
myPyramid: Increasing Nutritional Awareness

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Abstract

A major challenge that new college students face is the establishment of healthy habits that will affect their long-term health. Focusing on this difficult task is myPyramid: a dining hall service to support the development of healthy eating habits for busy and impressionable students. It offers an integrated student environment that builds basic nutrition and cooking skills in a fun and social manner while addressing unique student needs. In the myPyramid dining hall, students customize and cook meals that are tailored with the advice and recommendations of an "intelligent shopping basket". This intelligent basket offers personalized advice based on the USDA Dietary Guidelines to ensure proper nutrition based on students' eating history. By teaching students basic cooking skills and educating them about how foods affect their dietary balance, myPyramid empowers students with knowledge and skills to establish long-term healthy nutritional habits [10].

Keywords

Interaction design, service design

ACM Classification Keywords

H5.m. Information interfaces and presentation: Miscellaneous.

Introduction

Consider a typical freshman entering college: a student so busy juggling her new academic and social life in an unfamiliar setting that healthy eating becomes a low priority. Meals are inconsistent, eaten on the go, and occasionally skipped. Cooking is intimidating and

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CHI 2006, April 22–27, 2006, Montréal, Québec, Canada.

ACM 1-59593-298-4/06/0004.

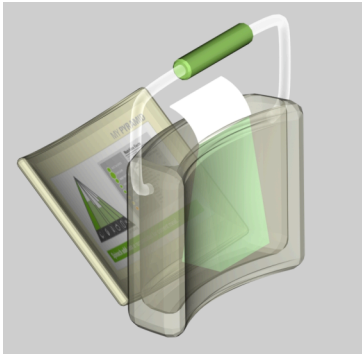


Figure 1: The Intelligent Basket. Constructed of injection-molded plastic and/or canvas-like fabric, it features a 7.5"-12" LCD screen to display nutritional information, an RFID reader to detect food packages, wireless communication capability and rechargeable battery. Since processing and storage occurs on a remote server, it can serve primarily as a display device, minimizing extra hardware, software and cost.

minimal, as the student lacks both knowledge of cooking and transportation to a grocery store. Due to the fast-paced culture of college life, the student resorts to eating meals that are convenient but nutritionally deficient—such as delivered pizza and instant canned-goods. These are habits that will shape the student for the rest of her life.

Imagine the ideal alternative. As the student walks into the dining hall, she enters a unique kitchen environment where everything required to prepare simple meals is provided. She sees a menu of delicious meal options and proceeds to customize and cook a healthy, balanced meal. Although apprehensive about cooking, she is drawn by myPyramid's simple, tasty recipes. With the aid of an interactive cooking station, she finishes cooking and enjoys eating with other student "chefs" and their creations.

Returning to campus life, she is filled with a sense of pride and fulfillment from independently preparing a delicious, healthy meal. She frequents the unique dining hall to learn how to cook other foods. Over time, her friends come with her to share this enjoyable experience. The experience has become so interwoven into the fabric of the student social life and the surrounding culture that a more positive and proactive stance towards healthy lifestyles is easily achieved.

This is the goal of the myPyramid Dining Hall: a unique student shopping/cooking/dining environment that educates and lowers the barrier to good nutrition. At the center of the myPyramid service is a shopping basket with display that provides personalized advice based on the USDA Dietary Guidelines; a guideline that, combined with physical activity, promotes health and reduces the risk for chronic diseases [10].

Motivation

The population of college undergraduates in the United States between the ages of 18 and 22 is growing [11]. Contrary to stereotypes, this demographic is still highly susceptible to developing unhealthy habits that have long-term effects. Norms of poor body images and other unhealthy behaviors are prevalent among undergraduates [3]. As undergraduates explore their newfound independence, they are particularly receptive to positive and negative influences from numerous sources (school, parents, friends, and the media). These influences can favor the development of unhealthy habits. Because life-long habits are most successfully adopted at a young age, we target this group in hopes of establishing long-term nutritional habits.

myPyramid: An Integrated Solution

myPyramid is designed to be tightly integrated with the campus to leverage the influence of the campus environment on college students. It integrates the campus dining hall, campus dining services and coordinator together with the USDA food pyramid to create a seamless environment that aligns student life with a nutritionally balanced diet. To see how this is achieved, a detailed run-through of the service follows.

