

DEVELOPMENT OF A STAFFING GUIDE FOR A COMBINED
A LA CARTE AND TYPE A FOOD SERVICE IN TWO SENIOR HIGH SCHOOLS

by

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Thesis submitted to the Graduate Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

in

Human Nutrition and Foods

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June 1972

Blacksburg, Virginia

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ACKNOWLEDGEMENTS

The author would like to express her appreciation to her major professor, Dr. Mary Quam, for her valued assistance and guidance during the work sampling study and in the preparation of this thesis. Dr. Quam, Dr. Ritchey and Dr. Phillips, and members of her committee, gave much encouragement and personal concern which was deeply appreciated.

A special thanks goes to the principals of Cave Spring High School and William Byrd High School for allowing the study to be conducted in their schools and to Arnold R. Burton, Superintendent of Roanoke County Schools for allowing the author to conduct the study while on the job as Food Services Supervisor of Roanoke County Schools.

Without the help of scholarships from the American School Food Service Association and the Virginia School Food Service Association, none of the graduate work could have been done.

Last but not least, my husband Jim deserves the greatest applause for being so patient and helpful to keep our household operating for four wonderful children, Jimmy, Sharon, Brenda, and Marilyn.

INTRODUCTION

As a result of increasing labor costs, shortage of trained food service employees, low productivity rates of present employees, high capital and overhead costs, low profit margins, high food costs, and customers demanding more for less money, the food service industry has been forced to evaluate its current quantity food production methods.

Since public school systems operate one of the largest food service establishments serving over 25,000,000 lunches daily, there is a need to explore new avenues to combat the problems that are common among all food service operations.

School food service are generally expected, by boards of education and school administrators, to operate a self-sustaining school lunch program. Prolonged losses, resulting from poorly managed school lunch operations, will not long be tolerated by a board of education.

Demands for low cost and free meals for the students, coupled with the rising food and labor costs with minimal government reimbursement have steadily increased over the past few years. Efficient productivity will be necessary for school lunch programs to remain financially stable.

There is need for better and more complete information concerning efficient production and labor staffing requirements for schools that serve items a la carte along with the Type A lunch.

STATEMENT OF THE PROBLEM

The problem of increasing food and labor costs and low productivity rates of food service personnel has made it necessary for the food services sector to evaluate labor needs more closely.

At the present time a general guide for labor staffing of Type A production is available from many states. However, there is no known labor staffing guides for the combined Type A and/or a la carte production system. The purpose of this study was to develop a preliminary labor staffing guide useful for a combined Type A and a la carte school lunch production system. The following objectives were established:

1. To establish menu patterns for a combined production of Type A and a la carte meal service.
2. To determine labor time and activities involved in the production of the above selected menu patterns.
3. To develop a guide for labor requirements as related to number served for a combined production of Type A and a la carte meal service.

In this study Type A is defined as a complete meal meeting regulations of the Department of Agriculture. A la carte is defined as a system in which a student makes his own selection from items offered on that particular line.

It is hoped that much of the information given will be useful to school systems for their food service operations.

REVIEW OF LITERATURE

Today's food service industry which includes public school food service operations is faced with the challenge of increasing the efficiency of its operation. It must use all its resources to improve quality of service and to increase its output per man-hour.

Changing Profile of School Food Service

The food service industry, the largest and most prominent sector of the services industries, is the fastest growing sector of the nation's economy in spite of its low productivity rate. (1) Statistics of the 1960's indicate that food service is the fourth largest industry in the country in terms of gross retail sales, and first in employees and sales. (2)

It is estimated that one out of four meals were eaten away-from-home in 1966 and this proportion would be increased to one out of three meals in 1969. (1) Additional potential markets cited are the students in colleges; civilians in factory and office jobs; armed services and school lunch programs. In 1963-64 over 16 million children benefited daily from a hot school lunch meal (3) while in 1970-1971, 25 million children participated in the program. (4)

Additional government control on wages have accelerated the situation of higher labor costs. In the Washington Report (5), it was reported that many food service employees are currently being paid

federal government minimum standards; whereas a few years ago this was not true. Between 1968 and 1972 the minimum wage increased from \$1.15 per hour to \$1.60 per hour. Higher rates are anticipated in the future. Social security and fringe benefit costs have risen steadily.

The universal school lunch bill No. H.R. 5291 introduced March 1, 1971 by Congressman Carl Perkins (6) would have a drastic effect on wages while benefiting the nutritional needs of all children. The mechanics of how labor costs could be stabilized across the nation if the bill is passed have not been considered to the fullest degree.

With the breakfast program well under way in most states, the newest group being fed by school lunch facilities are the elderly. This group, composed of persons 59 years of age or over, are fed either by going to the school or being served at home. A pilot project in Brookline, Massachusetts cited in the September, 1971 School Foodservice Journal (7) calls the elderly "the baby of school lunch."

Livingston (8) emphasized that one possible way to offset the forthcoming wage increases is worker productivity. The solutions to productivity may rest in systems analysis and expanded use of convenience foods according to an article in the November-December, 1971 issue of School Foodservice Journal. (9)

Menu Patterns

According to West (3) a menu pattern is the outline of food items to be included in each meal. The set menu with a single item in each course is a pattern that may be used in a school food service operation for the Type A lunch. A selective menu, or one with choices within each course, is used in order to better please the food likes and habits of the

clientele served.

Constant research is being done to determine the nutritional content of school lunches. Recent studies are reported in the April 1972 issue of the School Foodservice Journal (10) where a six-month study is being investigated with 12-16 year-old boys to determine whether acceptable, nutritious diets can be developed to change cholesterol levels. Findings on the impact of diet on cholesterol levels, in light of school feeding program requirements, will be reported. Recommendations will be made on child feeding program changes where health benefits can be established.

Officials of the American Health Foundations in New York have proposed to Congress extensive modifications in the "average American diet" to help reduce coronary heart disease. (11) The proposal would suggest changes in the national diet pattern by (1) adjusting total caloric intake to avoid obesity (2) decreasing total dietary fat to 35 percent of daily calories, and (3) changing the dietary fat from predominantly saturated to approximately iso-caloric amounts of saturated, mono-unsaturated and poly-unsaturated. A new Type A meal pattern will be studied in 1972 by a representative group across the nation.

Food habits vary from community to community. Therefore, it is necessary to try to adapt school food service operations to the changing times. A school lunch supervisor in New York explained how to accomplish a choice in menus in the November-December, 1971 issue of School Foodservice Journal. (12)

According to U. S. Department of Agriculture (13) a nutritional pattern for the Type A school lunch menu is planned to provide approximately one-third of the daily dietary allowances recommended by the

National Research Council for children 10 to 12 years of age. This pattern includes 2 ounces edible portion of lean meat, poultry, or fish or 2 ounces of cheese, or 1 egg, or 1/2 cup of cooked dry beans or peas, or 4 table-spoons of peanut butter or an equivalent quantity of any combination of the above listed foods; 3/4 cup serving of two or more vegetables or fruits, or both; 1 serving of whole-grain or enriched bread; 1 teaspoon of butter or fortified margarine; and 1/2 pint of fluid whole milk.

