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Vending Reimbursable Lunches to High School Students: A Study of Two Successes

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Please note that this study was published before the implementation of Healthy, Hunger-Free Kids Act of 2010, which went into effect during the 2012-13 school year, and its provision for Smart Snacks Nutrition Standards for Competitive Food in Schools, implemented during the 2014-15 school year. As such, certain research may not be relevant today.

ABSTRACT

Objectives
The objectives were to investigate the operational requirements for offering healthful vended reimbursable lunches to students and to identify barriers to implementation.
Methods
A descriptive case study method was utilized to explore the operations of two school nutrition programs offering vended reimbursable lunches. Two school districts were selected based on availability and willingness to participate. A multiple case design followed a replication format, thus conclusions from each study site contributed to the whole. Structured and informal interviews, examination of documents and direct observations were used to gather data during a one-day site visit.
Results
Two vending machines in a school in each participating district successfully vended reimbursable lunches to high school students. Three considerations were critical to this outcome: regulations, technology, and support. The ability to integrate point-of-sale software, cashless and vending machine technology, and school district electronic record keeping applications was the key element in implementing electronic compliance with USDA National School Lunch Program (NSLP) regulations. This interface of technology with regulations facilitated identification of legitimate reimbursable lunches, accurate provision of free and reduced price meals to eligible students, correct charges for full-pay meals, second meals and à la carte items, and maintaining confidentiality of meal eligibility category. The process entailed overcoming barriers and developing solutions to novel obstacles. All involved in the project stressed that it was possible only with the enthusiastic support of school nutrition program (SNP) and school district administrators, principals, and state agency administration overseeing the NSLP.
Application to Child Nutrition Professionals
This qualitative study provided useful information for school nutrition program and school personnel, administrators, district financial personnel, and state agency professionals when considering innovative vending practices. The results offer guidance in implementing a vended reimbursable lunch that provides an additional menu option and the potential for increasing participation and revenue.

Glossary of Key Foodservice Terms Used in the Text

A la carte – Any food or beverage sold by the school foodservice that is not part of a reimbursable meal. Some examples include: milk, juice, entrée, salad, dessert, snack items, and second servings of any food item from the menu.

Accuclaim – A federal nationwide project to improve the accuracy and accountability of claims for reimbursement from the National School Lunch Program (NSLP) and School Breakfast Program (SBP). Each school district with more than one feeding site shall perform an on-site review of the meal counting and recording procedures in each school prior to February 1 of each school year.

Benefit eligible – All public schools, non-profit private schools, and all Residential Child Care Institutions (RCCI) may participate in the NSLP. All students in these schools may participate in the lunch program. Household income determines whether the student receives a free meal, reduced price meal, or pays full price for the meal.

Coordinated Review Effort (CRE) - State agencies responsible for child nutrition programs are required to conduct a review of each school district or school food authority (SFA) participating in the NSLP once every five years. This review focuses on the administrative aspects of school foodservice operations to determine if complete meals are being offered, if proper meal counts are taken at point-of-service, and if free and reduced-price meal benefits are provided in accordance with regulations.

Food-based menu planning options – The two food-based menu planning approaches established by USDA, Traditional and Enhanced, that require specific food components in specific amounts for specific age/grade groups.

Free meal – Children from families with incomes at or below 130% of the poverty level, those from families receiving Temporary Assistance for Needy Families (TANF) and those receiving food stamp benefits are eligible for free lunches.

Full price meal ("paid") – Students whose family income makes them ineligible to receive free or reduced price meals pay the full price for a meal.

Meal eligibility category – Household income of the family determines the meal benefit category of the student; free meals, reduced price meals, or full price or "paid" meals.

Non-reimbursable meals - Meals that are served but cannot be claimed for reimbursement in the NSLP and SBP, such as adult meals, a la carte meals, and second meals served to students.

NuMenus - The two menu planning approaches, Nutrient Standard and Assisted Nutrient Standard, established by the USDA that use USDA-approved nutrient analysis software to plan school meals that meet the nutrient standards for the appropriate age/grade group.

Offer vs. Serve (OVS) - For lunch OVS is required in high schools but is optional in junior highs and elementary schools. OVS is optional in all grades for breakfast. Children must be offered the planned lunch that meets the nutrient standards and includes, at a minimum, an entrée, fluid milk as a beverage, and at least one side dish. If the planned lunch contains three menu items, students can decline one menu item (cannot decline the entrée). If the planned lunch contains more than three menu items, students cannot decline more than two items.

POS (point-of-service) – that point in the foodservice operation where a determination can accurately be made that a reimbursable free, reduced-price, or full price meal has been served to an eligible child.

