



Teaching Food Systems and Sustainability in Nutrition Education and Dietetic Training: Lessons for Educators

Hunger and Environmental Nutrition

a dietetic practice group of the Academy of Nutrition and Dietetics



Teaching Food Systems and Sustainability in Nutrition Education and Dietetic Training: Lessons for Educators

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and Dietetics

Teaching Food Systems and
Sustainability in Nutrition
Education and Dietetic Training:
Lessons for Educators

2013

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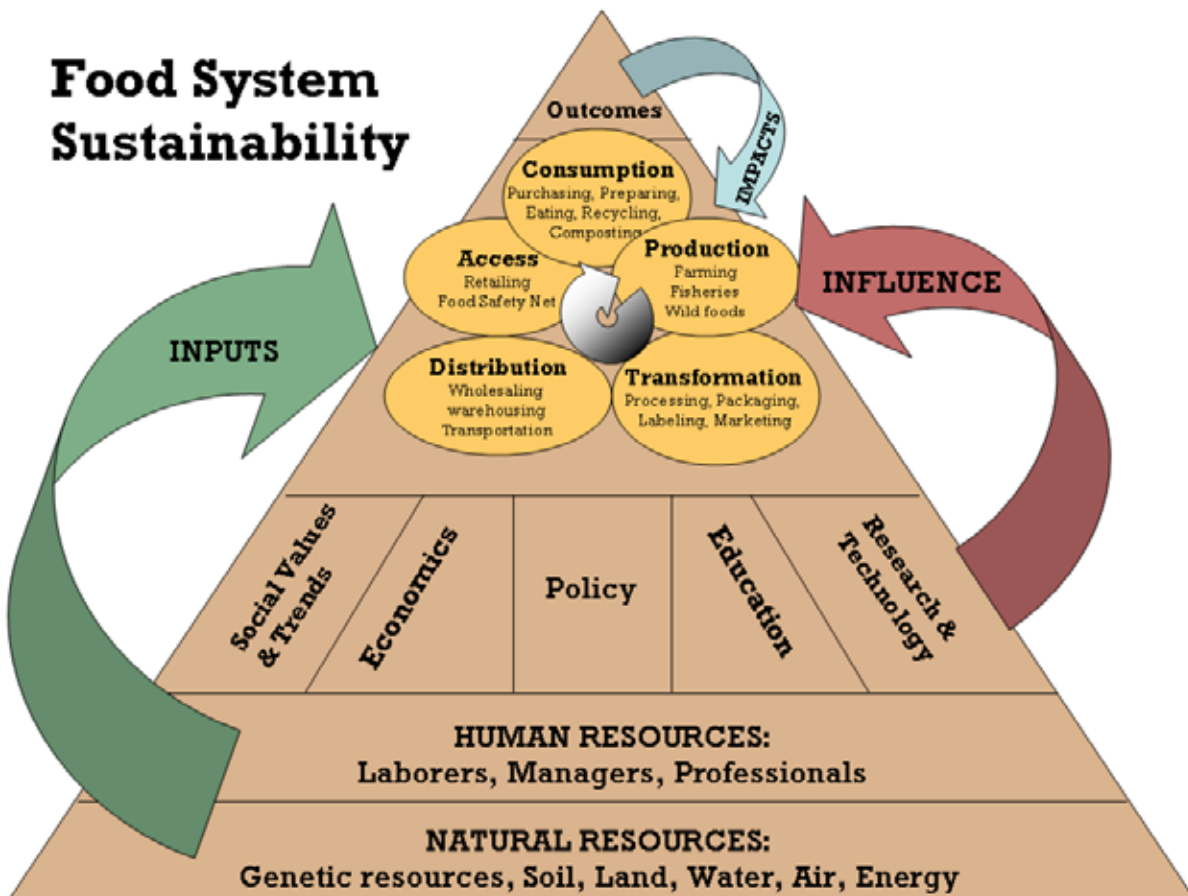
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Introduction

Teaching Food Systems and Sustainability in Nutrition Education and Dietetic Training: Lessons for Educators is a compilation of lessons from more than 30 food, nutrition, and dietetics educators at universities and food organizations in the United States and Canada. It is intended to provide guidance to educators who teach university level courses in food, nutrition, and dietetics; mentor dietetic interns, or supervise service learning and projects by student organizations, including the teaching of lessons to K-12 audiences. Lessons provide background information, learning objectives, and detailed procedures, along with suggestions for adaptations and extensions where appropriate.

A 2006 survey of dietetic educators assessed the extent to which concepts related to the food system and sustainability are taught in the current dietetic coursework, the relative importance that educators place on various food system topics, attitudes among dietetic educators on these topics, and the

resource needs of educators to expand teaching in this area¹. Community nutrition was the course in which most faculty reported teaching content about food systems and sustainability. Most survey participants agreed that educators of future nutrition and dietetic practitioners have a professional obligation to teach their students about sustainability issues. The majority also agreed that sustainability should be an important consideration for American consumers when making food choices and were interested in learning how to incorporate information about food systems and sustainability into their pedagogy. Only about half of educators felt confident in their own understanding, and less than half felt confident in teaching topics related to the sustainability of the food system. A strong majority agree that if the Academy of Nutrition and Dietetics provided resources, they would consider using them. For more detailed survey results, see Harmon et al¹. This compilation of *Lessons for Educators* is an effort towards satisfying the need for teaching resources.



Source: American Dietetic Association Sustainable Food System Task Force Report: *Healthy Land, Healthy People: Building a Better Understanding of Sustainable Food Systems for Food and Nutrition Professionals*²

Educators may also find it very helpful to refer to the 2007 report of the Sustainable Food System Task Force, available at the Academy of Nutrition and Dietetics Hunger and Environmental Nutrition DPG web site: http://www.hendpg.org/docs/Sustainable_Primer.pdf and by using the search function on the Academy of Nutrition and Dietetics web site: <http://www.eatright.org>. The following paragraph and conceptual diagram are excerpted from the report which is titled: *Healthy Land, Healthy People: Building a Better Understanding of Sustainable Food Systems for Food and Nutrition Professionals*.

Sustainability is the capacity of being maintained into the foreseeable future while meeting the needs of the present without compromising the ability to meet the needs of future generation. Sustainability is built on the foundation of human, natural and economic resources (see figure below). Each of the food system sectors depends on these resources or "inputs." The functionality of the food system is influenced by socio-cultural trends and values; economic factors; local, state, federal and international policies; research and education; and technological advances. Outcomes of the food system impact the viability and stability of each of the food system sectors as well as natural resources and the health of individuals, communities and populations. Therefore, sustainable food systems are ecological sound, socially acceptable, and economically viable. For the food system to be ecologically sound, inputs must be used in ways that conserve, regenerate or enhance natural resources. Social sustainability in the food system suggests that the distribution of resources is equitable; people working in the food system are treated justly; foods that are

produced benefit human health, are culturally acceptable, and economically and geographically accessible for all people; and the system functions with regard for future generations. A food system that is economically sustainable requires that each sector provide livelihoods that support families, that local food system activities contribute to economic development, and that no one entity holds a disproportionate share of economic control over food production, transformation, distribution, access, or consumption.

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1. Harmon, AH, Lapp J, Hauck A, Blair D. Teaching food system sustainability in dietetic programs: Need, conceptualization, and practical approaches. *J Hunger Env Nutr* 2011;6(1):114-124.
2. American Dietetic Association Sustainable Food System Task Force. (Lollar, D., Harmon, A., Hartman, B., O'Neil, C., Raimondi, M., Roberts, S., Tagtow, A., Wilkins, J., Devlin, C., & Holler, H.) (2007). *Healthy Land, Healthy People: Building a Better Understanding of Sustainable Food Systems for Food and Nutrition Professionals: A Primer on Sustainable Food Systems and Emerging Roles for food and Nutrition Professionals*. Chicago, IL: American Dietetic Association. Available at http://www.hendpg.org/docs/Sustainable_Primer.pdf.

Alison Harmon, PhD, RD, LN, Editor in Chief

Human Nutrition & Clinical Dietetics

The Womb Environment and the Global Environment

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BRIEF SUMMARY:

At times the consequences of our actions are difficult to see; specifically the consequences of our treatment of the environment. It may take years to see the harmful or beneficial effects of the changes that we make in the environment, and these lessons are not always passed along to future generations. Present research as well as historical observation concludes that components of the environment affect our food supply and thus human health. There are direct links between how we treat the environment and how it in turn affects our well being. The book *Having Faith* by Sandra Steingraber PhD, describes in a personal way how environmental components affect one person's health as well as the little human being developing inside of her. The connection between the global environment and the environment of the womb precisely exemplifies how susceptible human beings are to environmental contaminants. This book provides a personal and insightful view into our own vulnerability and what we can do about it.

LEARNING OBJECTIVES/OUTCOMES:

- To gain an understanding of the environmental impacts on fetal development.
- To understand the relationship between the global environment, the womb and the baby.
- To understand the changes occurring during pregnancy and their importance in development of a baby.

AUDIENCE OR SETTINGS:

This project can be used in an undergraduate human nutrition course or in a graduate level course.