Determining Labor Time

Work sampling is a technique used for obtaining reliable measurement information on activities and operations at random. (14) From these data, projections for required preparation time may be calculated on the basis of the random observations.

Barnes stated that work sampling is faster and less expensive than time studies while producing similar results.(14) The stopwatch time study was mentioned as the most commonly used method of measuring work in industry today.

The definition of work elements is the first step in the process of developing a work sampling study. (15) Both work activities and non-work activities should be included in the work sampling observations.

Hansen (15) listed the following steps for planning a sampling study:

1. define the objectives of the study
2. set time periods for the study
3. break down and define work and delay elements
4. make a preliminary estimate of the element percentage
5. determine the number of observations needed for reliability
6. establish observation intervals and snap reading times
7. design the observation record

In figuring labor costs Gravey (16) stated that the use of a random sampling technique is a realistic approach for determining productivity. He cited the Princeton Efficiency Foods Study, where the random sampling technique consisted of making quick observations of an activity such as food preparation or serving, and accurately recording these observations.

Freshwater (17) used the work sampling approach for determination of a productivity index for a commercial cafeteria. The number of productive man-hours required to serve 100 customers was ascertained by the use of the work sampling technique. Work percentages were determined by taking observations of various tasks at random times of each activity performed in every department of the cafeteria. Bakeshop activities were divided into bake, travel, clean station, miscellaneous work, and non-productive activities. Percentages of time spent was obtained for each activity as determined by the random observations.

The process chart-man analysis can be used in conjunction with the work sampling technique. It provides a means of separating the different types of activity or steps that a person performs in some operation. (18) Mundel described this analysis as a graphic means of portraying separable steps that a person performs when doing a task that requires him to move from place to place. It is an analysis of what a person does, not of the steps performed in sequence on a product or a material. After classifying the steps or activities into a suitable classification for recording data and determining a suitable number of randomized observational times, observations are taken using tally marks to record the steps or elements being performed at each observation time. (18)

Heuther (19), in an unpublished master's thesis, used a modified process chart-man analysis in conjunction with the work sampling technique to identify the activities of employees, and to obtain and record the amount of time spent by each employee in different preparation processes. At two-minute observations, tally marks were placed under the appropriate work processes as performed by the employees according to the defined elements of work.

Timings of observations can be done with a stopwatch and the readings recorded. The three most common methods of reading stopwatches (20) are continuous timing, repetitive timing, and accumulative timing. In the first method, continuous timing, the stopwatch runs from the beginning to the end of the data collection period and a time is recorded at the completion of each element. With repetitive time, the hands of the watch are snapped back to zero at the end of each element. Accumulative time, the third technique, permits direct reading of the time for each element by the use of two stopwatches. After the time study has been taken, a representative time is determined for each element. Two methods of determining representative times are proposed by Barnes (20). The arithmetic average of stopwatch readings is the most common method of handling data and is gaining favor among time study analysts. The Modal Method is also widely used and consists of taking the time that recurs most frequently for that element.

Quam (21) identified and classified commonly performed quantity food production processes into the functions of purchasing, receiving, storing, transporting, preliminary preparation, preparation, portioning, arranging for merchandising, and clean-up. The functions were further

divided into standardized work elements or basic preparation activities common to all food preparation activities. The Training and Reference Manual for Job Analysis (22) written by the Bureau of Employment Security, defined the term element as the "smallest step into which it is practicable to subdivide any work activity without analyzing separate motions, movements, or mental processes involved." It is the work unit that describes in detail, the methods; procedures; and techniques involved in a portion of a job. According to the manual's classification (22), these work elements constitute the logical and necessary steps in work performed by the worker and make up the distinct major activities, or "tasks," or "duties" of the worker.

The conclusion according to Quam's study (21) was that the work elements in quantity food production developed through observation can be utilized to develop time study data on an actual food service. The use of the time study technique can be applied in a food service operation to determine labor time used in the production of menu items prepared by different preparation methods.

Biederman et al (23), found in a study of six Type A lunch operations in Ohio that the average output per operation ranged from 9 to 13 meals per man-hour. The work sampling technique was used to obtain these data. In the study, 16 different and clearly distinguishable tasks were defined. It was found that when the labor time of all people contributing to the production of the meals was included, an average of 5.46 man-minutes was needed to prepare and serve a meal for one person. This is equivalent to an average of approximately 11 meals per man-hour.

In the Ohio study, the results show that 7.3 percent of total

labor time was spent in getting ready for meal preparation. While preparation and cooking of food was 25 percent of labor time, service of food accounted for 23 percent of the total labor time. Cleanup activities utilized 29.6 percent and incidental activities were 13.5 percent of total time. In every operation, whether it be a production line or office work, there are some unavoidable delays. The study showed 4.5 percent of total labor time in delays which is significantly lower than can be expected in the average production situation.

According to Biederman (23) the labor time expended for different tasks in school kitchens is affected by layout of facilities and availability of equipment. Results obtained did not give a clear indication that availability of floor space alone makes utilization of labor more efficient. Some types of work in school kitchens appears flexible in its timing. While Biederman's study (23) revealed 65 to 75 percent of total labor time was spent in productive work activities only 5 to 10 percent of this total time was "equipment-controlled" work. Equipment-controlled work refers to a situation in which the presence of a worker to operate a piece of equipment is mandatory. Consequently, the speed of work is governed by the machine such as the feeding of a food cutter in operation.

It was concluded that with the projected continued growth of school lunch operations, results from labor studies can aid management in the improvement of employee efficiency and a reduction in the effort required to prepare and serve Type A lunches.

In the March 1971 issue of "Type A Topics" (13) six basic steps were given for use in determining the size of the staff needed in Type A operations. They are as follows:

1. list the work to be done
2. describe the qualifications of personnel required to do the work
3. determine jobs to be performed by each employee
4. break down the individual jobs into specific tasks
5. determine the time required to perform each task
6. determine the total time required to perform all types of work

One of the major responsibilities of any school lunch manager is to determine the amount of help needed to operate the program. This includes both the number of workers and the number of man-hours to be scheduled. Many states have some method of determining staff needs for the production and service of a certain number of Type A lunches. These references include guides only for Type A and do not include a guide for combined Type A and a la carte food service systems.

METHODOLOGY

The methodology used was designed to fulfill the objectives as established:

1. to establish menu patterns for a combined production of Type A and a la carte meal service
2. to determine labor time and activities involved in production of the above selected menu patterns
3. to develop a guide for labor requirements as related to number served for a combined production of Type A and a la carte meal service system.

Situation

Data were collected in two senior high schools in Roanoke County which have a combined production system of Type A and a la carte serving lines. Both were chosen because they have similar enrollments and serve approximately the same percent of Type A and a la carte meals. Their choices of menu items, along with kitchen layout and equipment, are similar as shown in Appendix (A) and Appendix (B).

The personnel in both schools received an explanation of the purpose of the study and the techniques to be used in collecting the data. Reassurance was given to the employees that the study would have no effect on their job security and that their cooperation would be appreciated. Employees were instructed to organize and to proceed with their work as normally as possible so that the study would be accurate.

Menu Patterns

A menu pattern as defined by West (3) is the outline of food items to be included in each meal. Type A lunch is defined as a lunch that meets one-third of the child's daily nutritional requirements as set up by the Department of Agriculture. A la carte gives the student a choice in each item of the pattern.