Reimbursable meal - A school meal meeting the USDA meal requirements and nutrition standards, served to an eligible student, and priced as an entire meal rather than based on individual items. Such meals qualify for reimbursement with Federal funds.

Reduced price meal – Children in families whose income is between 130% and 185% of the poverty level are eligible to pay a specified, reduced price for the meal.

Second meal - a second full meal served to a student; it cannot be claimed for free or reduced price meal reimbursement.

INTRODUCTION

School nutrition professionals face growing pressures to operate school nutrition programs (SNPs) with increased efficiency. Due to financial considerations and the demand from students and parents for more variety and food selections, school districts are challenged to offer a wider range of appealing and nutritious meal choices. In most secondary schools, the time to eat lunch is a factor in the student's choice of meal. To address the economic issues, and considerations such as time and available food options, some school districts are considering offering vended reimbursable meals. While non-reimbursable vended food items are served in

91% of high schools and 87% of middle schools throughout the nation (Center for Science in the Public Interest, 2006), the concept of a healthful vended reimbursable meal is relatively new.

METHODOLOGY

Sample
Child nutrition state agencies were polled to determine if school nutrition program sites within each state were offering vended reimbursable meals to students. Responses indicated that two sites in one state were piloting programs to offer a vended reimbursable lunch to high school students. The SNP directors of the two sites were contacted by telephone and email to ascertain interest in participating in the project. In the course of the research, one additional site was identified and added to the project but later withdrew. Thus, site selection was dictated by the severely limited number of sites attempting to offer a vended reimbursable lunch and their willingness to participate in the research.

Research Design
The Human Subjects Protection Review Committee of The University of Southern Mississippi approved the protocol for the research project. The anonymity of participating school districts was protected. Permission to conduct a site visit to collect data served as consent.

A descriptive case study method was used to explore the operations of two school nutrition programs offering vended reimbursable meals to students. The study utilized a multiple case design that followed a replication format in which conclusions from each site contributed to the whole study. This type of methodology can be used to conduct a detailed contextual analysis of a program in which a review of documentation and archival records, direct observations and structured interviews are used to collect, analyze, and interpret data (Yin, 2003). In this research project structured and informal interviews, examination of documents and direct observations were used to gather and analyze data associated with implementing a vended reimbursable lunch program.

Data Collection
A focused telephone consultation was conducted with the SNP directors to outline study parameters, requirements and arrangements for an on-site visit. A follow-up letter and a list of documents important to the case study research were mailed to each SNP director prior to the site visit. A second letter notified the appropriate school official with responsibility for the unit to be visited. Each site visit was conducted over one full working day. A written survey was utilized to collect data on the school district, meal participation, financial information, vended meal components, and labor requirements associated with the vended reimbursable lunch.

The second instrument elicited information using a structured interview format. This instrument gathered information about the following topics: control, input, procurement, preparation, marketing, equipment and maintenance, distribution and service, sanitation and maintenance, memory, output, training, and operational procedures.

Direct observations were conducted. The investigator observed procedures related to technology, regulation, food safety, preparation, service, and mechanical operations of the vending machines. These topics were selected by the researcher in consultation with the food service director and manager responsible for the vending project in each district to provide a comprehensive overview/explanation of the vending operation.

Data Analysis
Once the two site visits were completed, the researchers examined all raw data using analytical strategies outlined by Yin (2003). Interview responses and the researcher's field notes were organized, categorized, and when appropriate, clarified with a follow-up telephone interview or email correspondence. Documents and reports were examined according to their content and purpose using content analysis techniques. Data were tabulated and cross-checked from each individual site visit. A cross-case search for patterns was conducted. In the cross-case analysis, information was investigated across both districts and data about each site's activities were compared to determine commonalities and differences in implementing a vended reimbursable lunch.

A draft report was emailed to participants to corroborate the facts and information presented in the case report. A short focused repeat interview was conducted when appropriate via telephone to verify key observations. This process enhanced the accuracy of the case study, hence increasing the construct validity of the research (Yin, 2003).

RESULTS AND DISCUSSION

Demographics

The demographic characteristics of the school districts participating in the study are presented in Table 1. To protect the anonymity of study participants, school districts were designated as A and B.