BACKGROUND:

The book *Having Faith* contains information from fetal development to the environmental impacts and effects on the baby. It exemplifies how the environment affects our food supply and those that consume it. By understanding how vulnerable a developing baby is to environmental factors, students gain a better appreciation of the susceptibility of the food supply to contamination and, consequently, our own vulnerability. The following questions can be used as discussion questions or as an assignment.

MATERIALS NEEDED:

Having Faith by Sandra Steingraber PhD (2001)

TIME NEEDED:

The book can be read over 2-4 weeks depending on how fast the instructor wishes to complete the book.

DISCUSSION QUESTIONS:

Chapter 1:

- What hormone is a pregnancy test designed to detect?
- What is the role of this hormone?

Chapter 2:

- How long is a normal human pregnancy from conception?
- What is organogenesis? When does it occur?

- What are stem cells?
- To what does this expression refer in the process of induction? "For want of a nail a kingdom is lost."
- What are some of the early symptoms of pregnancy?
- What happens to metabolism in early pregnancy? What causes this?
- Why is nausea a sign of a healthy pregnancy?
- What causes nausea?
- Why is the sense of smell enhanced in pregnancy?
- What purpose does nausea serve in early pregnancy?

Chapter 3:

- What is the placenta? What are the functions of the placenta?
- Why is maternal smoking dangerous to a fetus?
- Against what does the placenta fail to protect the fetus? Why?
- Why is the timing of fetal exposure to toxins as important as the dose?
- Why are fetuses more vulnerable to harm by environmental toxins?

Chapter 4:

- What is amniotic fluid?
- What does alpha-fetoprotein in the amniotic fluid indicate?
- Why is finding DDT in amniotic fluid concerning?

Chapter 5:

- In what ways is the fetus sensitive to the environment surrounding the mother?
- What is a teratogen?

Chapter 6:

- What important fetal changes happen in the 2nd and 3rd trimesters?
- Fetuses lack a blood-brain barrier. What are the consequences of this?
- How does mercury enter our food system?

- Why are pregnant women encouraged to eat fish?
- Why is it important that pregnant women limit consumption of fish?

Chapter 7:

- Would wild Alaskan salmon be a good food for pregnant women to eat?
- What does this expression mean?... "There is no other world than this one."

Chapter 8:

- How has the process of childbirth become "medicalized"?

Chapter 9:

- What hormones are involved in childbirth? Which hormone must "lose its grip" before labor can begin?
- Why is human childbirth so painful (and dangerous)?

Chapter 10:

- How does "natural" childbirth create the ideal situation for early breastfeeding?
- What hormones are involved in breast development?
- What hormones play a role in lactation?
- Why do infants lose weight after they are born?
- Why does it take 3-5 days for milk production to begin?
- What is "liquid gold"?
- How does a new mother know that breastfeeding is working?
- What factors can sabotage early breastfeeding (first 2 weeks)?

Chapter 11:

- What are some of the benefits of breastfeeding? (for infant and mother)
- How do the properties of breast milk make it easy to store?
- How does breast milk take over for the placenta, related to digestive system development?

- How does breast milk relate to brain development?

- How do policies impact the success of breastfeeding?

Chapter 12:

- How do environmental toxins enter breast milk?
- How does diet affect the contamination of breast milk?
- How long should women breastfeed their infants/toddlers?
- How do children who were fed contaminated breast milk compare with those fed human milk substitute?

ADAPTATIONS AND EXTENSIONS:

The questions from this book can be used as class discussion, small group discussion, as an assignment or as preparation for a test over the book.

RESOURCES:

Steingraber, S. *Having Faith*. New York NY: Berkley Book; 2001.

Flashlights in a Forest

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BRIEF SUMMARY:

This lesson is one component of three integrated interdisciplinary core courses, the Land, Food and Community series, in the Faculty of Land and Food Systems at the University of British Columbia.

The concept of sustainability requires a systems approach to critical thinking and problem solving. A professional in the field of human nutrition can no longer make adequate dietary recommendations by focusing on a single part of a client's diet; to be most effective, she/he needs to understand the links among food, soil, nutrients, and ecosystem and human health. In the era of climate change-induced food system vulnerability, the food professional must incorporate environmental determinants into their work. There needs to be an awareness of the entire food system, from production to processing and consumption to productive disposal of food cycle end products. The food we eat is part of a larger system than supermarkets, shelf-lives and kitchens; lessons that broaden the knowledge and analyze all system components benefit the learner in creating an understanding of the complex relationships among the health of human populations, individuals and the ecosystem. Each of these activities presents the notion that our food systems envelop broad concepts such as cultural preferences and system analysis, and that the best nutritionist/dietitian has a profound awareness of the entire food system and how it relates to sustainability.

This activity illustrates the value of combining diverse ways of seeing. Students are asked to consider different perspectives and ways of seeing (paradigms) as equivalent to using flashlights of different strength and degree of focus, to find their way through a dark forest.

This exercise represents a true discovery for the instructors in terms of what integrative learning moments can accomplish while demonstrating that behind agriculture and the way we feed ourselves, there are particular ways of seeing and think-

ing. This activity also helps students conceptualize competing paradigms that can exist in our society such as the three competing paradigms that Lang and Heasman¹ depict in our current food system: the Productionist approach, the Life Sciences Integrated approach, and the Ecological Integrated approach. The productionist paradigm is characterized by achieving human health through increasing production, which has been the dominant view in our food systems since the 1950s. The life sciences integrated paradigm focuses more on individual health, combining high production rates with new food technologies that offer long-term personalized dietary solutions. An understanding of the workings of food systems and cycles and an incorporation of human and environmental health as central goals of food systems are characteristic of the ecologically integrated paradigm.

LEARNING OBJECTIVES/OUTCOMES:

Upon completion of this exercise, students will be able to:

- Use examples to illustrate the concept of a paradigm.
- Recognize and validate the role of personal experiences and personal interests in the study of nutrition and agricultural sciences.
- Recognize and appreciate cultural differences and identify the challenges and learning opportunities provided by intercultural communication.

AUDIENCE OR SETTINGS:

Incorporation of the Food System and Sustainability into Dietetic/DPD courses.

The activity works well at all levels of university courses, in small classes or large lecture halls.

BACKGROUND:

When we initially teach about sustainable food systems and community sustainability, systematic efforts are made to help students understand and appreciate the importance of paradigms, values, and critical thinking in scientific research and in professional practice. We encourage conversation with the whole class early in our courses, asking students (and ourselves) questions such as “What has the global food system delivered? What way of seeing and thinking is behind this food system?” “How do we know what we know?” “How do we identify what we do not even know that we do not know?” “How does the context of knowledge influence learning?” “How do personal stories and the communities and cultures we come from influence our academic interests and professional goals?” These questions are used to elicit dialogue and convey the practical importance of “ways of seeing” (epistemology) and its companion values and ensuing ethical basis. Without embracing any particular rigid epistemological position, we explicitly encourage students to learn to “think out of the box” of their specialization, and to overcome discipline “tunnel vision”, a critical necessity to understand the challenges of sustainability, which are all integrative in nature. We introduce students to the idea that fragmentation of knowledge and over-specialization needed by industrialization and the consequent inability to see the entire picture, are ultimately key contributors to the crisis of agriculture and are behind the unsustainable nature of our contemporary civilization and more specifically, behind poor decisions about what to eat and what it means to be healthy.

MATERIALS NEEDED:

A number of flashlights and/or other light sources (candles, matches, light bulb) that vary in a number of characteristics such as brightness, focus, color of light, power source, or any other desirable trait.

PROCEDURES:

Their instructions are: “You and your team are placed in a dark forest and must find your way out. The team has the possibility of choosing from different flashlights. Some may be very powerful with narrow beams of light; others may be weak and diffuse. Still others may illuminate wide sections of the forest, but not reveal details”. To simulate that scenario, we turn off all the lights in the classroom and ask the students to envision the situation. Then one by one, we turn on different types of flashlights, moving them through the room while asking the students to describe (after a short dialogue with their neighbor) what they see with each flashlight. Then we ask them to describe what they see without any flashlight and what flashlight they would choose under certain circumstances. Finally, we turn all the flashlights on and direct them into different objects, separately and together. We alternate this with total darkness, allowing time for their eyes to get adjusted to the darkness. Usually students describe the following situations:

- The stronger focused beam allows the observer to see many details with great clarity within the spotlight. However, we observe that the stronger the beam and the focus, the darker and more impenetrable the surrounding forest seems to be.
- Conversely, a wider focus and softer beam may give a clearer view of the background but a very fuzzy view of details and components. Although some of the richer immediate details of our path may be missed, we may now be aware of the surroundings that the highly focused flashlight prevented us from seeing.
- Probing almost blindly as we walk in the dark forest without any flashlight initially prevents us seeing anything at all, and usually is an option that we do not favour.