Identical five-day menu patterns and actual menus were used in both schools to represent the production required in a combined Type A and a la carte system as shown in Appendix (C). Menus were developed in cooperation with both managers according to patterns, requirements, likes and dislikes of each school, availability of certain foods, equipment limitations, and present staffing. The number of servings prepared was determined by the manager's past records for that particular menu and school.

Data were collected over a two month period with each school serving the planned five-day sequence of menus.

Determination of Labor Time

Work processes used in this study were identified and defined as step by step procedures used in the preparation of many types of menu items. Work elements were identified and defined as the smallest step into which it is practicable to subdivide any work process food production activity. The work processes and work elements used in this study are shown in Appendix (D).

To determine the percentage of labor time spent in performing work processes in preparation and service of each menu pattern in each school a modified work sampling technique was used. The activities of each employee

were observed and recorded at two-minute intervals with the use of a stop-watch using the snap-back method. A labor requirement-menu pattern chart was developed for recording the data. (Appendix E)

Both productive and non-productive activities were observed and recorded. Productive time was defined as that labor which is directly related to the preparation and service of the menu pattern. These activities included the work processes of preliminary preparation, preparation, portioning, displaying, serving, dishwashing, and cleanup. Non-productive time, as related to the preparation and service of a menu pattern, was defined as the work directly related to office activities as well as personal and other activities. The chart included data concerning:

1. individual menu items representing the particular menu pattern
2. number of portions per menu item prepared from the estimate
3. work processes involved
4. replication number and date recordings were made
5. number served on the Type A and a la carte serving line.

A pilot study was conducted in both schools to verify procedures. Data, from the beginning of the production period through the service and cleanup of the day's production, were collected. From the pilot study, it was determined that the classification of work processes and elements was not complete for a school situation. Adjustments were made to include additional processes and elements needed for the study. The modified work sampling technique was found to be feasible along with the labor requirement-menu pattern charts developed for data collection.

In tabulating the data, the total number of man-minutes spent in

each work process for all menu items was obtained by summing the total man-minutes of the two replications. From these data a mean rating for each work process was obtained.

An average man-minute labor time was calculated to determine the total productive and non-productive time required to produce and serve each menu pattern. In addition, the percent of total labor time spent in each work process was calculated.

To check the reliability of the labor time data collected between the two replications in each school, a Pearson product-moment correlation coefficient was used. It was decided that additional replications would be necessary if a $r=.80$ was not achieved.

Guide for Labor Requirements

From the work sampling data collected from the two schools, an index of productivity was determined. Man-minutes recorded for each work process were used to determine the total labor time required to produce each combined Type A and a la carte menu pattern for each school.

The total labor time was further categorized by productive and non-productive time spent in producing the Type A, the a la carte, and the combined menu patterns for each school. The total number of customers served at each school was recorded. From these data, the labor times and the number served, the index of productivity was determined.

The index of productivity was based upon the productive labor time required per 100 customers served to produce the combined Type A and a la carte menu pattern for each school. It was based upon 100 customers rather than total labor time to produce the total menu pattern in order to compare

the data between the two schools serving an unequal number of meals. The index was calculated by dividing the average productive labor man-minutes recorded in a school by the average total man-minutes to obtain the percent of productive time spent in the production of each menu pattern.

The productivity index between each school was compared for each combined Type A and a la carte menu pattern. The percentage difference between the two schools was noted. It was determined that this difference should be within .05 of each other if the data was to be assumed reliable for use as a projection to determine labor requirements for the combined Type A and a la carte menu patterns used in a school food service operation.

The actual guide for each school was calculated in terms of labor man-minutes required to produce a combined Type A and a la carte menu pattern per 100 customers. The guide was based upon the assumption that productive labor time should attain a minimum level of 80 percent of the total labor time expended. A comparison was made of the original actual labor time required to produce each menu pattern between each school. Finally, an average of all five menu patterns was projected for each school in order to project a feasible guide which could be used to establish actual labor requirements in either school.

RESULTS AND DISCUSSION

In order to develop a guide for labor requirements, as related to number served for a combined production of Type A and a la carte meal service system, the results will be discussed in accordance with the stated objectives.

Menu Patterns

In fulfilling the first objective of this study, five menu patterns and actual menus were established for use in both schools. As indicated in Table 1, the choice of actual menu items listed under the Type A menu pattern appears to influence the number of students selecting a Type A meal instead of selecting from the a la carte menu. In the second school more students consistently chose Type A meals in preference to a la carte selections while in the first school, for the fourth and fifth menus, more students chose to select from the a la carte menus. The percentage of students selecting a la carte menus in School 1 ranged from approximately 33 percent to 55 percent. In the second school the percentage of students selecting an a la carte menu was less than School 1 ranging from approximately 37 percent to over 48 percent. However, in both schools, more students tended to select Type A meals in preference to a la carte selections.

This pattern of selection could have some influence over the labor required to produce the total menu. It was assumed that, in this study, the same student selection pattern would be maintained and therefore the development of a labor guide would still be feasible.

Table 1

Average meal count and percentage by type of
menu pattern for two schools .

		School 1 (William Byrd)		School 2 (Cave Spring)		% difference of number served between schools
		Actual meal count	% of total served	Actual meal count	% of total served	
Menu 1	Type A	519	67.3	494	58.0	4.8
	A la Carte	252	32.7	358	42.0	29.6
Menu 2	Type A	410	57.2	484	57.9	15.3
	A la Carte	307	42.8	352	42.1	12.8
Menu 3	Type A	400	59.6	373	51.6	6.8
	A la Carte	271	40.4	350	48.4	22.6
Menu 4	Type A	353	49.7	521	63.1	32.3
	A la Carte	358	50.4	305	36.9	14.8
Menu 5	Type A	297	45.2	398	50.6	25.4
	A la Carte	360	54.8	389	49.4	7.3

Determination of Labor Time

Work processes and work elements were defined as the first step in the determination of labor time requirements. The labor time in man-minutes and the percentage of time spent in each work process was calculated as shown in Table 2 and 3 respectively. Both schools spent more time in cleanup, preparation, and serving respectively than in any of the other productive work processes. The preparation, serving, and cleanup work processes represented over 50 percent of the total time spent in production of the combined menu patterns. Less than 5 percent of the total labor time was spent in activities related to portioning and displaying of merchandise. Time spent in dishwashing ranged from 8 to 10 percent of the total labor time.

The percentage of productive labor time as compared to non-productive time between the two schools averaged 62 to 72 percent respectively. If this percent of productive time could be increased, better utilization of employees could result.