1. The "Student Shopper" and the Intelli-Basket

Upon entering the dining hall, the student assumes the role of the "student shopper" – a student of nutritional shopping (Figure 2-Step 1). Swiping her student ID, the student picks up an intelligent personalized basket (Figure 1) to "shop" for a meal. She can explore the different meal options provided by myPyramid while receiving nutritional feedback from the basket.

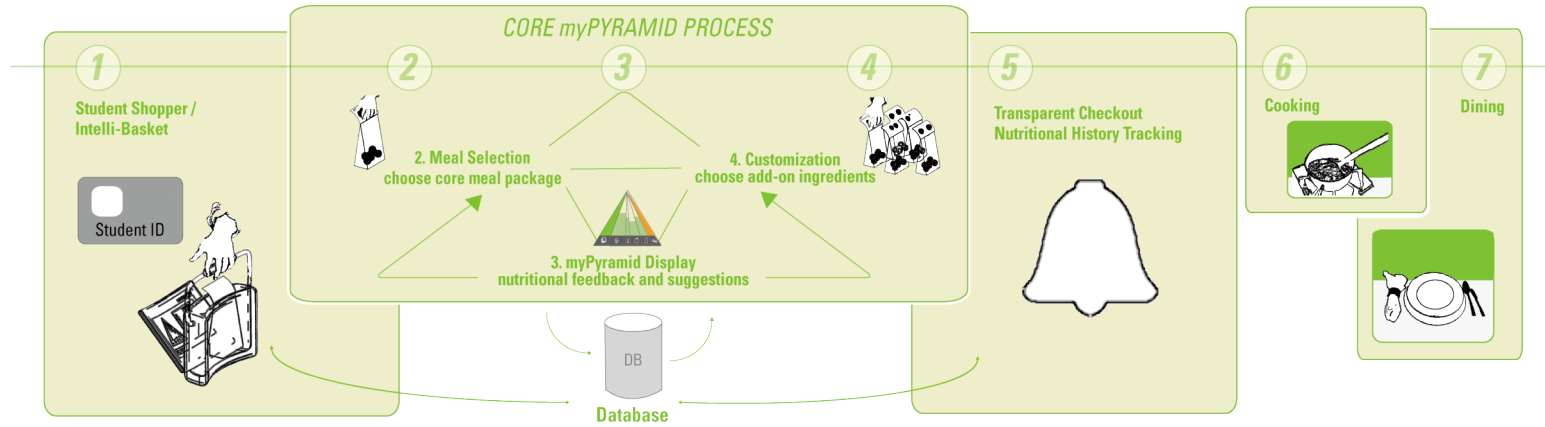


Figure 2: Overview of the myPyramid Dining Hall Service

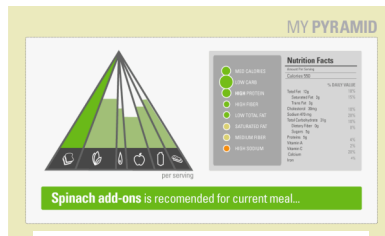


Figure 3: Nutritional display screen. Based on the latest food pyramid established by the USDA Food Guidelines, the myPyramid display shows which daily food group requirements are being met. Suggestions are made to meet the groups that are lacking.

2-4. The Core myPyramid Process

Providing nutritional awareness through exploration lies at the center of the myPyramid design. Students have varying preferences and tastes. Using the Intelli-basket, the student is able to choose from a variety of core recipe ingredients that have been packaged together and prepared for cooking (Figure 2-Step 2). Here, the dining services staff can play an integral role in shaping the student's nutritional balance and learning experience by defining these recipes. This involvement is beneficial to both the school and the parents as it results in happier and healthier students.