We also ask the students to consider and speculate what would be the experience of the inhabitants of the forest, whose familiarity with the place likely would allow them to find their way without a flashlight. The forest people wait until their eyes get used to the dark and so confidently find their way that they know so intimately. They know the type of soil they are stepping on, the moisture, the direction of the wind, the sounds of animals, and the position of plants. They can walk barefoot with no more than the light of the stars or the moon, and wait safely if necessary, with no fear, until dawn. They may not need a flashlight or even not know about its existence.

At this stage, the class is invited to discuss the exercise and are invited to “imagine every way of seeing as a particular set of lenses” that will give the impression of a paradigm. This emphasizes that paradigms are collectively shared assumptions and ways of seeing, and are not the same as an individual opinion. The underlying assumption is that paradigmatic awareness is a critical condition to learn about the challenges of sustainability in all aspects of the food system, and certainly in the design of sustainable diets. Questions such as “What are the links between diets and climate change? Or, how do nutrition, human health and environmental health interact to attain the goal of sustainability?”

TIME NEEDED:

20 minutes to 1 hour, Depending on the number of light sources and the length of the discussion that follows.

DISCUSSION QUESTIONS:

Is it possible to use the different flashlights to illuminate a learning object? And how does the object look like if seen from the different perspectives?

Is the knowledge of the “inhabitants of the forest” important to scientists?

Is integration/translation between these different forms of knowledge possible, desirable? If yes, what does it involve? If not, why not?

ADAPTATIONS AND EXTENSIONS:

Paradigms in food and agriculture: Learning to identify the working assumptions behind each.

REFERENCES:

1. Lang T, Heasman M. Food Wars: The Global Battle for Mouths, Minds and Markets. London: Earthscan; 2004.

RESOURCES:

Rojas A. Towards Integration of Knowledge through Sustainability Education and its Potential Contribution to Environmental Security. In: Allen S, Ed. *Addressing Global Environmental Security through Innovative Educational Curriculum*. Dordrecht, Netherlands: Springer Science; 2009: 131-153.

Field Trip to a Dairy Farm

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The concept of sustainability requires a systems approach to critical thinking and problem solving. A professional in the field of human nutrition can no longer make adequate dietary recommendations by focusing on a single part of a client's diet; to be most effective, she/he needs to understand the links among food, soil, nutrients, and ecosystem and human health. In the era of climate change-induced food system vulnerability, the food professional must incorporate environmental determinants into their work. There needs to be an awareness of the entire food system, from production to processing and consumption to productive disposal of food cycle end products. The food we eat is part of a larger system than supermarkets, shelf-lives and kitchens; lessons that broaden the knowledge and analyze all system components benefit the learner in creating an understanding of the complex relationships among the health of human populations, individuals and the ecosystem. Each of these activities presents the notion that our food systems envelop broad concepts such as cultural preferences and system analysis, and that the best nutritionist/dietitian has a profound awareness of the entire food system and how it relates to sustainability.

The sights, sounds and smells students encounter on a trip to a dairy farm change the way they look at a glass of milk forever. A dairy farm is an ideal setting for analyzing a system as an entity comprising all of its components and their interrelationships, together with relationships between the system and its environment. Through this field trip, students will have an understanding of the boundaries, goals, interactions and components of an agricultural system as well as a profound respect for the lives of the people who choose to make their living through this demanding enterprise. Each component of a dairy operation relates to the broader concepts of human nutrition and social, economic and ecological sustainability.

LEARNING OBJECTIVES/OUTCOMES:

Upon completion of this exercise, students will be able to:

- Identify the boundaries, components, interactions and goals of a dairy farm system
- Describe flows of energy, water and nutrients through the system including the roles of land and climate (agroecological approach to study of agricultural systems)
- Describe the community context of the dairy farm
- Discuss the agri-food policy process and its effects on dairy farmers

AUDIENCE OR SETTINGS:

Incorporation of the Food System and Sustainability into Dietetic/DPD courses.

BACKGROUND:

A dairy farm represents an ideal opportunity for systems analysis. It provides a soil to food product to soil analysis of an agricultural system as most operations grow their own silage and return their waste material back onto the fields. Much can be learned by students through witnessing and researching the processes involved in a modern dairy farm such as raising calves, dealing with sick animals, selecting proper genetics for artificial insemination, quality testing of milk products, responding to market trends, capital investment for infrastructure, and the changes in the local farming community. Topics like animal welfare and environmental impacts of agriculture are best felt and understood through personal experience with the weight of the theoretical material not adequately described in a classroom setting. The inputs and outputs of this system can be easily documented but it is the realization of how each component comes together as a whole and inter-

acts with outside factors (like government policy, international trade agreements and consumer preferences) that convey the true complexity of the our current global food system. The process of investigating such a system will provide agriculture and health science students with the skills to understand other food systems that they will encounter in their professional careers.

MATERIALS NEEDED:

Local dairy farm and a cooperating farm family.

PROCEDURES:

Set-up as a round robin style tour with five stations, the stations can be designed for learning about:

1. Dairy cow management
2. Feeds and feeding
3. Dairy herd genetics, efficiency and health
4. Agroecology 1 (climate, soil management)

5. Agroecology 2 (water management, nutrient cycling, impacts on wildlife, and relationships to surrounding communities)
6. Policy impacts

TIME NEEDED:

4 hours on site plus traveling time.

DISCUSSION QUESTIONS:

How is the health of the farm ecosystem related to human nutrition?

How can sustainability and sustainable practices be increased at each level of the dairy farm system?

ADAPTATIONS AND EXTENSIONS:

Another farm system such as a beef cow-calf operation would be a good substitution if there are no dairy farms in the region.

Environmental Ethics: Flower of Values

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BRIEF SUMMARY:

This lesson is one component of three integrated interdisciplinary core courses, the Land, Food and Community series, in the Faculty of Land and Food Systems at the University of British Columbia.

The concept of sustainability requires a systems approach to critical thinking and problem solving. A professional in the field of human nutrition can no longer make adequate dietary recommendations by focusing on a single part of a client's diet; to be most effective, she/he needs to understand the links among food, soil, nutrients, and ecosystem and human health. In the era of climate change-induced food system vulnerability, the food professional must incorporate environmental determinants into their work. There needs to be an awareness of the entire food system, from production to processing and consumption to productive disposal of food cycle end products. The food we eat is part of a larger system than supermarkets, shelf-lives and kitchens; lessons that broaden the knowledge and analyze all system components benefit the learner in creating an understanding of the complex relationships among the health of human populations, individuals and the ecosystem. Each of our activities presents the notion that our food systems envelop broad concepts such as cultural preferences and system analysis, and that the best nutritionist/dietitian has a profound awareness of the entire food system and how it relates to sustainability.

This lesson on agricultural and environmental ethics uses a tool called the *Flower of Values* as a key visual aid to explore the relationships between human values and the way food, nutrition and agricultural problems are defined. Understanding the ethical basis of food choices and food policy assists professionals in making informed decisions and recommendations. In order to be well-informed, critical thinkers, students need to be exposed to the values that underlie particular ethical eating debates like veganism, vegetarianism, animal welfare issues, organic vs. conventional production methods, the role of genetically modified foods, and food labeling. The *Flower of Values* is a great tool for introductory discussions to a

range of cultural and ethical paradigms that dominate our current food systems.

LEARNING OBJECTIVES/OUTCOMES:

Upon completion of this exercise, students will be able to:

- Discuss fundamental concepts in food and agricultural-environmental ethics
- Identify the main paradigms in food and agricultural-environmental ethics
- Identify how paradigms in food and agricultural-environmental ethics frame the problems of the food system and its relations to nature
- Apply key food and agricultural-environmental ethics to debates on hunger and food security
- Identify how different ethical paradigms define the problem of food security, nutrition, health and environment.
- Identify paradigms in food, nutrition, health, agroecosystem design and sustainability
- Establish the connections between values and scientific paradigms in the study of food systems

AUDIENCE OR SETTINGS:

Incorporation of the Food System and Sustainability into Dietetic/DPD courses.

Other: Nutrition Research Design, Ethics, Nutrition, Communications, Professional Development. The activity works well at all levels of university courses, in small classes or large lecture halls.

BACKGROUND:

This tool was developed by one of our team members under the pressure of having to condense the material for teaching agroecological and environmental ethics from a full term course into 6 instructional hours. It places the cultural and ethical paradigms of our current food system along the x- and y- axis forming a two-dimensional graph of values which create a relative spectrum within each quadrant. The four paradigms are anthropocentrism, biocentrism, individual freedom, social responsibility/community. When moving away from centre in each quadrant, various points reflect the values of recognizable social/political positions commonly held in society. For example, moving away from centre on the upper right quadrant (anthropocentric and social responsibility/community) would place one on the realm of social regulation, public ownership or wealth distribution. Similarly, moving in the opposite direction from centre in the lower left quadrant (individual freedom and biocentric) would place one in the realm of small scale farming and family-owned, ecologically sensitive businesses. There are many potential philosophical and political paradigmatic labels (each quadrant represented by a different color) that fit into the quadrants with variation in regional names. The spectrum allows for intermediate variations like strong anthropocentrism and weak (or soft) anthropocentrism or ecological humanism. It also permits the same variations of strong and weak (soft) biocentrism and intermediate positions between individual freedom and social & community responsibility (like right, centre and left politics).