A Guide for Labor Requirements

The total labor time, productive and non-productive, was recorded by menu type for each school. Labor time was separated into Type A and a la carte categories with some activities being prorated by the number of customers served. It was necessary to prorate time for activities such as management, dishwashing, cleanup, personal, and other because of the difficulty in assigning time spent in these activities to a particular menu item. For example, it was difficult to define accurately how much cleanup time was spent on one menu item since the employees prepared

Table 2

Total labor time by work process and menu patterns in two schools (man-minutes)

Work processes	Menu patterns and schools										Total average labor time for 5 menu patterns	% for both schools
	#1		#2		#3		#4		#5			
	Sch. 1	Sch. 2	Sch. 1	Sch. 2	Sch. 1	Sch. 2	Sch. 1	Sch. 2	Sch. 1	Sch. 2		
Productive:												
Preliminary Preparation	180	483	226	445	184	446	281	394	176	339	315.4	10.0
Preparation	439	583	412	518	437	384	314	550	330	535	450.3	15.0
Portioning	87	111	93	112	61	104	30	59	36	63	75.6	3.0
Displaying	34	75	53	101	74	85	67	75	50	78	69.2	2.0
Serving	327	491	411	423	503	434	420	478	458	410	435.5	14.0
Dishwashing	245	325	325	271	416	283	365	325	255	334	314.4	7.0
Cleanup	523	960	607	842	623	651	565	869	529	783	695.2	7.0
Total	1835	3028	2127	2713	2298	2387	2042	2750	1834	2542	2355.6	
Non-Productive:												
Cashing	225	197	215	170	230	196	230	175	230	173	204.1	10.0
Management	163	179	212	186	138	213	143	294	207	257	199.2	22.0
Personal	200	403	170	506	240	596	261	675	181	700	393.2	12.0
Other	55	115	10	73	7	75	13	103	11	46	50.8	2.0
Total	643	894	607	935	615	1080	647	1247	629	1176	847.3	
Total combined time	2478	3922	2734	3648	2913	3467	2689	3997	2463	3718	3202.9	
Percent productive time	.74	.77	.78	.74	.79	.69	.76	.69	.75	.68	73.9	

Table 3

Percentage of labor time spent in each work process in two schools

Work Process	School 1						School 2						Avg. of both schools
	Menu 1	Menu 2	Menu 3	Menu 4	Menu 5	Avg.	Menu 1	Menu 2	Menu 3	Menu 4	Menu 5	Avg.	
Prelim. Prep.	7	8	6	10	7	8	12	12	13	10	9	11	10
Prep.	18	15	15	12	13	15	15	14	11	14	14	14	15
Portioning	14	3	2	1	2	2	3	3	3	2	2	3	3
Displaying	1	2	3	3	2	2	2	3	3	2	2	2	2
Serving	13	15	17	16	19	16	13	12	13	12	11	12	14
Cashing	9	8	8	8	9	8	5	5	6	4	5	5	7
Management	7	8	5	5	8	7	5	5	6	7	7	6	7
Dishwashing	10	12	14	14	10	12	8	7	8	8	9	8	10
Cleanup	21	22	21	21	22	21	25	23	19	22	21	22	22
Personal	8	6	8	10	7	8	10	14	17	17	19	15	12
Other	2	1	1	1	1	1	3	2	2	3	1	2	2
Totals in percent	100	100	100	101*	100	100	101*	100	101*	101*	100	100	104*

*Total percentage is not equal to 100.00% due to rounding errors.

several items, but cleaned up several soiled utensils at one time. The prorated time was obtained by dividing the total time spent in each work process by the number students served.

Table 4 shows the man-minutes per 100 customers spent in Type A, a la carte, and combined service for each menu pattern and each school. In all menu patterns more labor time was required to produce the Type A menu than the a la carte menu items. Two reasons for this additional time required for Type A menus is the fact that, first, both schools use many pre-prepared items on the a la carte line whereas the items on the Type A line are produced completely in the kitchen, and second, more servings of each item listed in the Type A menus were prepared.

Using the average number served, the productive labor time, and the total labor time required to produce each menu pattern in each school, a productivity index was calculated. Table 5 shows the productivity index per 100 customers for the two schools. The productivity index for School 1 ranged from .74 to .79 indicating that from 74 to 79 percent of the labor time was productive time while the index for School 2 ranged from .68 to .77. The average productivity index was .76 and .71 for School 1 and School 2 respectively.

The man-minutes required by each work process to produce each menu pattern for 100 customers was calculated for each school. These man-minutes were further divided into productive and non-productive time expended to produce the menu patterns for 100 customers as shown in Table 6. The average total time required for all menu patterns per 100 customers for School 1 is 379.6 man-minutes as compared to 468 man-minutes for School 2. Productive time for School 1 averaged 289.6 man-minutes per

Table 4

Total productive and non-productive labor time per 100 customers
by menu type and menu pattern for the two schools

Menu Patterns	(Man-Minutes)					
	Type A		A la Carte		Total combined	
	School 1	School 2	School 1	School 2	School 1	School 2
Menu #1						
Productive	129.2	194.5	54.3	108.3	183.5	302.8
Non-Productive	43.1	52.2	21.2	37.2	64.3	89.4
Total time	172.3	246.7	75.5	145.5	247.8	392.2
Menu #2						
Productive	126.7	150.4	86.0	120.9	212.7	271.3
Non-Productive	34.7	54.2	26.0	39.3	60.7	93.5
Total time	161.4	204.6	112.0	160.2	273.4	364.8
Menu #3						
Productive	151.3	148.3	78.5	90.4	229.8	238.7
Non-Productive	36.6	55.4	24.9	52.6	61.5	108.0
Total time	187.9	203.7	103.4	143.0	291.3	346.7
Menu #4						
Productive	122.6	193.6	81.6	81.4	204.2	275.0
Non-Productive	31.2	79.1	33.5	45.6	64.7	124.7
Total time	153.8	272.7	115.1	127.0	268.9	399.7
Menu #5						
Productive	102.2	151.8	81.2	102.4	183.4	254.2
Non-Productive	28.7	59.4	34.2	58.2	62.9	117.6
Total time	130.9	211.2	115.4	160.6	246.3	371.8

Table 5

Productivity index per 100 customers by menu pattern for two schools

Menu Patterns	Average number served	(Man-Minutes)		Productivity index
		Total time	Productivity time	
Menu 1				
School 1	770	247.8	183.5	.74
School 2	852	392.2	302.8	.77
Menu 2				
School 1	722	273.4	212.7	.78
School 2	836	364.8	271.3	.74
Menu 3				
School 1	670	291.3	229.8	.79
School 2	723	346.7	238.7	.69
Menu 4				
School 1	711	268.9	204.2	.76
School 2	825	399.7	275.0	.69
Menu 5				
School 1	657	246.3	183.4	.75
School 2	787	371.8	254.2	.68
Average for the five menu patterns				
School 1	706	265.5	202.7	.76
School 2	805	375.0	268.4	.71

Table 6

Total labor time per 100 customers for combined Type A and A la Carte menus in two schools

Work Process Productive Avg. No. Served	Menu 1		Menu 2		Menu 3		Menu 4		Menu 5		Average for 5 menus	
	School 1	School 2	School 1	School 2	School 1	School 2	School 1	School 2	School 1	School 2	School 1	School 2
	770	852	722	836	670	723	711	825	657	787		
Prelim. Prep	24	56	32	54	28	62	40	48	26	44	30.0	52.8
Prep.	58	68	58	62	66	54	44	66	50	68	55.2	63.6
Portion	12	14	12	14	10	14	4	8	6	8	8.8	11.6
Display	4	8	8	12	10	12	10	10	8	10	8.0	10.4
Serving	42	58	58	50	76	60	60	58	70	52	61.2	55.6
Dishwashing	32	40	44	32	62	40	52	40	38	42	45.6	38.8
Cleanup	68	112	84	100	92	90	80	106	80	100	80.8	101.6
Total	240	356	296	324	344	332	290	336	278	331	289.6	335.8
Non-Productive												
Cashing	32	24	30	20	34	28	32	22	36	22	32.8	23.5
Management	22	22	30	22	20	30	20	36	32	32	24.8	28.4
Personal	26	48	20	60	36	82	36	82	28	88	29.2	72.0
Other	8	14	2	8	2	10	2	12	2	6	32.0	8.0
Total	88	108	82	110	92	150	90	152	98	148	90.0	133.6
Total Time	328	464	378	434	436	482	380	488	376	472	379.6	468.0

100 customers or 76 percent as compared to 335.8 productive man-minutes or 72 percent for School 2. The percentage of non-productive labor time per 100 customers for the two schools ranged from 24 to 29 percent.

