria before the end of the lunch period, or washing the tables in preparation for the next lunch period.

WHAT WAS THE AVERAGE TIME FOR BUSING DISHES?

The average time for busing dishes for all schools was 27 seconds (Table 3). Further analysis indicated that elementary school children spent more time busing dishes than students in the other two divisions because they were required to go in a line to the trash room located opposite the exit to the cafeteria. For the other two divisions, numerous trash containers were available, and students were allowed to dispose of their trash at any point during the lunch period.



AVERAGE TIME FOR BUSING DISHES

(NUMBER OF OBSERVATIONS = 2777)

COMPONENTS.....	AVERAGE TIME
Busing dishes.....	27 sec.

Table 3

CASE STUDY • MAPLE STREET ELEMENTARY SCHOOL

Maple Street Elementary School, grades K-5, has an average of 600 students participating daily in the school lunch program. Students have approximately 20 minutes to eat lunch after they enter the cafeteria. Students are served on a staggered release schedule. Mrs. Smith, the school foodservice director, has received complaints from several teachers about the amount of time students are having to stand in line to receive their lunch. She has also received complaints from parents that students have too little time to eat after they are seated at the table. To answer their concerns, Mrs. Smith decided to design a study to measure the average time students are waiting for service and to determine how long students actually spend eating a lunch.

SAMPLE POPULATION

To ensure that students selected for the study will be as representative as possible of students eating in the school cafeteria, Mrs. Smith decided to use the guidelines listed below:

- Only students participating in the school lunch program will be studied.
- Students standing at the beginning, middle, and end of the serving lines will be randomly selected for measuring speed of service.
- Students observed at the dining tables for actual eating time will be randomly selected throughout the cafeteria area. Busing of dishes will also be random selections.
- An attempt will be made, based on the lunch schedule, to include an equal number of observations from each grade level.
- Measurements will be taken during a three-week menu cycle. (You may want to do a 2-week, 4- week, or other.)

SAMPLE SIZE

Approximately 5 percent of the total number of students participating in the school lunch will be observed. This is a good rule of thumb to follow for observation and will ensure a sample size that gives adequate results for making credible decisions. Maple Street Elementary has an average of 600 students that participate daily. Mrs. Smith calculates that 5%

of 600 students equals **30 students every day** for 15 days for a total of 450 student observations in each segment studied.

NOTE: In a very small school, you may want to observe more than 5% of participation, and, in a very large school, 5% might yield a larger number of observations than necessary for a valid study.

TIME STUDY SEGMENTS AND DEFINITION

Mrs. Smith determined the following definitions will apply to the segments she wants to observe for measurement:

- **Speed of service** - the time required for a student to receive lunch after he/she enters the cafeteria. The measurement will be taken in three components: (1) time in line: starts when the student enters the cafeteria and ends when all food items are picked up, (2) time at cashier: ends when student is leaving cashier stand, and (3) time required to walk from the cashier stand to the dining table and get seated.
- **Time at table** - the time available for students from the time they are seated at the dining table until they remove their trays to leave the cafeteria. The measurement will be taken in two components: (1) actual eating time (chewing and drinking), and (2) time spent socializing or other non-eating activities.
- **Busing of dishes** - the time required to carry dishes to the dish return and leave the cafeteria.

DATA COLLECTION

Mrs. Smith developed the following table to provide a guide for data collection. The first row suggests the number of team members needed for each segment. Some team members will be assigned to observe more than one segment. For example, team members observing time at the table will also observe students busing dishes. The second row is a guide for equipment needs. The third and fourth rows suggest the observations each data collection member should make and the calculations Mrs. Smith made to obtain the sample size. The last row provides the procedure for making observations and recording measurements. A sample recording form is provided under the data analysis section.

DATA COLLECTION PROCEDURE		
TIME SEGMENT	SERVING SPEED	TIME AT TABLE/BUSING DISHES
Team Members	1 member	6 team members
Equipment	clipboard • 1 stopwatch	clipboard • 3 stopwatches per team member
Observations	Total of 30 students. Spread over all grades. Select from front, middle and end of line.	Total of 30 students. Team members will observe 2 students at the same time in 2 or 3 classes, according to schedule and class overlaps. Alternate classes and spread over all grades.
Calculations for total number observations	1 team member x 30 students = 30 observations. 30 x 15 days = 450	3 team members x 2 students per class x 3 classes = 18 observations and 3 team members x 2 students per class x 2 classes = 12 observations 18 + 12 = 30 observations per day 30 x 15 days = 450
Procedure	When class enters cafeteria door, begin stopwatch. Observe students from the time they enter the door until they are seated at table. Record time spent in each of the 3 components of service. After last student is seated, reset the stopwatch to 0 and wait for next class.	Stopwatch (SW)#1-Start when class enters cafeteria. When subjects being observed are seated, record time from #1 (SW continues to run). When subjects get up to bus dishes, record second time from #1 (SW continues to run). When subjects leave the cafeteria, record 3rd setting from #1. Stop - reset all stopwatches. SW #2 & #3 will be used to time each subject's actual eating time. For each subject - start the SW when the child starts chewing or drinking. Stop when the child stops chewing or drinking. Team members do not take their sights from the children being observed during this time!