MATERIALS NEEDED:

Flower of Values (See Figures 1 and 2)

PROCEDURES:

Introduce and define the terms from each petal of the flower (anthropocentric, biocentric, individual freedom, social responsibility/community). Explain that the further one moves from the centre, the more extreme one's position is relative to the cultural or ethical paradigm of the axis. Ask students where their personal values would fall on the diagram (which quadrant, how far from the centre, etc). Once the students have had sufficient time, show the second figure with the spectrum of core values located within the quadrants.

TIME NEEDED:

1 hr plus, depending on the depth of previous knowledge of ethics of the students and the desired length of the discussion that follows.

DISCUSSION QUESTIONS:

Discussion questions will vary according to the examples chosen by the instructor.

RESOURCES:

Van DeVeer E, Pierce C. *The Environmental Ethics & Policy Book*. Third Ed. Toronto ON: Wadsworth; 2003.

Figure 1

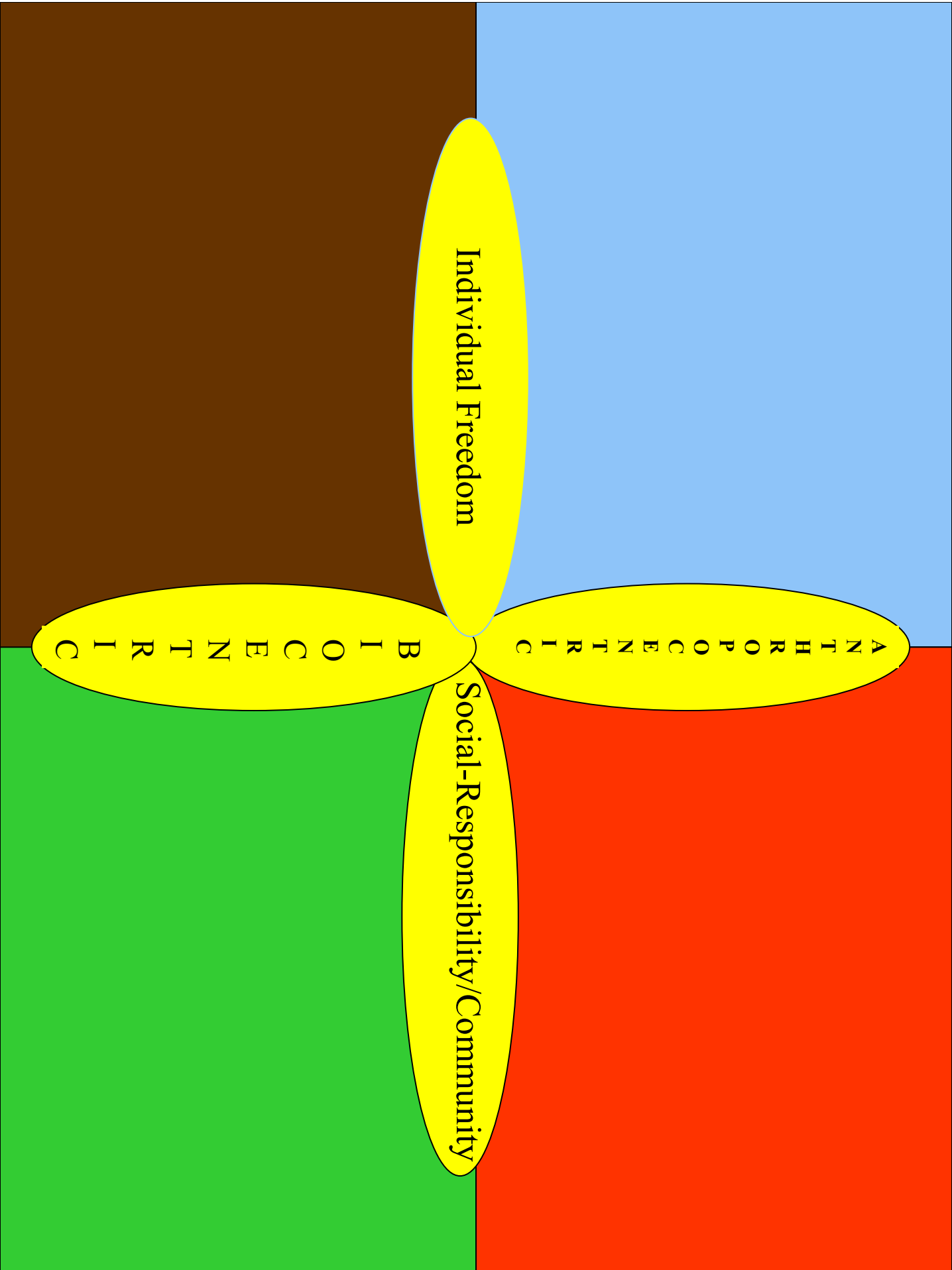
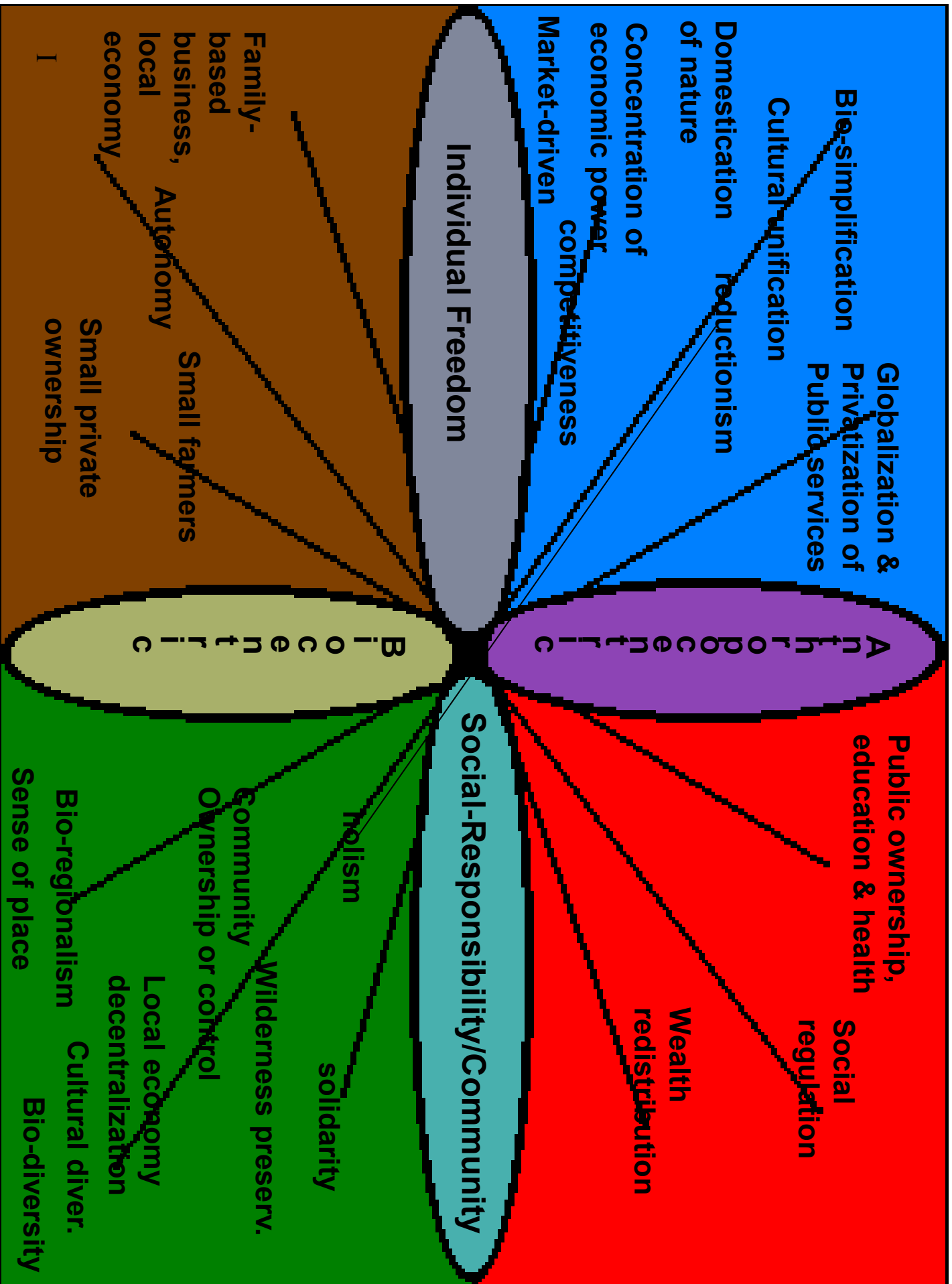


Figure 1



Dietary Guidance for Ecological Sustainability

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BRIEF SUMMARY:

In this activity, students revise current Dietary Guidelines so that they can be used to help clients make food choices that benefit health as well as food system health and ecological sustainability.