Table 1. Demographic Characteristics of School Districts A and B

Variables	District A	District B
USDA region	Southeast	Southeast
Number of schools in district	20	166
Number of high schools	2	7
Student enrollment	17,000	112,127
Meal benefit eligibility percentage	46.0%	42.0%

Background

While food items sold individually (i.e., muffin, sandwich, cookies, pieces of fruit) and items such as candy, chips, and soft drinks have long been vended in schools throughout the nation, the concept of a vended reimbursable meal is relatively new. The requirement for a wellness policy in all schools (Murphy, 2006) and the focus on more healthful vending has contributed to interest in a vended reimbursable lunch (Enoch, 2007).

In district A student selections from vending machines frequently met the requirements for a reimbursable meal but were not recognized as such. This prompted the SNP director and the educational technology specialist to collaborate in initiating a vended reimbursable lunch to capture this lost revenue.

The director and assistant director of district B developed a vended reimbursable lunch in response to a schedule change by the principal of one high school. A single lunch period at the end of the school day was instituted. This caused an immediate and significant drop in participation in the NSLP in that high school. In both districts, an outside consultant with expertise in vending operations in school food service provided advice on vending operations and recommended appropriate technology.

In districts A and B, the directors worked closely with the administrator of the food and nutrition division of the state Department of Education and the director, Child Nutrition Division, Food and Nutrition Service, USDA. Each visited the sites to inspect the menu, machines, sanitation, production, operations, reporting capabilities, and procedures for meeting USDA requirements for the NSLP. It is important to note that the sale of reimbursable lunches from vending machines makes each machine a point of service (POS) and subject to the federal Coordinated Review Effort (CRE) and ACCUCLAIM regulations.

Machines

District A purchased vending machines that are open-faced, refrigerated, and display all available items at once. In district B both vending machines are refrigerated, carousel type machines. The machine mechanisms are not proprietary and can operate with software by companies other than those used in the pilot.

Location

A site survey conducted in both districts prior to machine placement assessed factors such as security, convenient access to machines, and availability of local area network (LAN) lines. A machine available to students during class changes is an appropriate alternative method of delivery within the school schedule and structure. After pilot testing, district A plans to situate machines away from the cafeteria in areas where students congregate. District B located one machine in the school cafeteria and one in a courtyard where students meet to socialize (Minnesota Department of Children, Families, and Learning- Food and Nutrition Service, 2001).

Technology

In district A, students enter individual personal identification numbers (PIN) in a keypad on the face of the vending machines. In addition, students in district A are identified using the following methods in any combination: pin number, student identification number, biometric finger imaging, and identity card readers

(either magnetic strip reader or bar coded). A photo of each customer and transaction is retained on tape for future reference. The machines accept cash and the electronic technology has the capability to recognize selections that create a reimbursable lunch. Machine software enables access to the district data base of students, their financial records, and meal eligibility category. The confidentiality of the customer is assured and food items are vended according to student eligibility and NSLP regulations.

In district B an interface to integrate the cashless technology in the vending machines with the lunch accountability point-of-sale software was required to ensure that each sale was conducted and recorded correctly according to NSLP regulations. In this district each machine was equipped with a biometric reader to scan the index finger of users and a keypad for students to enter their PIN. The fingerprint technology and PIN are tied to the school data base to ensure that only qualified students purchase meals at a reduced price or receive a free lunch from the vending machines. When the machine does not recognize the fingerprint as that of a free or reduced price eligible student, these patrons are charged the full à la carte price. Second meals are recognized as such and the buyer is charged accordingly.

Menu and Production

District A uses the traditional food-based menu planning option with the menu developed by the director and field manager. Food-based menus must incorporate foods from specific food groups and in specific quantities as required by NSLP regulations. The NuMenu menu planning option in which any foods in any quantities may be used if nutrient analysis demonstrates that the menus meet the nutrient requirements set by NSLP regulations was not selected as the food-based option was already in use in the district.

The directors and managers of the vended projects in both districts were interviewed to ascertain the criteria used for the selection of items included in the reimbursable lunches. Each director was asked to rank the factors in order of importance. Table 2 displays the ranked criteria utilized to select food items included in the vended lunches.

Table 2. Selection Factors for Vended Reimbursable Lunch Food Items (1=most important)

Rank	District A	District B
1	Food Safety	Student Preference
2	Cost	Nutritive Value
3	Student Preference	Food Safety
4	Labor	Cost
5	Nutritive Value	Labor
6	Pre-packaged Portion	Packaging Requirements
7	Packaging Requirements	Pre-packaged Portion
8	Temperature Requirements	Temperature Requirements

Sandwiches, salads, fruit drinks, milk, and side items such as fruit are prepared on-site and loaded into the vending machines in district A. Each food item category is displayed on a separate tier and the machine software identifies selection combinations that qualify as a reimbursable meal. An example of a reimbursable vended lunch could be a sandwich of meat, lettuce, and tomato, a carton of milk, and a fresh apple. One additional hour of labor is designated for food preparation and supply. The site manager oversees production, service, cash handling, and record-keeping. These tasks are incorporated into the manager's current work schedule.

