LAI 575 Informal Science Education Final Project

La Shun L. Carroll

University at Buffalo Graduate School of Education

LAI 575 Informal Science Education

Dr. Alexis Conway

November 13, 2017
Improving Dietary Choices: Healthier Decision-Making Through the Use of Nutritional Data to Encourage Metacognition

Although the human body is capable of producing some of its own energy for purposes of short-term consumption, it requires exogenous sources of energy to sustain itself. Exogenous sources of energy are obtained through the consumption of food. Also, food consumption is determined by the nutritional habits and dietary choices that one makes, which are learned behaviors. Unfortunately, when proper dietary choices and eating habits have not been learned, or have been learned inadequately, the decisions made about which food to consume at each meal will not consider nutritional value. Furthermore, the lack of basic nutritional value awareness concerning food options, as well as estimated energy requirements, results in the consumption of food containing amounts of energy that are either qualitatively or quantitatively inaccurate with respect to the specific needs of the individual. Whether insufficient or excessive energy is consumed, the failure to meet nutritional needs takes a toll on overall health. Specifically, when there is an inordinate amount of energy consumed, weight gain results contributing to the overweight and obesity epidemic in the United States.

In the United States today, nearly two out of three adults and one out of three children deals with being overweight or obese (NIDDK, 2017). Moreover, research has suggested that, if the present rate at which the overweight and obesity epidemic is spreading continues, then the population will be comprised of a majority (51%) of individuals classified as obese by the year 2030 (Trust for America’s Health, 2017). That implies that over the next 12 years, not only will more of those classified as adults...
Currently join the ranks of the overweight and obese, but current children and adolescents, as well as those yet to be born, will as well. This informal science learning activity was designed in consideration of the growing epidemic of overweight and obesity. The purpose of this informal science learning activity is to help teach children how to improve dietary choices by making healthier decisions through the use of nutritional data.

**Background**

Formerly provided by the Recommended Dietary Allowances (RDA), the particular needs for individuals have been expanded upon, and replaced, by Dietary Reference Intakes (DRIs). DRIs consist of a set of reference values intended to guide people on meeting the consumption requirements for specific nutrients (Standing Committee on the Scientific Evaluation of Dietary Reference Intakes, Subcommittees on Upper Reference Levels of Nutrients and Interpretation and Uses of Dietary Reference Intakes, A Report of the Panel on Macronutrients, Food and Nutrition Board, & Institute of Medicine, 2005). To meet the demands of a variety of daily activities comprising maintenance and leisure, there is a specific set of needs for the human body that must be met in the form of both nutrients and energy.

Nutrients contained in food are either considered macronutrients or micronutrients. Micronutrients consist of vitamins and elements whereas macronutrients comprise carbohydrates, fats, proteins, and alcohol (Standing Committee on the Scientific Evaluation of Dietary Reference Intakes et al., 2005). Of interest to note is that all of the energy required to meet the body's needs is derived from the ingestion of macronutrient-
containing foods (Standing Committee on the Scientific Evaluation of Dietary Reference Intakes et al., 2005). Since significant amounts remaining energy may be stored and can accumulate as fat in and around the visceral organs and subcutaneously over time if intake exceeds expenditure, it is critical that individuals strive to maintain an energy balance.

Being cognizant of the need for energy balance throughout life is essential in order to avoid the potential health hazards associated with becoming overweight or obese. Success in preventing becoming overweight or obese begins may start with developing an appropriate relationship with food. Furthermore, as in any healthy relationship, one's relationship with food should be based on comfort with give and take, or interactivity.

The interactivity should be between people and the nutritional content and value information of the foods they are considering for consumption. The knowledge of the content and nutritional value of foods will encourage informed thought processes and decision-making as well as provide a framework for thinking about one’s thoughts and decisions, which is referred to as metacognition. Additionally, because metacognition can be encouraged and taught regardless of age, domain, or topic of interest, it may serve as an opportunity to control one's own learning (NRC, 2009). Thus, through interacting with the nutritional content and value information of food a metacognitive framework for healthier decision-making may be encouraged that has the potential to positively impact food choices (i.e., nutritive versus non-nutritive), food habits (i.e., sufficient amount versus excessive amounts), and influencing overall health, which should significantly improve the quality of one’s life throughout its course.
The unit of energy used to describe the amount of energy food contains is the Calorie (Cal). Technically, a Cal is the total energy required to increase 1 kg of water by 1°C from 14.5 degrees C to 15.5 degrees C at a pressure of 1 atmosphere (Standing Committee on the Scientific Evaluation of Dietary Reference Intakes et al., 2005). In addition, according to the Dietary Reference Intakes (DRI) (NAP, 2005), when the consumption of food is qualitatively inaccurate, I am claiming that there is a presence or an absence of one or more specific categories of nutrients (e.g., vitamins, minerals, carbs, etc.) when there should not be. Quantitatively inaccurate consumption refers to insufficient or excessive amounts of energy. Furthermore, over time, the surplus of energy accumulates, which leads to weight gain that significantly and detrimentally impacts overall health.