LEARNING OBJECTIVES/OUTCOMES:

Upon completing this lesson, students will

- Become familiar with current Dietary Guidelines for Americans.
- Be able to provide recommendations for both improving individual health and for improving the health and sustainability of the food system.
- Be able to justify dietary guidelines for sustainability with current scientific evidence.

AUDIENCE OR SETTINGS:

This lesson is most appropriate for upper division students in courses such as advanced human nutrition, community nutrition or nutrition education.

BACKGROUND:

The Dietary Guidelines produced and distributed by the US Department of Agriculture and the US Department of Health and Human Services are updated every five years, and based on current scientific knowledge about food components, good groups, and human nutrition needs. However, the Dietary Guidelines rarely provide information on the impact of food choices beyond individual human health, and do not provide recommendations related to encouraging a sustainable food system. This lesson provides an opportunity for students to expand on current dietary guidance such that readers can

make choices that increase personal health and food system health and sustainability.

MATERIALS NEEDED:

Copies of or internet access to the current version of the Dietary Guidelines for Americans.

PROCEDURES:

Provide the following directions to the class:
For this assignment, you will use what you have learned from class, current events, and your own independent research to develop dietary guidance for food system health and ecological sustainability. Natural resources are part of our food system's foundation. *Conservation means the careful preservation, protection, or planned management (of natural resources).*

The US Department of Agriculture (USDA) and the US Department of Health and Human Services (USDHHS) jointly issue Dietary Guidelines for Americans every five years. You should use the most current Dietary Guidelines for Americans as your starting point. These guidelines are developed based on the most current scientific research on the relationship between diet and disease. Other food system issues, including the depletion of finite resources are not taken into account. Revise the guidelines as you think appropriate, providing rationale for your specific recommendations.

Papers are evaluated based on the quality of your communication, the application of your knowledge, and your use of sources.

TIME NEEDED:

This assignment can be introduced in class in about 15 minutes, and then completed by students outside of class.

DISCUSSION QUESTIONS:

1. What were the most important ways that you would revise the Dietary Guidelines for Americans?
2. What food groups did you struggle with the most, to provide dietary guidance for sustainability?
3. What stakeholders are involved in the development and revision of the Dietary Guidelines for Americans?

4. Why do you think current dietary guidance does not account for food system health and ecological sustainability?

RESOURCES:

United States Department of Health and Human Services. Health.gov. Dietary Guidelines for Americans. <http://www.health.gov/dietaryguidelines/>. Accessed March 1, 2013.

Family Food & Change: Exploring the Food System through Generations

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BRIEF SUMMARY:

This assignment gives lifecycle nutrition students an opportunity to learn about the food system and change by interviewing members of their families from different generations.

In this activity, students interview family members from three different generations in an effort to determine how the significance of food preparation, family meals, and food traditions has changed over time. Using your interviews you will develop an essay describing these changes as well as the implications for nutrition professionals who care for clients across life stages. You will end your essay with some personal reflection on the topic.

LEARNING OBJECTIVES/OUTCOMES:

- Gain practice in conducting a food history interview.
- Understand the food experience of family members or non-relatives of varying generations
- Gain practice in writing a narrative that includes a mixture of qualitative interview data, personal reflection, and professional implications.
- Understand the implications for health professionals of working with clients from multiple generations.

AUDIENCE OR SETTINGS:

Most appropriate for life cycle nutrition students.

BACKGROUND:

Older and younger relatives (or non-related members of various generations) provide a storehouse of valuable

information for developing food and nutrition professionals. This activity allows students to interact with multiple generations on an exploration of how the food system has changed over time, how the significance of food has changed and how food and nutrition trends and concerns have evolved. Students often experience some regret at the conclusion of this assignment because they observe that food traditions have been lost or weakened over time, so it is important to empower them to consider how they will conduct family meals in the future.

MATERIALS NEEDED:

Students need the instructions provided below and an electronic version of the table (Family Food and Change Worksheet), which can be adapted, expanded or modified to meet the particular needs of any one student or class.

PROCEDURES:

Students should follow these steps:

1. Select the individuals you will interview. They should be from three different generations of your family (e.g. cousin or sibling, aunt or parent, grandparent or great uncle). If you are not able to interview family members, non-family members are also acceptable.
2. Develop a list of interview questions. Use the *Family Food and Change Worksheet* to help you develop your interview. Use similar questions for each interview, including questions about popular or favorite foods in the past and present, food habits, food traditions, importance of family meals, food preparation equipment or appliances, time spent in food preparation, concerns about nutrition etc.
3. Conduct your interviews.
4. Organize your responses using the *Family Food and Change Worksheet*.

- Develop an 800-1000 word essay describing each generation and the changes that have occurred over time. Between which generations do you think the most change has occurred? What has remained constant over generations? Discuss the implications for nutrition professionals who are for patients and clients across the life stages. What are your personal reflections? What will family meal patterns be like in your future family?

TIME NEEDED:

Students will need time to identify their interviewees, conduct interviews, and develop their written report. One class period is needed to conduct a follow-up discussion of interview results.

DISCUSSION QUESTIONS:

- Between which generations do you think the most change has occurred?
- What has remained constant over generations?
- What are the implications for food and nutrition professionals who serve patients and clients across the life stages?
- What did you learn that will have an impact on your future family food decisions, family meal patterns, or the significance you place on food in your own family?

FAMILY FOOD & CHANGE WORKSHEET (CONDENSED)

Person Interviewed & Age			
Popular and Favorite Foods			
Food Habits			
Significance of Family Meals & Food Traditions			
Food appliances or equipment			
Typical amount of time spent of food preparation			
Nutrition Concerns			

Food System Sustainability: What the Clinical RD Needs to Know

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BRIEF SUMMARY:

Nutrition professionals increasingly must have the ability to answer client questions regarding food system issues. As the local, sustainable food movement gains popularity, clients will be turning to registered dietitians – the “food experts” – for accurate information regarding these trends.

Sustainable principles and practices can be incorporated into several areas of dietetics practice; one area often overlooked, however, is clinical dietetics. The clinical dietitian is in a unique position to communicate to clients and the public the ways in which personal food buying decisions affect the sustainability of the food system. In order to explain the implications of personal food choices, RDs must have a thorough understanding of the food system and current nutrition trends related to sustainability e.g. organic, local, etc. Furthermore, the nutrition professional must be able to articulate this knowledge in a clear, concise, and understandable manner to clients of varied cultural, economic, and educational levels.

The following activities are designed for future dietetics practitioners to increase their knowledge of current food system issues and to consider the broader implications of current nutrition recommendations.

LEARNING OBJECTIVES/OUTCOMES:

- To gain an understanding of the food system and sustainability issues important to consumers.
- To examine the current perspectives surrounding these issues
- To practice explaining these issues and perspectives to clients, keeping in mind individual needs.

AUDIENCE OR SETTINGS:

Undergraduate level dietetics course.

PROCEDURES:

1. Ask students to define the following terms as they relate to the food system: local, sustainable, organic, free range, cage free, antibiotics, hormones, grass fed, rBGH, community supported agriculture, pesticides, additives, food safety, GMOs, food irradiation, heirloom varieties, omega 3 and omega 6 fatty acids, factory farms, vegetarian diets, eating seasonally, community food security, fair trade, wild fish vs farmed fish, mercury levels in fish, food miles, and concentrated animal feeding operations.
2. Outline the perspectives on each issue (pros and cons) if applicable. Conduct price comparisons so that students are educated about differences and are able to provide guidance for consumers.
3. Pick one of these terms (or you as the instructor formulate hypothetical client questions- i.e. is organic worth the price? Why do they say grass fed beef is better for me?). Write a report detailing the issue, examine from several different viewpoints. Write it from the perspective of an RD. For example, a client asks about cage-free eggs. She wonders if there are certain health benefits conferred by eating cage-free eggs and why the eggs are more expensive than the conventionally produced alternative. What do you tell her? Incorporate individual health concerns, as well as the broader food system issues such as animal welfare, human rights, ecological health, and economics and affordability, with sensitivity to the individual needs of clients.
4. Have each student summarize their topic to the class, and discuss as a group.

5. Role-play RD/client discussions. Divide students into partners with one person playing the role of the RD and the other person the client. Have the client ask the RD several food system related questions based on the prior group discussion. Switch roles. Make sure all students feel comfortable answering a variety of food system related consumer questions.

DISCUSSION QUESTIONS:

1. Would you change your advice for clients with limited resources? What ideas or resources could you provide for making sustainable food more accessible to these clients?
2. For which, if any, client health conditions would you modify your advice? i.e. Can sustainable eating practices be incorporated into all prescribed diets or are there times when eating for a specific health condition takes precedence?
3. How will your personal food philosophy affect your dietetics practice? Should you or should you not allow your personal views affect how you counsel a client?

4. Do you think current nutrition guidelines are in line with eating sustainably? What would you change?

ADAPTATIONS AND EXTENSIONS:

- Have students create a client fact sheet pertaining to the topic on which they chose to focus.
- The client fact sheet could also be more general in focus, containing tips and suggestions on how to incorporate more sustainable eating practices into their diet.
- Ask students to read any current position or practice paper from the Academy of Nutrition and Dietetics or the American Public Health Association on a food systems topic. Incorporate into class discussions the perspectives presented in any appropriate and current position paper.