From the above data, the actual productivity index for each school, and the average labor time required to produce each menu pattern to serve 100 customers, a labor requirement guide was developed as shown in Table 7. The guide was calculated on the basis of an assumed productivity index of .80. It was assumed, by management, that an index of .80 was reasonable and feasible for these two schools.

The original actual labor time required to produce each menu pattern for 100 customers ranged from 396 man-minutes to 459 man-minutes for School 1 and School 2 respectively. Projecting the labor requirements to achieve a .80 productivity index indicated that the range of labor time needed to produce the same menu patterns would range from 377.8 man-minutes to 430 man-minutes for the two schools. Using the projected data, the combined Type A and a la carte menu patterns for School 1 would require an average of 366.4 man-minutes per 100 customers or a reduction of 9 percent in labor time, while School 2 would require an average of 429.2 man-minutes or a 10 percent reduction in labor time. This basic labor time guide could then be used to project schedules for individual employees.

Table 7

Actual and projected labor guide per 100 customers in two schools

MENU PATTERN	(Man-Minutes)					
	School 1		School 2		Average of two schools	
	Actual labor time (per 100 customers)	Projected .80 productivity index labor time	Actual labor time	Projected .80 productivity index labor time	Actual labor	.80 prod. index
1	328	308	464	450	396	379
2	378	370	434	418	406	394
3	436	432	482	429	459	430
4	380	365	488	434	434	400
5	376	357	472	415	424	386
Average time for 5 menu patterns	379.6	366.4	468	429.2	423.8	377.8

CONCLUSIONS

This study was based upon the assumption that a labor guide for actual employee requirements could be developed for school lunch operations serving both Type A and a la carte menus through use of work sampling data observations. The results of the study need to be substantiated by further investigations since the findings are based upon observations from only two situations.

The work processes and work elements in quantity food production developed through observation can be utilized to develop work sampling data in an actual food service. The use of the work sampling technique can be applied to determine labor time used in the production of menu patterns produced in different locations. The method employed to determine labor time requirements objectively needs to be tested further and probably be revised for greater usefulness in a variety of school lunch operations. The content of the work elements listed under each work process may need to be defined in greater detail.

Use of the general procedure for developing a labor requirement guide for combined Type A and a la carte menu patterns in a school lunch operation studied in this investigation is feasible. It could serve as an aid in evaluating current use of labor and in projecting better utilization of labor in a given situation.

Factors used as criteria in this general procedure, number served and direct productive and non-productive labor time, should not be used

alone in determining actual labor requirements. Ability of employees, equipment available and layout of the operation should be considered. Further investigations for developing techniques to project labor time standards in order to achieve a predetermined productivity index need to be made.

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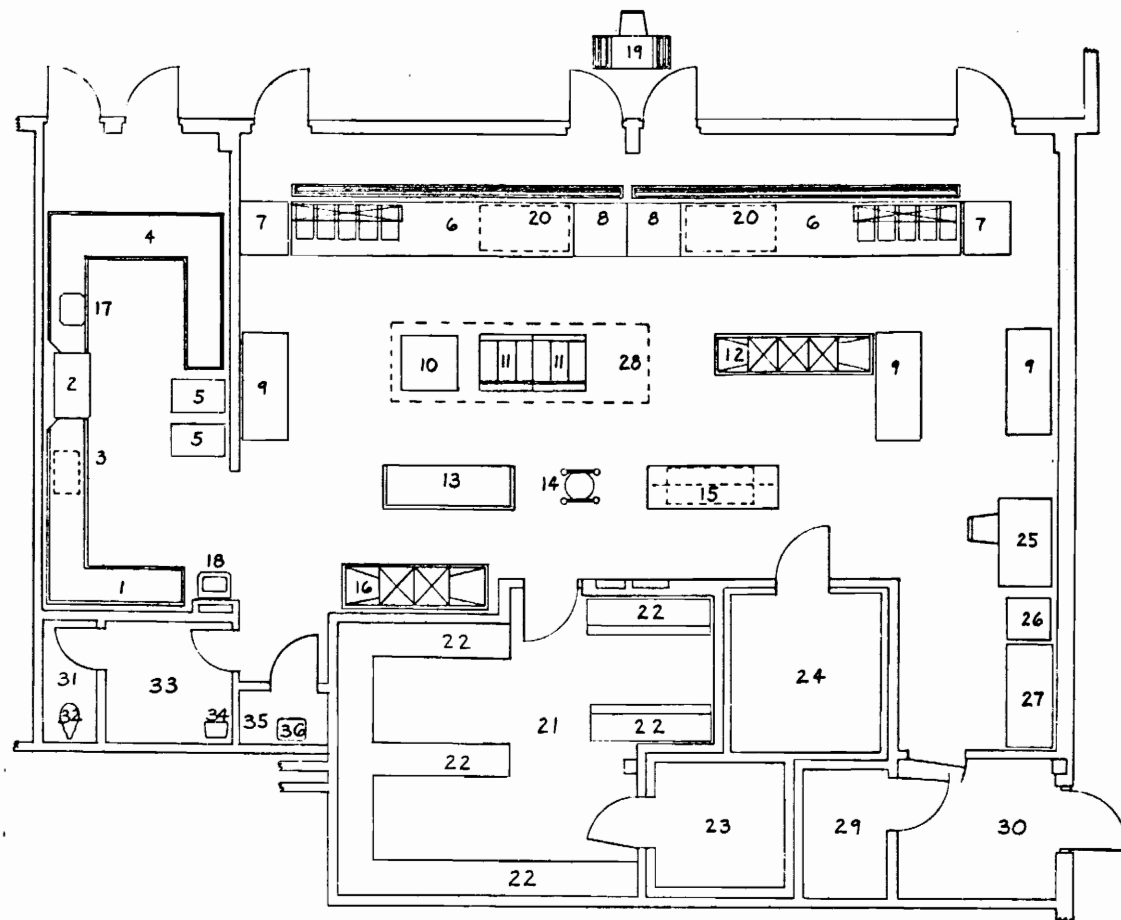
APPENDIX A