Using RFID sensing technology, the Intelli-basket detects the meal packages and displays specific nutritional information (Figure 2-Step 3). Based on nutritional history, the student receives suggestions to address any lacking food groups [5]. (Figure 3) This provides an opportunity for recipe customization, appealing to students' desire for variety in food options (identified in our MakeTools [8] sessions). As add-on

ingredients are placed in the basket, the Intelli-basket updates its nutritional display, showing the new food group distribution, detailed nutritional content, and other high-level nutritional "alerts" (Figure 2-Step 4). The student can add and remove ingredients and even select new core recipes based on preferences and feedback from the Intelli-basket. This creates a natural cycle where nutritional advice plays an active role in the student's exploration of personal food choices. Over time, students gain confidence in meal selection and knowledge in nutritional content of ingredients, which serve as the basis of independent healthy living.

5. Seamless Checkout and Nutritional History

Satisfied with a meal selection and basket of ingredients customized to her desire, the student goes to the cooking area. Upon leaving the meal selection area, the Intelli-basket seamlessly performs two key tasks. The first is a transparent checkout process where the selected meal and ingredients in the basket are automatically sensed and charged to the student

MakeTools [8] Sessions Quotes

"I always eat the same thing over and over."

"When I go home for the summer, I have time to work out and eat better. But when I go back to school, I don't have time and end up gaining back the weight I lost over the summer."

"I always end up eating something unhealthy with the meal plan."

"The healthier on-campus restaurants are never open when I want to eat."

"As a student, I always run out of time. I end up microwaving something from the freezer."

account. (Figure 2-Step 5) This accommodates the busy student's schedule, allowing her to circumvent the time-consuming task of grocery checkout and payment.

Secondly, by knowing what was purchased, the basket logs nutritional information for the student. Combined with nutritional information of previous campus purchases, the log serves as a basis for suggestions towards a balanced diet. (Figure 2-Step 5) Over time, students view long-term personal nutritional data on a campus website that integrates with the advice and tools from the FDA food pyramid website [5].

6-7. Cooking and Dining

To appeal to our typical college student with limited cooking experience, myPyramid uses a recipe paradigm that includes "one-pot" recipes—recipes that require minimal steps and skill. The cooking table interface supports this paradigm and shows photos and video clips to clarify steps in the recipe. Cooking stations and dining tables (Figure 2-Step 6, Step 7) are designed to support the building of common-identity groups—people with similar interest and backgrounds stay together longer [7]. Here, the student builds nutritional and cooking skills as well as forge strong social relationships, promoting a culture that encourages healthy eating.

Process Overview

Discovery

The design of myPyramid began with a period of discovery. We conducted a *literature review* of health and academic papers on related health technology, followed by a *competitive analysis* of existing products and services for promoting healthy lifestyles. We then proceeded to gather detailed information regarding current health practices by *interviewing* 13 students as well as 5 domain experts about diet and exercise.

Information gathered from a *focus group* of 7 undergraduate students, *MakeTools [8] sessions* of 7 undergraduate students, *65 surveys*, and *student shadowing in dorms and dining halls* provided further insight into the needs of our target user group. We constructed affinity diagrams and created a series of models to represent the data we had collected.

Generation and Evaluation Cycles

Following the discovery phase, we entered several generation and evaluation cycles in which we iteratively brainstormed and refined our concepts. Using grounded brainstorming, experience prototyping, concept validation, and scenario walkthrough techniques, we arrived at our final design.

Design Rationale

The concept and design of myPyramid was primarily driven by the findings from our discovery phase, which revealed numerous health-related issues that fell into two main categories: (1) problems experienced by the general population, and (2) problems that are of particular importance to undergraduate students. The following section enumerates our findings and explains how each affected the final design.

General Issues

People need motivation and encouragement.