Incorporating Sustainability Concepts into a Dietary Intake Exercise

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BRIEF SUMMARY:

Dietary intake exercises (completing a diet history, food frequency questionnaire, or 24-hour recall) are an integral part of learning the dietary assessment process that is used in clinical nutrition. With a few modifications, the assignment can also be used to heighten awareness of food systems and sustainability issues, too.

LEARNING OBJECTIVES/OUTCOMES:

As a result of this lesson, students will

- practice how to collect and analyze dietary intake data
- become acquainted with concepts used when assessing impact of food and agriculture on the environment and some web-based tools available for this
- become more aware of the impact of food choices on the environment and consider dietary alternatives to reduce the carbon footprint
- complete an assessment and practice writing a report for their client considering the above issues

AUDIENCE OR SETTINGS:

Suitable for students, interns, or practitioners who are either learning how to do dietary assessments or else already have those skills but want to become more familiar with connections between personal diet and sustainability issues and available tools.

BACKGROUND:

Students often don't see the connection between personal nutrition and food systems. They also sometimes forget that we all must cook and shop in the real world even when we are

following a special diet. Normal in-patient practice doesn't routinely allow time to investigate environmental issues; nevertheless, as a society our food choices do shape our food system(s) and how sustainable they are. Using the following website tools will provide some insight into the nature and complexity of the issues as well as the relative merits of one food choice over another. However, the number of variables is too great to make absolute judgments about the environmental impact of a specific diet based solely on this information since methods for doing this are still in their infancy.

PROCEDURES:

Students will work in pairs. Before starting, they should read through the assignment and understand what is required in the final report.

1. Each student keeps a 3-day food diary using a record similar to Sample #1 (this can be modified depending on what other information the instructor wants students to gather, as can the number of days the record is to be kept). Student will also complete a simple 7-day food frequency questionnaire based on one of the online tools.
2. After the food diary and FFQ are completed, each student will exchange their records with their partner to do the assessment. After having recorded the data but before doing the assessment provide students with appropriate grading rubrics, if any are to be used.
3. Dietary analysis – Have students do whatever nutrient analysis is called for in the usual class exercise; may use nutrient analysis software for this or else go to USDA's National Nutrient Database: <http://ndb.nal.usda.gov/>
4. Go to the following website sponsored by the Environmental Working Group, read down the page and look at the table. Chose 3-4 messages to pass on to your client based on the 3-day food record and the food frequency

questionnaire you have analyzed with a brief explanation of why you chose each message that is individualized to your client's meal pattern:

<http://ewg.org/meateatersguide/at-a-glance-brochure/>. Also interesting: <http://ewg.org/meateatersguide/helpful-tips-for-meat-eaters/>

5. Next, go to Center for Science in the Public Interest (CSPI)'s website: <http://www.cspinet.org/EatingGreen/calculator.html>. Here you will use the one-week FFQ data you collected. After printing a copy and looking at the results, suggest a few realistic changes that your "client" could make, enter those changes and recalculate the impact, and record.
6. Check out fruits and vegetables chosen by your client on this list compiled by the Environmental Working Group: <http://www.foodnews.org/fulllist.php>. Where do fruits and vegetables on the food log fall in terms of pesticide load? Include this in your report.
7. If your client ate fish, use the mercury calculator to determine safety (you will need to estimate your client's weight for this). Go to the National Resources Defense Council website: <http://www.nrdc.org/health/effects/mercury/protect.asp> A Seafood Watch Pocket Guide by region of the country is available from the Monterey Bay Aquarium at: http://www.montereybayaquarium.org/cr/cr_seafood-watch/download.aspx
8. Food preparation. Now look at how food was prepared, if known, or use your best judgment.

9. Food waste. Read page 7 in above article, then go to <http://earth911.com/> → Households to learn about recycling options in your geographic area. Use this information to make suggestions about how your client or others in their household or neighborhood can reduce waste.

Write a brief paper to your "client" (partner) based on the results of your food and nutrition assessment including recommendations for reducing environmental impact and potential exposure to chemicals. Check out www.eatwild.com for locally-sourced animal products; <http://www.localharvest.org/> to locate grocery stores, farmers markets, and other outlets selling local foods.

TIME NEEDED:

This lesson can be done over 1 or 2 weeks.

DISCUSSION QUESTIONS:

Are our food choices determined by what's available to purchase, or do our food choices determine what's available?

What connections, if any, did students find between the kind of food, its relative healthfulness, method used to produce/transport/prepare it, and environmental impact?

ATTACHMENTS:

Food Diary

Food Frequency Questionnaire for One Week

Food Frequency Questionnaire for One Week:

Indicate the number of servings of each of the following foods you eat in a typical week:

Beef	1 serving = 3.5 oz (100 g)	
Chicken	“ “	
Pork	“ “	
Milk or yoghurt	1 serving = 1 cup = 8 oz.	
Hard cheese	1 serving = 1 oz	
egg	1 serving = 1 egg	

Your Zip code: _____

Incorporating Sustainability Concepts in a Therapeutic Menu Planning Exercise

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BRIEF SUMMARY:

In this activity students will consider sustainability when planning a therapeutic menu.

LEARNING OBJECTIVES/OUTCOMES:

As a result of this lesson, students will:

- practice writing a therapeutic, calorie-controlled menu
- become more aware of availability of heart-healthy foods and their prices at food retail stores in their community as well as potential food access issues
- become acquainted with some concepts used when assessing environmental impact of food choices and make use of some web-based tools available for this purpose
- consider some food-related environmental health issues of concern to clients and the challenges of providing adequate, accurate advice

AUDIENCE OR SETTINGS:

Suitable for dietetics students taking medical nutrition therapy-related class, interns, or practitioners wanting to learn about and practice applying tools related to sustainability issues to clinical dietetics.

BACKGROUND:

Students often don't see the connection between clinical nutrition and food systems. They also sometimes forget that patients must cook and shop in the real world even when on a therapeutic diet, and that, as a society, our food choices and food system(s) are linked. Using the following website tools will provide some insight into the nature and complexity of

the issues as well as the relative merits of one food choice over another. However, the number of variables is too great to make absolute judgments about the environmental impact of a specific diet based solely on this information since methods for doing this are still in their infancy.

PROCEDURES:

Have students read through the entire assignment. Divide into groups of 3 students each.

Case study: The patient Mrs. Lee is a 60-year old Korean-American post-menopausal woman with HTN who is moderately active. Her BMI is 27. There is a history of heart disease in her family. She wants to lose some weight and improve her HTN by improving her eating habits. Create a two-day menu for her based on the DASH-type diet following the parameters below.

Part 1 – menu creation

Approximate the daily nutrient levels specified below:

- 1600 kcals (1550-1650)
- 25 – 30% of total calories from fat ($\leq 7\%$ saturated fat, $\leq 1\%$ trans fat, cholesterol < 300 mg.); include at least one good dietary source of omega-3 fatty acids each day
- Na < 2300 mg
- Potassium ≥ 4700 mg
- fiber ≥ 30 g
- calcium ≥ 1200 mg (calcium supplement is allowed, but be specific about amount and type)
- 6 to 8 cups fluid/day

FOOD GROUPS	DAILY SERVINGS	
Grains	6	Include dry cereal, bread, rice or pasta; at least 3 whole-grains
Vegetables	3-4	Include at least 2 different potassium-rich
Fruits	2-3	Include at least 2 different potassium-rich
Milk (0% to 1%) and low-fat milk products	2-3	Milk, yogurt and/or cheese, or equivalents
Lean meat, poultry, egg Fish	3-6 oz	(1 egg = 1 oz) For this exercise, include at least 1 serving of fish over two days.
Nuts, seeds, legumes	3 per week	½ to 1 serving a day
Fats and oils	2	Include 2 or more different sources
Sweets and added sugar	0 - 1	5 or / week

- Include portion sizes and major ingredients for combination foods on your menu. Consider how foods will be cooked, what equipment will be needed.
- Choose at least some vegetables and fruits harvested in your region of the country, and make choices appropriate for the season. Also consider Mrs. Lee's ethnic preferences. For guidance, look at your state Extension Service website or the Field to Plate website at (<http://www.fieldtoplate.com/guide.php>). Local Harvest will help you identify direct farm to consumer sites near you: <http://www.localharvest.org>.
- Mrs. Lee is also concerned about pesticides on her food and asks about buying organic produce: Food safety: Environmental Working Group: <http://www.foodnews.org/fulllist.php>.
- When deciding what fish to recommend, refer to recommendations made by the American Heart Association.
- Also of interest: National Resources Defense Council website at <http://www.nrdc.org/health/effects/mercury/protect.asp>. A Seafood Watch Pocket Guide by region of the country is available from the Monterey Bay Aquarium at: http://www.montereybayaquarium.org/cr/cr_seafood-watch/download.aspx.

Part 2 – shopping list

Draw up a shopping list containing main ingredients needed for two-day menu and quantity of each ingredient you will need.