Key and Floor Plan
of
William Byrd High School

APPENDIX A

KEY AND FLOOR PLAN OF WILLIAM BYRD HIGH SCHOOL

- | | |
|---------------------|-----------------------------------|
| 1. DISH TABLE | 19. CASHIER COUNTER |
| 2. DISHWASHER | 20. DISPLAY SHELVES |
| 3. BOOSTER | 21. STORAGE |
| 4. DISH TABLE | 22. STORAGE SHELVES |
| 5. CARTS | 23. FREEZER |
| 6. SERVING COUNTERS | 24. REFRIGERATOR |
| 7. TRAY AND SILVER | 25. DESK |
| 8. MILK | 26. FILE |
| 9. WORK TABLES | 27. TABLE |
| 10. OVEN | 28. RANGE HOOD |
| 11. RANGES | 29. COMPRESSOR ROOM |
| 12. VEGETABLE SINK | 30. GARBAGE CAN STORAGE AND FOYER |
| 13. BAKERS TABLE | 31. TOILET |
| 14. MIXER | 32. WATER CLOSET |
| 15. COOKS TABLE | 33. LOCKER ROOM |
| 16. POT SINK | 34. LAVATORY |
| 17. DISPOSER | 35. JANITORS CLOSET |
| 18. LAVATORY | 36. SLOP SINK |



WILLIAM BYRD HIGH SCHOOL KITCHEN
 $\frac{1}{4}'' = 1'-0''$

APPENDIX B

KEY AND FLOOR PLAN

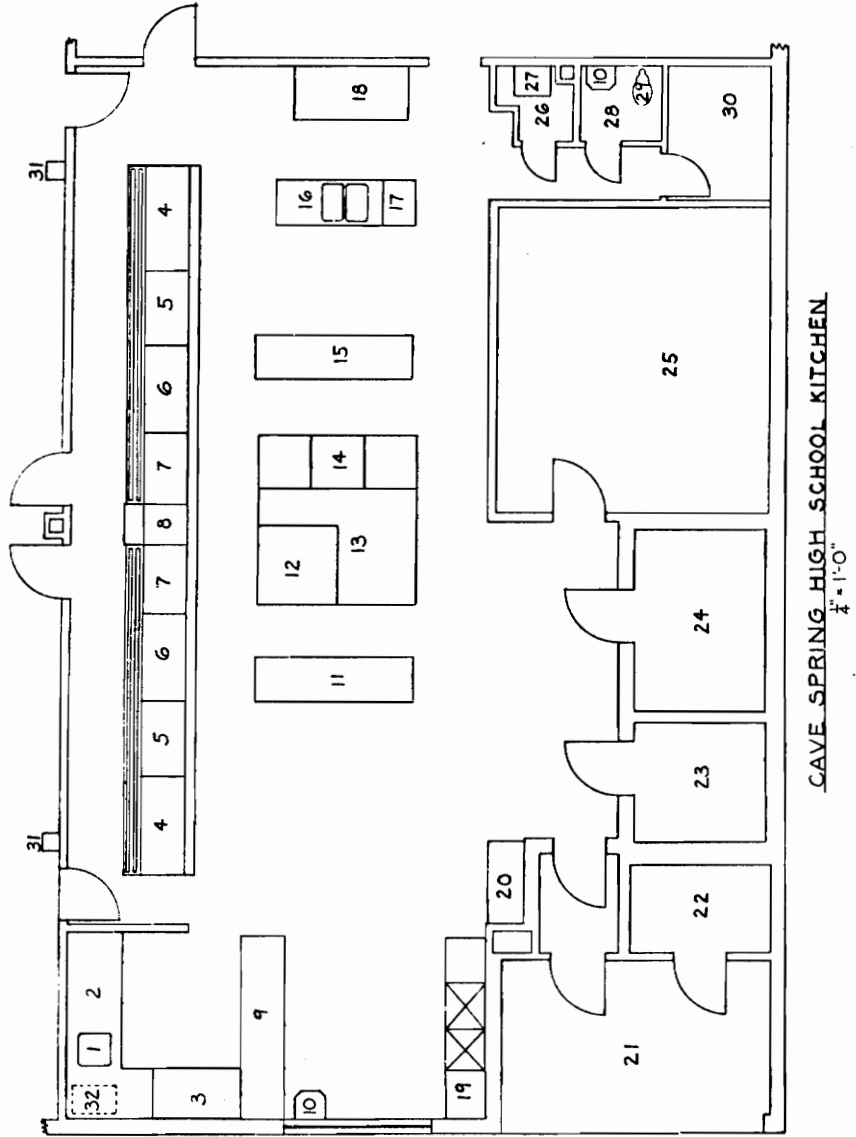
of

CAVE SPRING HIGH SCHOOL

APPENDIX B

KEY AND FLOOR PLAN OF CAVE SPRING HIGH SCHOOL

- | | |
|---------------------------|---------------------------|
| 1. DISPOSAL | 22. COMPRESSOR ROOM |
| 2. SOILED DISH TABLE | 23. FREEZER ROOM |
| 3. DISHWASHER | 24. COLD ROOM |
| 4. HOT FOOD | 25. DRY STORAGE |
| 5. OPEN SPACE | 26. JANITORS CLOSET |
| 6. COLD FOOD | 27. SLOP SINK |
| 7. MILK | 28. TOILET |
| 8. CASHIER | 29. WATER CLOSET |
| 9. CLEAN DISH TABLE | 30. LOCKER ROOM |
| 10. LAVATORY | 31. ELECTRIC WATER COOLER |
| 11. BAKERS TABLE | 32. BOOSTER |
| 12. OVEN | |
| 13. FUTURE OVEN OR KETTLE | |
| 14. RANGES | |
| 15. COOKS TABLE | |
| 16. SALAD SINK | |
| 17. PEELER | |
| 18. FUTURE REFRIGERATOR | |
| 19. POT SINK | |
| 20. DESK | |
| 21. LOADING PLATFORM | |



APPENDIX C

MENU PATTERNS AND ACTUAL MENUS

APPENDIX C

Combined Type A and a la carte menu patterns and actual menus served in
two senior high school food services

Menu Pattern 1

<u>Type A</u>	<u>Actual Menu</u>	<u>A la Carte</u>	<u>Actual Menu</u>
Sandwich	Hamburger on bun	Soup	Vegetable soup
Vegetable	French fries	Heat and serve entree	Fish square
Vegetable	Mixed greens	Sandwiches	Egg salad and peanut butter sandwiches
Baked dessert	Cake square with icing	Mixed vegetable salad	Tossed salad
Beverage	Milk	Mixed meat salad	Tuna salad
		Fruit congealed salad	Red gelatin fruit salad
		Cottage cheese and fruit salad	Pineapple and peach with cottage cheese
		Fruit pies	Apple and cherry pies
		Cream pies	Lemon and coconut cream pies
		Beverage	Milk

Menu Pattern 2

Sandwich	Hot dog on bun	Soup	Vegetable soup
Vegetable	Mashed potatoes	Heat and serve entree	Sloppy Joe on bun
Vegetable	Green beans	Sandwiches	Pimento cheese and egg salad sandwiches
Baked dessert	Brownies	Mixed meat salad	Tuna salad
Beverage	Milk	Mixed vegetable salad	Tossed salad
		Fruit congealed salad	Orange gelatin fruit salad
		Cottage cheese and fruit salad	Peach and pear with cottage cheese
		Fruit pies	Cherry and apple pies
		Cream pies	Coconut and lemon cream pies
		Frozen dessert	Eclairs
		Beverage	Milk

APPENDIX C (cont'd.)