During our MakeTools [8] sessions with students, we discovered that long-term changes in behavior are difficult to make. Some existing solutions do not promote changes in behavior that last beyond the duration of a diet or exercise program. Factors such as perception of progress and variety motivate individuals. Individuals become discouraged if they are unable to perceive the results of their efforts. Fitness trainers and dietitians note the beneficial motivational effect of logs,

such as hours spent exercising or food consumed. Additionally, placing a novice with others with similar goals increases the individual's motivation. This motivational approach is similar programs as Weight Watchers [9] and Curves [2].

myPyramid aims for long-term changes in individuals' lifestyles through education. Empowering students with the ability to prepare their own healthy meals will persist after college. Because cooking education results in higher consumption of fruits and vegetables [1], the goal is to improve students' overall diets. myPyramid offers recipes of varying difficulty to match students' skill level and also encourages group cooking with two types of cooking stations: (1) Individual cooking stations that face one another in clusters, allowing individuals to cook alongside their peers, and (2) Larger cooking stations that facilitate the preparation of meals by a few individuals for an entire group.

People do not know what to eat for a balanced diet.

People do not know the appropriate number and size of servings they need for a balanced diet. Quite often, nutrition is a not a high priority. Students said that they "don't care what [food] it is as long as it's edible".

Creating nutritional awareness, the Intelli-basket suggests meals and additional ingredients to guide students in achieving a balanced diet. To receive more accurate suggestions, students enter their height, weight, and other information via a website, which can also display logs of their food purchases.

Student Problems

Students need flexibility and convenience.

The minimax principle—doing the minimum work to achieve the maximum benefit—guides choice of healthy

food. Students will choose healthy food if it is easily accessible and available. If not, students may choose an unhealthy alternative—such as food from vending machines or restaurant delivery. On campus, students lack transportation and therefore do not have easy access to fresh foods. Dormitory kitchens are frequently dirty and poorly maintained. According to our MakeTools sessions [8] and interviews, students found cooking difficult because of the time involved for preparation and clean up. Because of a heavy course-load, lack of time, and an unpredictable schedule, students often do not eat at regular times.

Convenience and variety will attract students [4]. myPyramid provides prepared ingredients and cleans/maintains the cooking stations. It also provides variety with a changing menu and by allowing customization of meals through personalized cooking. To accommodate students' schedules, myPyramid is open late and on the weekends. Students can also prepare for the upcoming days by cooking in bulk and taking the surplus home in provided containers.

Students need social support.

Students receive significant peer support, guiding decisions in health. Through our research, we found that students created self-images both from people around them as well as images from media. They tended to follow a surrounding culture. If their friends ate fast-food often, students also ate fast-food often. Because similar interests and habits bond people together and people adopt characteristics of their friends [7], promoting a culture that encourages healthy eating is important for the success of this service.

Experience Prototyping and Concept Validation Sessions Quotes

"It would remind me to eat healthy."

"...I am curious about what is in my food."

"If I cook by myself, I would feel too lonely. It would be fun with others."

"It's nice not to wait in line [when checking out]."

"...[cooking] is fun. Definitely makes having dinner with your ex more interesting..."

"Some people cannot eat by themselves."

myPyramid centers around an activity that brings people together. Cooking, a stimulating and interactive activity involves people and provides a shared activity among friends. Our service not only supports socialization, but also capitalizes on providing healthy food choices to students.

Evaluation

Through experience prototyping sessions with 3 students and concept validations with 7 students, we received mostly positive feedback about the service. People expressed interest in the service, since it addresses their difficulties of finding healthy food and knowing what meal choices to make. They enjoyed the social aspect, smiling and laughing as they made and ate a meal during experience prototyping. In another experience prototyping session, an individual student said she enjoyed the service but would have liked to experience it with others, indicating the need for a social aspect. Finally, our evaluations showed that students were interested to learn how to cook good food while in college and beyond.

Conclusions

myPyramid gives students training wheels for achieving better nutrition. As students become aware of how various ingredients affect their dietary balance, they will gradually become less reliant on the advice given by the Intelli-basket. Equipped with basic cooking skills and nutritional awareness learned from myPyramid, students will continue to eat and cook balanced meals after college. It is all about getting started and laying the foundations for an independent, healthy lifestyle.

Acknowledgements

Special thanks to Anind Dey, Jodi Forlizzi, and Shelley Evenson for invaluable mentorship. We thank the HCII for contributing to our project budget. Finally, we thank

our colleagues in the HCII and Design, the Jewish Community Center, Chris Pacione, Pattye Stragar, Paula Martin, and Wil Forrest for their critical insights and expertise.

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