Part 3 – grocery store data collection

- Each member of the team will choose one grocery store

to “shop” at using the shopping list. Among the 3 stores, choose (a) a large conventional supermarket or superstore; (b) a limited assortment store (e.g., Aldi's, Sav-A-Lot); (c) your choice: food coop, health food store, bodega, small ethnic or corner grocery, or another grocery store/supermarket. In each case, assume this is Mrs. Lee's neighborhood store and that she needs to buy all of her ingredients here. You may combine a local farmers market or other farm-direct program with one of the above store options (<http://www.localharvest.org>). If you cannot find a low-fat or low-sodium item, substitute something else (e.g., frozen spinach for fresh, regular margarine for low-fat margarine). Use the attachment for this lesson as a guide for data collection.

- **Note:** Before going shopping, the team should decide what units to use when choosing items. For instance, measure produce by ounces, milk by ounces or mls. ([Bring a calculator.](#)) If there is more than one brand to choose from that meets your needs, choose the least expensive or else justify why you chose a more expensive product. Remember that you will be comparing items from store to store.

Part 4 – compare lists, written report to include

- a summary of your findings. Include a table that compares the three stores (use the “total” columns for total cost, total amounts of sodium, potassium, and fat for each store) to help explain. Was the availability of heart-healthy foods available at all stores? What compromises might Mrs. Lee need to make in terms of dietary quality, the cost of the diet, or accessibility to specific foods?
- Discuss environmental impact: To what degree were local/regional foods available? For non-local foods, what did

you think of the distance some food travels? What about the safety of the fish you chose vs. its omega-3 content? Vegetables chosen? How about cooking methods and waste generated? Overall impression of looking at these factors in addition to nutritional factors?

- Include as an appendix to your report: Calculations for creating 1600 kcal diet; 2-day menu plan, grocery list, a copy of each of the 3 store lists.
- The report will probably generate several pages.

TIME NEEDED:

A minimum of two weeks is recommended.

DISCUSSION QUESTIONS:

- How much variation did you find between different grocery stores? How might these variations affect your client and her ability to follow your 2-day menu, depending on where she lived and her budget?
- What kinds of shopping tips could you give to this client? (e.g., shop the perimeter of the store, eat before shopping, have a shopping list, buy produce in season, etc.)

- What did you think about the environmental implications of what you found (food safety, food availability, travel miles, waste disposal)? Are these simply Mrs. Lee's problems, or do they affect all of us to some degree?
- What role, if any, do nutrition professionals have in (a) raising their clients' awareness of environmental issues related to how they buy, cook, and dispose of food and waste? (b) advocating for food-related environmental change where they work and live?

ADAPTATIONS AND EXTENSIONS:

Instructors are free to modify the assignment to fit class needs. For instance, a calorie-controlled diet may not be needed. Other dietary requirements may be substituted.

ATTACHMENT:

Food Item Spreadsheet

Food Item Data Sheet

Name: _____

Store Name/type: _____

Abbreviations: N/A = Not available; none; not applicable; S = substitute
(for instance, store doesn't carry what you need so you get this instead)

This table can be modified by the instructor.

Food Item & unit size. Include brand if appropriate, if fresh, frozen, canned.	Price/unit	Na/unit	K/unit	Total fat	Sat fat	Trans fat	Place of origin?	Describe packaging
TOTAL (Add columns)								

Food Science, Foodservice Management & Culinary Arts

The Household Food System

Alejandro Rojas, PhD, MA, BSc (*Agroecology*)

Will Valley, PhD Candidate, BA, BEd (*Integrated Studies of Land and Food Systems*)

Art Bomke, PhD, MSc, BSc (*Agroecology*)

Brent Skura, PhD, MSc, BSc (*Food Nutrition & Health; Global Resource Systems*)

*University of British Columbia
Land and Food Systems*

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BRIEF SUMMARY:

This lesson is one component of three integrated interdisciplinary core courses, the Land, Food and Community series, in the Faculty of Land and Food Systems at the University of British Columbia.

The concept of sustainability requires a systems approach to critical thinking and problem solving. A professional in the field of human nutrition can no longer make adequate dietary recommendations by focusing on a single part of a client's diet; to be most effective, she/he needs to understand the links among food, soil, nutrients, and ecosystem and human health. In the era of climate change-induced food system vulnerability, the food professional must incorporate environmental determinants into their work. There needs to be an awareness of the entire food system, from production to processing and consumption to productive disposal of food cycle end products. The food we eat is part of a larger system than supermarkets, shelf-lives and kitchens; lessons that broaden the knowledge and analyze all system components benefit the learner in creating an understanding of the complex relationships among the health of human populations, individuals and the ecosystem. Each of these activities presents the notion that our food systems envelop broad concepts such as cultural preferences and system analysis, and that the best nutritionist/dietitian has a profound awareness of the entire food system and how it relates to sustainability.

In this introductory lesson, students make a map, diagram or flowchart of their family or household food system focusing on how food moves through the household and the various ways in which it is changed or transformed in the process. The final product is titled "The Flow of Food" to be presented in small groups followed by discussion.

LEARNING OBJECTIVES/OUTCOMES:

- Students will have reflected on and explored the links between land, food and community as depicted by the flow of food in their household.
- Students will be able to respond to a question and articulate their ideas to an audience within a limited time frame.
- Through presenting in small groups, students will have opportunities to become more familiar with other colleagues within the class.

AUDIENCE OR SETTINGS:

The activity works well at all levels of university courses, in small classes or large lecture halls.

BACKGROUND:

This exercise has numerous functions within a classroom/lecture setting. It is best used as a general introductory to food systems as it raises awareness of the complexities of something often taken for granted: where our food comes from. It facilitates student participation at all levels as it is not based on expertise but personal experience, giving opportunity to tie curriculum related topics to daily life experiences and allowing each individual to confidently contribute in the exercise. Through emphasizing aspects of a household's food system such as inputs/outputs, quantity/quality, sourcing, dietary preferences, and food wastes, students begin to see the relationships between nutrition, production methods, distribution, purchasing, personal/cultural preferences, and food waste. This exercise also allows students to become more

familiar with each other as it provides a window into the daily lives of colleagues. This helps build relationships within the course and allows students to become more confident communicators in group settings.

MATERIALS NEEDED:

Writing materials for students to create flow chart.

PROCEDURES:

Activity explanation – Students have a set amount of time to create an individual flow chart of household food system, trying to include as many aspects of the food system as possible from sources to wastes (level of prompting or leading up to instructor).

Presentation – Have students present their flow chart to each other either in small groups or as volunteers to the entire class (depends on class size). Allow students to ask questions for clarification.

Discussion – Follow the individual presentations with a group discussion allowing students to share and reflect on any ideas that they think worthwhile.

TIME NEEDED:

15mins – 1 hour, depending on length of time given to create flow chart and length of presentations and follow-up discussion.

DISCUSSION QUESTIONS:

1. How many students know where their food comes from?
2. In your experience, is it easy or difficult to determine where food comes from?

3. Is it important to know where your food comes from?
4. How prepared is your household in case of an emergency? Would you be self-sufficient?
5. What are some methods of food waste disposal?
6. How important is nutrition to your family? How important is food price?
7. Where do you predominately buy your food?
8. How often do you eat out at restaurants?
9. Is it important to know how to grow and preserve your own food?
10. How many people enjoy cooking? How many people know how to cook?
11. In which parts of the diagram can more sustainable practices be incorporated into a household food system or the entire food system?

ADAPTATIONS AND EXTENSIONS:

This exercise can be developed into a take home project, having students track their household food items for a specific amount of time and analyzing any prevalent dietary trends. Focuses can be placed on food miles, estimated nutrient content, price, sources, amount of waste generated, and any other aspect of the food system.

RESOURCES:

Rojas A. Towards Integration of Knowledge through Sustainability Education and its Potential Contribution to Environmental Security. In: Allen S, Ed. *Addressing Global Environmental Security through Innovative Educational Curriculum*. Dordrecht, Netherlands: Springer Science; 2009:131-153.

Sensory Evaluation of Fluid Milk Products and Milk Alternatives

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BRIEF SUMMARY:

This lesson is one component of three integrated interdisciplinary core courses, the Land, Food and Community series, in the Faculty of Land and Food Systems at the University of British Columbia.

The concept of sustainability requires a systems approach to critical thinking and problem solving. A professional in the field of human nutrition can no longer make adequate dietary recommendations by focusing on a single part of a client's diet; to be most effective, she/he needs to understand the links among food, soil, nutrients, and ecosystem and human health. In the era of climate change-induced food system vulnerability, the food professional must incorporate environmental determinants into their work. There needs to be an awareness of the entire food system, from production to processing and consumption to productive disposal of food cycle end products. The food we eat is part of a larger system than supermarkets, shelf-lives and kitchens; lessons that broaden the knowledge and analyze all system components benefit the learner in creating an understanding of the complex relationships among the health of human populations, individuals and the ecosystem. Each of these activities presents the notion that our food systems envelop broad concepts such as cultural preferences and system analysis, and that the best nutritionist/dietitian has a profound awareness of the entire food system and how it relates to sustainability.