Menu Pattern 3

<u>Type A</u>	<u>Actual Menu</u>	<u>A la Carte</u>	<u>Actual Menu</u>
Loaf mixture	Meat loaf	Soup	Tomato soup
Vegetable	Mashed potatoes	Heat and serve entree	Beans and franks
Vegetable	Green peas	Sandwiches	Ham and egg salad sandwiches
Bread	Hot rolls	Mixed meat salad	Tuna salad
Unbaked dessert	Preacher cookie	Mixed vegetable salad	Tossed salad
Beverage	Milk	Fruit congealed salad	Green gelatin with pineapple congealed salad
		Pudding	Chocolate and vanilla pudding
		Fruit pies	Cherry and apple pies
		Cream pies	Eclairs
		Frozen dessert	Milk
		Beverage	

Menu Pattern 4

Pan spooned mixture	Spaghetti and meat sauce	Soup	Vegetable soup
Salad	Tossed salad	Heat and serve entree	Pizza
Fruit	Applesauce	Vegetable	Lima beans
Bread	French bread	Sandwiches	Peanut butter and pimento cheese sandwiches
Baked dessert	Peanut butter cookie	Mixed meat salad	Tuna salad
Beverage	Milk	Fruit congealed salad	Tossed salad
		Mixed vegetable salad	Red congealed fruit salad
		Fruit and cottage cheese salad	Peaches and pineapple with cottage cheese
		Pudding	Chocolate pudding
		Fruit pies	Cherry and apple pies
		Cream pies	Coconut and lemon cream pies
		Frozen dessert	Eclairs
		Beverage	Milk

APPENDIX C (cont'd.)

Menu Pattern 5

<u>Type A</u>	<u>Actual Menu</u>	<u>A la Carte</u>	<u>Actual Menu</u>
Portioned	Salisbury steak	Soup	Chicken noodle soup
solid entree	Buttered rice	Vegetable	Lima beans
Vegetable	Cole slaw	Bread	Bread
Salad	Hot roll	Sandwiches	Egg salad and ham sandwich
Bread	Apple crisp	Mixed meat salad	Tuna salad
Baked dessert	Milk	Mixed vegetable salad	Tossed salad
Beverage		Fruit congealed salad	Lemon and fruit congealed salad
		Fruit and cottage cheese salad	Peach and pineapple with cottage cheese
		Fruit pies	Cherry and apple pies
		Cream pies	Chocolate and lemon cream pies
		Frozen dessert	Eclairs
		Beverage	Milk

APPENDIX D

WORK PROCESSES AND WORK ELEMENTS

APPENDIX D

WORK PROCESSES AND WORK ELEMENTS DEFINED

- I. Preliminary Preparation: All activity concerned with the preparation of basic ingredients to produce a product suitable for subsequent utilization. Does not include any mixing or combining of ingredients.

<u>WORK PROCESS</u>	<u>WORK ELEMENT</u>
Planned preparation	<ol style="list-style-type: none">1. Study menu, and products and quantities to be produced.2. Obtain, read, and/or study recipes (assumes quantities or amounts required to prepare are pre-calculated).3. Determine production requirements and quantities of products to make and/or make recipe calculations to fit requirement needs.4. Adapt leftovers to recipe incorporation.5. Requisition ingredients or products for production.6. Discuss mechanics of preparation with supervisor or fellow employee in work area.
Preliminary preparation	<ol style="list-style-type: none">7. Assemble and/or rearrange tools and equipment within work area.8. Clean and sort materials and ingredients, equipment, and/or work area to remove foreign particles and obtain sanitary condition for use.9. Prepare food ingredients as purchased to edible portion by hand or mechanical means (includes weighing and measuring).10. Prepare ingredients by hand or mechanical

WORK PROCESS

Preliminary
preparation
(cont'd.)

WORK ELEMENT

means to obtain correct dimensions for product incorporation (including cutting, slicing, dicing, chopping, mincing, and peeling).

11. Immerse or rehydrate ingredients or products.
12. Crisp and/or chill ingredients or products.
13. Obtain from, or return to, temporary storage any ingredients or products (includes proper packaging and labeling).
14. Open or close ingredients or products in cans, packages, boxes, and containers.
15. Prepare ingredients or products for thawing.
16. Assemble required food ingredients and/or products from within work area (including weighing and measuring).
17. Obtain ingredients or products from, or return to, storeroom or other refrigerated or storage area outside of work area.
18. Check or refer to recipe (refers to reading ability, general understanding, and ability to utilize recipes and follow recipe directions).
19. Transport soiled utensils and equipment to cleaning area and/or straighten work area.

II. Preparation: All activity directly connected with the production for a specified quantity of finished product from the time of preliminary preparation, including measuring, combining, and mixing of ingredients, and when appropriate, cooking, up to portioning and merchandising for service.

WORK PROCESS

Preparation

WORK ELEMENT

1. Assemble and/or rearrange tools and equipment within work area.
2. Assemble required food ingredients and/or products within work area (includes weighing and measuring).
3. Add, combine, or mix by hand or mechanical means (includes beating, stirring, cutting in, blending, creaming, whipping, folding, and scraping sides of container).
4. Bread product and/or mixture (involves three mixtures - flour, egg, and crumbs).

WORK PROCESS
Preparation
(cont'd.)

WORK ELEMENT

5. Drain or strain ingredients, products, or mixture.
6. Dredge (flour) product or mixture.
7. Sift ingredients.
8. Roll product or mixture by hand or mechanical means (includes preparation activity of flouring the board).
9. Knead or work with product or mixture by hand or mechanical means (dough hook).
10. Mold or manipulate design or shape of product by hand or mechanical means (includes hand tools or equipment).
11. Rack product or mixture to cool or to rise in proofer.
12. Brush product or product container to "wash" or spread to coat.
13. Cook product or mixture (includes attention required to blanch, saute, broil, brown, braise, sear, complete fry, deep fat fry, melt, roast or bake, steep, scald, boil, simmer) and attend to product including stirring of product.
14. Check or refer to recipe (refers to reading ability, general understanding, and ability to utilize recipes and follow recipe directions).
15. Pan product or mixture for cooking, temporary storage, cooling, or necessary setting time (includes weighing and measuring).
16. Unpan product or mixture.
17. Construct two or more finished products and/or mixtures into a single finished product.
18. Inspect product by sight, touch, taste, or mechanical means (timer, thermometer) during any preparation process to discern doneness or readiness for next step (includes stirring).
19. Transport product from one preparation stage to another or to temporary storage.
20. Discern and/or correct deficiency in ingredients or product (includes discussing cause and how to

<u>WORK PROCESS</u>	<u>WORK ELEMENT</u>
Preparation (cont'd.)	correct with supervisor and/or fellow employee in work area).
	21. Open or close ingredients or products in cans, packages, boxes, and containers.
	22. Regulate equipment controls for use (includes setting time, temperature, setting dials, knobs, regulating levers, etc., for use, assumes knowledge of how to operate equipment correctly) or tend equipment.
	23. Transport soiled utensils and equipment to cleaning area and/or straighten work area.