What is particularly disconcerting is the alarming rate of obesity that is affecting the nation’s youth. Since 1980 the rate of obesity has almost tripled for children and adolescents (CDC, 2017). In addition to developing cardiovascular diseases, several common forms of cancer, and osteoarthritis, being overweight or obese places one at a higher risk of developing type 2 diabetes (EASO, 2017). The overweight or obese are also found to occur among 67% and 72% of senior women and men, respectively (Obesity, 2017). Although some senior citizens contributing to the data may have become overweight or obese late in life, such a statistic in the aged population likely implicates a lifelong struggle concerning habits associated with dietary and nutritional decision-making, which begins in childhood. The influence that poor dietary choices has on the growing epidemic can be decreased with a basic experience and education in interacting with nutritional data, which this activity hopes to provide.
PURPOSE:

Educate elementary school students on making healthier nutritional decisions when grocery shopping. Very important, relevant and popular topic today!

OVERARCHING STATEMENT:

Will comprise constructs relied on for my designed experience

GOALS & OBJECTIVES:

After the informal experience, students should be capable of using the nutritional information obtained to guide them in the selection of smart food choices.

THE EXPERIENCE:

Out-of-School Science Learning Experience

STRAND EMPHASIZED:

Strand 3 - Engaging in Scientific Reasoning

THE ENVIRONMENT:

Informal Setting

THE SETTING:

The Local Grocery Store

Main Feature of Design: Benefits of Novelty Without the Novelty Phenomenon

As opposed to a museum, zoo, or other fantastic non-formal venues to which some students may not have been, my deliberately choosing the informal environment of the local grocery store instead was simultaneously part of the three-pronged strategic approach to novelty
reduction (Eshach, 2007). Nevertheless, given the benefit that novelty can have, this activity manages to derive benefits of novelty without the novelty phenomenon.

Although there are many excellent museums, zoos, and other non-formal venues, I claim that the grocery will be more effective because everyone has been there before and is familiar with the setting. Furthermore, the majority of the necessary knowledge or skills students need they already possess and what they may not be readily taught. Also, they will not only be able to practice in class before the experience, but they will likely already have visited the venue with their families routinely and can do so for further practice. The combination of familiarity, prior possession of knowledge and skill, and the ability to practice I claim addresses the negative impact the novelty phenomenon may have. By so addressing, there will be less orientation and acclimation required, which will allow students to better focus on, and be present for the fun and learning associated with the experience itself.

While there is not anything technically novel in this activity since the setting of the local grocery store is familiar as are the employees and even the food items selected, the novelty is the interactivity in this informal science learning activity. That is, the manner in which the students behave with the food that is new. Despite being claimed with respect to museums visits, I argue that the combination of aspects of physical interactivity with novelty as occurs in this activity may also stimulate children and prompt discourse surrounding “what if” lines of inquiry (NAP, 2009). The significance of “what if” lines of questioning is that it indicates cognitive or mental interactivity as well. In other words, after reading a food item and asking “what if,” the child is contemplating solutions and reconsidering alternative outcomes in response to the solutions.

**Class of Activity:**
Activity:

The students choose the food items to make the healthiest version of their favorite meal. In-store kiosks or handheld scanners will be used. Two chaperones will shop with each small group and students may work in pairs or triplets if odd number. Students beforehand chose their favorite meal/food (e.g., lasagna) and practice in class reading and understanding the nutritional information contained on labels. Students will also practice in class how to use the kiosk/app technology available in-store to scan barcodes/QR codes on ingredient packages.

Once they scan an item it is included in the recipe for the meal of their choice. The app keeps track of the basic nutritional content (e.g., calories, carbohydrate, fat, protein, vitamins, etc.). The app responds by calculating the nutritional difference for each category (e.g., cal, carbs, fats, etc.) showing the student how much healthier than the normal version their meal is (e.g., same, better or worse than original). The goal for students will be to make their favorite meal healthier.

The results of how healthy the meal is is determined for each nutrient category, which would consist of both the numerical quantity and color-coded (i.e., red=worse, yellow=same, and green=better) to provide a visual gauge for them. Not only is the activity hands-on with the handling and manipulation of things, but the color-coding resulting from what the students will do would facilitate their own response to what the app/kiosk did (i.e., interactivity/minds-on).

Accommodate Personal Learning:
This experience was designed according to the contextual model, which comprises the personal, the sociocultural, and the physical contexts (Eshach, 2007). In this respect, my project may be said to allow for and accommodate personal learning, as students have different styles, preferences, and needs. In particular, those with special needs on either end of the spectrum may find what works best for them during the experience. The children will have the opportunity to engage in free-choice aspects in the experience related to the items they choose, the reasons for choosing, whether they want fewer fat in their version or less carbs, etc. These aspects of free-choice will allow them to learn actively, employ metacognition, and meaning-make as a result of the personal significance of their own input into activity.
References


Standing Committee on the Scientific Evaluation of Dietary Reference Intakes, Subcommittees