(Continued)

PRACTICAL USE OF THIS INFORMATION

WHAT HAS THIS RESEARCH DETERMINED ABOUT THE ADEQUACY OF TIME SCHEDULED FOR LUNCH?

While the specific findings of this study are limited to the six schools in which data were collected, the following conclusions provide insight regarding the original concerns expressed by school foodservice managers:

- The majority of school children observed at the six schools had enough time to eat their school lunch. However, some elementary school students required a much longer period to eat than was indicated by the average for elementary school students. In addition, the researchers observed extreme cases in junior and senior high schools where some students had less than 10 minutes to actually eat their lunches.
- The major factor that limited the time available to eat was the time spent for service, specifically, waiting in the serving line. This was particularly true in junior and senior high schools where some students spent in excess of 15 minutes in the serving line. Rather than spend a large portion of their lunch period in the serving line, it is likely that some junior and senior high school students purchased foods from vending machines or did not eat.
- A large portion of the time available to eat was spent on non-eating activities, primarily social interactions. However, school children need time for the social interactions that occur during the scheduled time for lunch.

HOW CAN THE SCHOOL FOODSERVICE OPERATION ADDRESS THE ISSUES RELATED TO THE TIME SCHEDULED FOR LUNCH TO IMPROVE CUSTOMER SATISFACTION?

In order to address the issues related to the time scheduled for the lunch period, school foodservice

policies should be reviewed and revised to maximize time for eating and allow for normal social interactions. Operational characteristics of the school foodservice programs also should be evaluated, particularly for their effect on the speed of service. Specific recommendations for school foodservice policy and operations include the following:

- The number of students released at one time to the cafeteria should be monitored, and, where possible, a staggered release should be used. The results of this study illustrate the positive effect of the staggered release on the speed of service, particularly waiting in the serving line.
- In order to assure that all children have adequate time for both eating and socializing, policies regarding appropriate student behavior should be implemented that allow for both of these activities to occur in a pleasant environment. If reasonable policies are implemented to encourage eating and general behavior in the cafeteria, ample time will be available for the students' social interactions.
- School foodservice operations that commonly use individually portioned and packaged menu items need to arrange for assistance, especially for the younger elementary school children.
- School foodservice managers, especially in junior and senior high schools, should evaluate service time components to identify factors that lengthen serving time. More efficient service techniques that result in students spending less time in the serving line need to be implemented.

These issues are particularly important if more students choose to eat the NSLP meal in response to innovative programs designed to increase participation. In addition, managers must implement ways to be more efficient within the time presently scheduled for lunch in view of the projection of an increased school population by the year 2006.

WHAT IF SCHOOL FOODSERVICE DIRECTORS WANTED TO CONDUCT A SIMILAR STUDY IN THEIR OWN DISTRICTS?

1. Once you have selected a school in which to conduct the study, observe the lunch period activities to identify the various segments you wish to include in the time study, for example, students' travel time from the classroom to the cafeteria door, the time standing in line waiting to be served, time for cashier to obtain meal count (include waiting with tray), travel time to find a table, actual eating time, time on non-eating activities and time to return soiled dishes.
2. Using the information in this *INSIGHT*, design your study. Start by defining the segments you wish to include in the time study and developing procedures for conducting the study. This will ensure consistency in your data collection. Develop a form for recording information during data collection sessions. Decide on the number of observations you want in each segment and how many students a data collection team member can observe in each segment. (See the Case Study included in this article.)
3. Get approval from your school administrators! Select your data collection team for conducting the study. Parents, teachers, and even high school students could be possibilities. Another idea is to partner with local colleges/universities to involve their students in data collection.
4. Purchase the needed stopwatches and train your team members. The data collection team will need to practice using stopwatches and recording information by making actual observations.
5. Do a pilot study. Analyze the results and prepare for the "real thing"!

Information about this and other topics may be obtained by contacting the
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