III. Portioning: Rationing by weight or volume into pan or container, or into individual portion size for service.

<u>WORK PROCESS</u>	<u>WORK ELEMENT</u>
Portioning	1. Assemble and/or rearrange tools and equipment within work area.
	2. Assemble required food ingredients and/or products from within work area (includes weighing and measuring).
	3. Divide product or mixture into individual portion size (includes weighing, measuring, scoring, slicing, or use of any portion measure, can be before or after cooking).
	4. Pour or pan product or mixture and cover (for uncooked products).
	5. Transport product to temporary storage or service.
	6. Transport soiled utensils and equipment to cleaning area and/or straighten work area.

IV. Arranging for Merchandising: All activity concerned with displaying of finished product including plating correct portions, garnishing, and storing until actually served to customer.

<u>WORK PROCESS</u>	<u>WORK ELEMENT</u>
Arrange for merchandising	1. Assemble serving dishes on trays.
	2. Assemble and/or rearrange tools and equipment within work area.
	3. Assemble required food ingredients and/or products

<u>WORK PROCESS</u>	<u>WORK ELEMENT</u>
Arrange for merchandising (cont'd.)	within work area (includes weighing and measuring).
	4. Arrange food on individual plates for service according to specifications (includes actual plating and garnishing).
	5. Transport product to temporary storage or service.
	6. Transport soiled utensils and equipment to cleaning area and/or straighten work area.

V. Serving: All activity concerned with serving finished product to the customer.

<u>WORK PROCESS</u>	<u>WORK ELEMENT</u>
Serving	1. Assemble all serving dishes and trays in work area.
	2. Assemble required food on serving line.
	3. Serve food on plates as line progresses.
	4. Replenish food as needed from temporary storage.

VI. Cashing: All activity concerned with collecting payments from customers at the end of the serving line.

<u>WORK PROCESS</u>	<u>WORK ELEMENT</u>
Cashing	1. Secure money box from manager to check change.
	2. Get cash register tape set for operation.
	3. Collect payments from customers making proper change.
	4. Remove cash register tape and assemble money box to return to manager.

VII. Dishwashing: All activity concerned with washing dishes through automatic dishwasher.

<u>WORK PROCESS</u>	<u>WORK ELEMENT</u>
Dishwashing	1. Fill tank of dishwasher.
	2. Add detergent which has been properly measured.
	3. Assemble tray racks from storage to clean dish table.
	4. Prepare silver container with suds and water.
	5. Turn on disposal.

WORK PROCESS
Dishwashing
(cont'd.)

WORK ELEMENT

6. Pull soiled trays and dishes from return window as they appear.
7. Spray trays and dishes and rack for entering dishwasher.
8. Pull rack of clean trays and dishes to permit free flow of racks.
9. Stack clean trays, silver, and dishes on cart to be returned for use on serving line.

VIII. Cleanup: All activity concerned with cleaning up work areas, serving lines, and eating area not previously covered in other work processes.

WORK PROCESS
Cleanup

WORK ELEMENT

1. Transport serving pans to pot sink for washing.
2. Remove unserved food to proper storage containers and store.
3. Wipe serving lines.
4. Wipe eating tables removing all trash left on tables.
5. Clean all equipment in all work areas.
6. Wash pots and pans and place in proper storage areas.
7. Sweep kitchen for all loose dirt in preparation for mopping by custodial staff.

IX. Management: All activity concerned with planning, placing orders, receiving orders, counting receipts, giving directions and any other managerial function.

WORK PROCESS
Management

WORK ELEMENT

1. Unlock all doors, storage areas and equipment locks such as milk coolers.
2. Post menu for the day and employee assignments with quantity estimates.
3. Receive all orders checking for number and bid specifications.
4. Place any order necessary for week's menu accomplishment.

WORK PROCESSManagement
(cont'd.)WORK ELEMENT

5. Give guidance to employees on product preparation.
6. Receive telephone calls coming into kitchen area.
7. Assign serving schedule and supervise setting up both serving lines.
8. See that cashier has change box.
9. Work where needed during rush time.
10. Receive money from cashier and count to make deposit.
11. Properly record all information as to number served, milk used, money collected and amounts of food used.
12. Discuss any problems with employees concerning food preparation, serving or cleanup.
13. Review next day's assignments with employees to accomplish preliminary preparation on next day's menus.
14. See that all areas are locked and all equipment turned off before leaving building.

X. Personal: Time in which no productive activity is performed, applied under all processes.

WORK ELEMENT

1. Idle.
2. Scheduled breaks.
3. Personal sanitation.

XI. Other: Time in which product does not require attention and personnel are not tending product or are doing other production or walking.

WORK ELEMENT

1. Cooking time.
2. Other production.
3. Walking.

APPENDIX E

LABOR REQUIREMENT-MENU PATTERN CHART

APPENDIX E

Modified work sampling data collected on work elements
in each menu pattern at two-minute intervals

Replication number _____

Date _____

Menu Item Type A	Amount Prep.	Number Served	Prelim. Prep.	Prep.	Portioning	Dis- playing	Serving	Cashing	Mgt.	Dish wash.	Clean up	Per- sonal	Other
a la carte													
Totals													

VITA

The writer, a United States citizen, was born in Tazewell County, Virginia on January 18, 1935.

In 1956 she received a B.S. degree in Home Economics from Virginia Polytechnic Institute. She worked from date of graduation in June 1956 until June 1957 as Assistant Home Demonstration Agent with the Agriculture Extension Service in Bedford County, Virginia. From August 1957 until January 1959, she held the same position with the Extension Service in Roanoke County, Virginia.

After eight years at home during which four children were born, she returned to work as a teacher of Home Economics in Special Education classes with the Roanoke County School system. In September of 1966 she was appointed Food Service Supervisor for Roanoke County Schools where she still holds that position. Work on her M.S. degree started in 1967 and has continued for the five year period while she continues to work and maintain a home for a lovely family.

She was the recipient of the American School Food Service Association Scholarship in 1970 and also received the Helen G. Ward Scholarship granted by the Virginia School Food Service Association in April of 1972.

Pauline L. Hallway

DEVELOPMENT OF A STAFFING GUIDE FOR A COMBINED
A LA CARTE AND TYPE A FOOD SERVICE IN TWO SENIOR HIGH SCHOOLS

by

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Abstract

The purpose of this study was to develop a guide that could be used in a senior high school for determining the staffing needs for a combined Type A and a la carte food service system. It was felt that a modified work sampling technique could be used in connection with observations made in an actual school food service operation.

Menu patterns and actual menu items for a five-day period were developed for the study. A labor requirement-menu pattern chart was designed to be used to record observations that were made at two minute intervals with the use of a stopwatch. Work processes and work elements were defined and found to be essential in developing a work sampling study.

Labor time was divided into productive and non-productive time. A productivity index was calculated for both schools and found to average 74 percent. The projected staffing guide was based on an assumed productivity index of 80 percent. Findings indicated that both schools would require a reduction of 9 percent in labor time to achieve an 80 percent productivity index.

Based on this investigation, the procedures and techniques used in this study appear to be useful as management aids in determining labor

requirements in a school food service operation. The results of this study need to be substantiated by further investigations since the findings are based upon observations from only two situations.