Vended lunches are prepared on-site in district B using the food-based menu planning option, also. All components required for a reimbursable lunch are packaged together in a clear, plastic container. Meals that meet school lunch program requirements are prepared from a rotating menu of sandwiches, yogurt, fruits,

salads, juices, and milk choices. To fulfill the Offer versus Serve requirement, some lunches contain three items, some four items, and some five items. Within these categories, additional choices are offered. The machines automatically cease operation if options are not available. A message generated to the manager's cell phone advises that a refill of a specific food item is needed.

One additional labor hour was added to the daily work load of two school nutrition assistants/technicians in district B. One is charged with preparing the sandwiches and salads and the second employee stocks the machines. The SNP manager at the high school oversees the operation of the two vending machines and incorporates these duties into the workday. Approximately five percent of the manager's workday is directed toward the vended lunch operation.

Food Safety
The vending machines used in both districts self monitor the internal temperature and if a temperature of 48o F is reached, the machine automatically ceases operation. A safety temperature can be set (default 3o C) and if this temperature is not reached within 45 minutes of beginning operation or after 15 minutes of normal operation, the machine will cease vending.

School nutrition employees in both districts were provided a video tutorial and training by the company from whom the machines were purchased. Instructions for the operation and maintenance of the machines, safety and sanitation, and methods for resolving recurring minor malfunctions are included in the training.

Participation
Each machine vending a reimbursable lunch is considered a point-of-sale and the same information generated by the point-of-sale software for regular serving lines is generated for the vending machines. Early results indicate that in district A each machine can be expected to sell approximately 100 reimbursable lunches a week.

Participation in the lunch program in the pilot high school of district B fell from an average of 35-40% of enrollment to less than two percent with the advent of the changed schedule. Participation in the designated high school has increased by 20-25% since installation of the two vending machines dedicated to the sale of reimbursable lunches. Currently, sales of the reimbursable lunch involve small numbers but with expansion of the program, longer operation, and increased marketing, the number of students purchasing a nutritious reimbursable lunch will increase.

Marketing
Several articles in trade journals and the local media discussed the use of biometrics and its potential benefits in district A. The director plans to work with a marketing consultant to develop a strategy for promoting the vended reimbursable lunch. Several students will be randomly selected to receive funds for a specified period of time to purchase the vended lunch. They will be asked to provide an evaluation of the new meal service option.

In district B the vended reimbursable lunch has been marketed through articles in the student newspaper and menu cards posted on the vending machines. The local affiliate of a national television station aired an interview with the school food service assistant director demonstrating the cashless technology and new vending options available to students.

Within the year, the vended reimbursable lunch program will be expanded to all high schools in both districts. The SNPs will need to engage the full range of their district's marketing resources to promote the vended reimbursable lunch (Institute of Medicine of the National Academies, 2005). This will demand greater marketing efforts to introduce the new meal option and encourage students to select a nutritious, reimbursable lunch from a vending machine.

CONCLUSIONS AND APPLICATIONS

Results of this study indicated that three factors were of major importance in implementing a vended reimbursable lunch in a high school setting. These three factors were support, regulations, and technology.

Support
The school food service directors of the districts participating in the case study research verbalized their commitment to the project and its appropriateness for fulfilling a niche in their food service operation. Their commitment was apparent in the support they provided the operational leader in the form of advice and

collaboration, resources, and time for managing the project. In district A, the department educational technology specialist was responsible for the project and in district B, the assistant director of the food service department implemented the vended reimbursable lunch project. Each exhibited enthusiasm for the project, the ability to solve problems and circumvent barriers, and determination to complete the endeavor.

Both school nutrition directors stressed the critical importance of support by the school principal. Each stated emphatically that it would not have been possible to implement the vended reimbursable lunch if the principal of the participating school had not understood the project and considered it an asset to school operations. Additionally, the directors agreed that the interest, expertise, and assistance of the administrator of the food and nutrition division at the state Department of Education were essential and critical elements in the success of the program.

Regulations

Adherence to all NSLP regulations must be demonstrated before the vended reimbursable lunch can be approved as a legitimate reimbursable menu option. The vending machine software must be integrated with the SNP program point-of-sale software and the school district data base to accurately recognize reimbursable lunches and consistently vend lunches free or at a reduced rate to benefit eligible students only. All others must be charged à la carte or full price for the food items. Second meals must be recognized as such and customers charged accordingly. The technology must be capable of recognizing students by two dependable methods, identifying meal benefit eligibility category, and providing the offer versus serve option.

Technology

In the beginning of pilot testing in district B, the technology was quite sensitive and the machines ceased operation frequently during use. A third party technology was required to facilitate a seamless machine/software interface. In addition, the position of the biometric reader was awkward and did not reliably capture the required identification. The reader was remounted at a 45o angle for better access and with these corrections, using the biometric reader became straightforward and results reliable and consistent.

Concerns about privacy and sanitation of the fingerprint technology were addressed in a letter sent home to parents. Articles in the local newspaper clarifying the process for using the new biometric technology also helped allay parental apprehensions.

Safeguarding the vending machines was an aspect in determining machine location. One machine in an outdoor site was enclosed in a metal grill with openings for operation to prevent vandalism in an unguarded and unsecured location. Appropriate machine placement required adequate space for ventilation at the rear of the machine and access to local area network (LAN) lines.

The location of other food offerings was a further consideration. À la carte offerings that competed with the reimbursable lunch were positioned away from the reimbursable lunch vending machine as were machines vending foods of minimal nutritional value and soft drinks. The à la carte offerings were priced to ensure that these items did not compete with the price of the reimbursable lunch.

Both district A and B determined that only cold food items (i.e., sandwiches, salads, individual pieces of fruit, fruit drinks, cheese, milk) would be offered in the vended lunch. The option for serving hot food items was rejected as it would entail adding a microwave oven to the vending area for student use. Other considerations were the potential for frequent equipment breakdown due to rough handling and heavy use, the potential for vandalism, and food safety concerns.

Each district faced barriers to implementing the vended reimbursable lunch. Some obstacles were common to both and some were unique to the particular situation or district. Others were not actually observed but might be reasonably predicted.

Despite the drawbacks inherent in vending, substantial benefits can be derived from a well-administered vending program. Income is typically seen as the greatest benefit (À la carte/Vending Research, Summary Report, April 2002, p. 22). Both the barriers and benefits inherent in implementing a vended reimbursable lunch are enumerated in Table 3.

Table 3. Barriers and Benefits to Implementing a Vended Reimbursable Lunch

Technology/Equipment

• Inadequate, out-of-date equipment • Resource requirements • Prior contractual obligations • On-going maintenance
Menu/Food Items
• Special packaging • Limited menu • Myriad regulations • Trash/garbage generation
Human/Personnel Factors
• Inadequate support • Insufficient experience/expertise • Scarce written guidance • Training requirements • Vandalism/theft
Benefits
• Income • Labor savings/convenience • Line speed • After-hour sales

Commitment and enthusiasm are needed to guide a vended reimbursable lunch project to completion. In both districts, motivated individuals took action to initiate and lead the process of change while gaining support from those affected in the school and district (GAO, 2005).

Many factors are crucial to accomplishing the aims of the vended reimbursable lunch project. Table 4 illustrates some factors that contributed to success.

Table 4. Factors Significant in the Success of Offering a Vended Reimbursable Lunch to Students

Technology
• Technical maintenance and repair • Physical security of equipment/technology • Knowledgeable assistance from vending companies and reps • Advantageous machine location • User friendly equipment
Support
• Project leader • SNP administration/managers • Principal • State agency personnel • Vending consultant
Regulations
• Thorough knowledge of regulations

- Skillful compliance in new situations
- Marketing emphasis on program objectives

Vending machine manufacturers monitor trends and are eager to meet emerging needs. Machines are being developed that include the technology needed to vend a reimbursable lunch. As the technology has become more available, the price of the machines has decreased making the sale of vended reimbursable lunches more practical.

The results of this qualitative study provide useful information to school foodservice personnel, principals, administrators, school district financial personnel, and state agency professionals when considering more effective and innovative vending practices. The obstacles encountered in implementing a vended reimbursable lunch were presented and techniques to overcome them were discussed. The findings offer guidance in implementing a vended reimbursable lunch to provide students with an additional menu option. Directors, project leaders, and managers all agreed that vending a reimbursable lunch was an opportunity to capture lost participation and revenue. Both districts plan to enhance and expand their reimbursable vending options in the future.

Results of this research cannot be generalized as only two school districts participated in the study. This small number was due to the severely limited number of operations currently implementing vended reimbursable lunches and the voluntary nature of participation in a research study. School district size, geographic area, demographic composition of the school population, participation levels, and many other factors have significant implications and effects on the process and must be considered when implementing such a program.

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