This activity explores the processing, distribution, marketing, consumption and consumer preference of milk and milk alternative products. Students sample and rate a variety of different products on a scale of 0-12, from dislike extremely to like extremely. The data generated is then used to demonstrate statistical measures of central tendency (mean, median and mode) as well as standard deviation. Students also become familiar with evaluating sensory properties and are introduced

to the role of packaging and marketing of common food products. Discussions stemming from this activity touch upon a wide range of food industry topics such as marketing and consumer behavior, nutritional value of milk and milk alternatives, and product packaging, waste generation and dairy industry sustainability.

LEARNING OBJECTIVES/OUTCOMES:

Upon completion of this exercise, students will be able to:

- Describe the nutritional linkages between dairy production and processing, food consumption and human and environmental health, and the influence of social, cultural and economic factors on diet and consumption trends
- Describe the roles of packaging for dairy products
- Explain the sensory properties of various fluid milk products and milk alternatives
- Analyze sensory scores for fluid milk products and milk alternatives using statistics
- Describe the impact of processing and composition on flavor and mouth-feel of fluid milk and milk alternative products
- Discuss the role of milk and milk alternatives as a component of the human diet
- Describe the role of packaging in the fluid milk industry
- Evaluate packaging containers for fluid milk and milk alternative products and their impacts on food safety and the environment

AUDIENCE OR SETTINGS:

The activity works well at all levels of university courses, in small classes or large lecture halls.

BACKGROUND:

Fluid milk and milk alternatives are consumed by a significantly large portion of the population on a daily basis. And due to their ubiquity in our society, these products are ideal for representing a subsection of the overall food system. A carton of skim milk succinctly represents a range of industry innovations and issues including production, processing, marketing, packaging, nutritional content, and consumer choices. The large assortment of milk and milk alternative products can be found easily in any supermarket and are relatively inexpensive. The exercise provides excellent opportunities to use the students' experience as a great learning opportunity and integrates sensory qualitative experience with hard data. Statistics become alive and nicely compared with individual sensory perception.

MATERIALS NEEDED:

Depending on the milk products and milk alternatives available in one's area, one should choose a range of products to be tested. For example, skim, 1%, 2%, whole milk, goat's milk, soy milk, lactose-free milk, acidophilus milk, calcium-fortified milk, buttermilk, rice milk, almond milk, and many others. Appropriately sized, brown paper bags secured with masking tape are used to wrap and disguise each product which is labeled with a three digit code; small, 1 oz cups per person per round; food to clean the palette between samples (such as salt-free soda crackers); bottle of water to enable the participant to rinse the mouth between samples; container for participants to expectorate samples once sensory testing is completed.

PROCEDURES:

Have all products wrapped in order to disguise the product type and labeled with a random number. Have students sample each product and record their ratings. Between samples, students should cleanse their palette with a cracker followed by rinsing with water in order to remove the flavor of the previous sample. Once the sampling and recording is finished, calculate the measurements of central tendency and distribute results to the class.

TIME NEEDED:

Approximately 1 hour for the sampling, discussion length will vary.

DISCUSSION QUESTIONS:

1. How do the sensory rankings of the milk and milk alternative products relate to the popularity of the products in the market place?
2. Describe the relationship between milk fat content and sensory score of the milk products?
3. Does fat content of milk affect the calcium content of the milk product?

ATTACHMENT:

Evaluation of Fluid Milk Products and Statistical Analysis of Data

EVALUATION OF FLUID MILK PRODUCTS AND STATISTICAL ANALYSIS OF DATA

Preparation for Sensory evaluation

When instructed to do so, please proceed to the room assigned to your group. There you will find packages of milk and milk alternatives wrapped in brown paper bags each with a three-digit code. Please do not attempt to determine what the products are until everyone in the classroom has had an opportunity to sample the products. All products to be tested were purchased from the retail market. We encourage everyone to sample all products but understand if you do not wish to do so for religious reasons, or if you are allergic to cows' milk, milk from other animal species, soybeans or rice.

Each person should obtain the following:

- *One large paper plate on which to place sample cups
- *14 small plastic sample cups
- *a cup to expectorate samples should you wish to not swallow the samples
- * 14 unsalted crackers

From each coded product, place about 15 ml into one of the plastic cups. Fifteen ml will fill the cup about 1/3 full. Be sure to keep track of the sample codes by recording the code on the paper plate where you have placed each sample cup.

Sensory evaluation:

Prior to starting sensory evaluation you should eat an unsalted cracker and rinse your mouth with bottled water. This will clear your palate. Follow the directions on the sensory evaluation sheets in order to determine a sensory score for each product. Please do not make comments about products as this may influence your colleague's decisions. We wish to have scores generated with the least amount of bias.

Data analysis:

Conduct data analysis as described on the following pages. Each member of the group should be able to calculate the mean, median and standard deviation for at least two of the coded samples tested. **We encourage you to do the calculations long hand so that you get a sense of what is being done during the calculations.** Most calculators have function keys that will do the calculations for you but using those keys does not aid in understanding the process of the calculations. Once the values have been calculated, please collate the data, on the Data Input Sheet, according to sample code.

SENSORY EVALUATION SHEET

Name: _____

Group number: _____

Room location: _____

Please sip each sample of milk with a code shown on this sensory evaluation sheet. Indicate, by marking a horizontal line across the vertical line under the sample code of the milk sample, to indicate how much you like or dislike each sample. Between samples, please rinse your mouth with the bottled water provided, and expectorate into the paper cup provided for that purpose. You can chew an unsalted cracker between samples to clear your palate from the previous sample.

Code:	Code:	Code:	Code:
Like Extremely	Like Extremely	Like Extremely	Like Extremely
Like Very Much	Like Very Much	Like Very Much	Like Very Much
Like Moderately	Like Moderately	Like Moderately	Like Moderately
Like Slightly	Like Slightly	Like Slightly	Like Slightly
Neither Like Nor Dislike	Neither Like Nor Dislike	Neither Like Nor Dislike	Neither Like Nor Dislike
Dislike Slightly	Dislike Slightly	Dislike Slightly	Dislike Slightly
Dislike Moderately	Dislike Moderately	Dislike Moderately	Dislike Moderately
Dislike Very Much	Dislike Very Much	Dislike Very Much	Dislike Very Much
Dislike Extremely	Dislike Extremely	Dislike Extremely	Dislike Extremely
Comments	Comments	Comments	Comments

DATA ANALYSIS

For each coded sample, measure the distance in centimeters to the horizontal mark you made on the line. **Measure from the bottom of the line.** If your horizontal mark was made at bottom of the vertical line your distance would be recorded as 0.0. If you liked a sample extremely and made a horizontal mark at the top of the vertical line the distance along the line for that sample would be 12.0.

Like
Extremely

Like
Very Much

Like
Moderately

Like
Slightly

Neither Like
Nor Dislike

Dislike
Slightly

Dislike
Moderately

Dislike
Very Much

Dislike
Extremely

Measures of central tendency

Several measures of central tendency can be calculated from sensory data as a means of reducing large amounts of data into measures that are easier to handle and report (e.g. Mean, median and mode). The mean, median and mode are values used to express a calculated estimate of the true value of the parameter (e.g. Sensory score) that is being determined from a set of observations. Other calculations (e.g. Standard deviation) can be conducted to provide an indication of the dispersion of the observations collected.

Mean (Average): The mean is a measure of where the center of the distribution of values in the data set lies. Calculate the mean for each coded sample by taking the sum of the score for the sample given by each panelist of the group and dividing that number by the number of panelists (eg.10).

Example: In sensory analysis of a new blend of cranberry juice and peach juice using 10 panelists the following scores were obtained (12 = like extremely; 0 = dislike extremely)

Panelist	score
1	5
2	8
3	6
4	7
5	6
6	8
7	6
8	4
9	9
10	5

$$\frac{\text{Panelist \#1 score} + \dots + \text{Panelist \# 10 score}}{10} = X_m$$

$$X_m = \frac{5 + 8 + 6 + 7 + 6 + 8 + 6 + 4 + 9 + 5}{10} = 6.4$$

The mean value of the 10 observations is 6.4, which indicates that the panelists slightly liked

Median: is another way of expressing the middle range of a data set. There are an equal number of observations lower than the median and higher than the median. To calculate the median, rank the numbers in the set of observations a sample in numerical order from lowest to highest. If the number of scores is odd (e.g. 5 scores), the middle value is taken as the median. If the number of scores is even (e.g. 10 scores), the median is the average of the central pair of numbers. The sensory scores for the cranberry-peach juice blend, when arranged in numerical order, are: 4, 5,5, 6,6,6,7,8,8, 9. In the case of the example of the cranberry-peach juice blend, the median is the mean of the two middle scores $(6 + 6)/2 = 6$. The median is less sensitive than the mean to the presence of extreme values in the data set.

Mode: The mode is defined as the most frequent score in a set of observations. In the example above, the mode is 6.

Range: The range is used to describe the dispersion of a data set. In the example above about the cranberry-peach juice mix, the range is calculated as the maximum sensory score (9) minus the minimum sensory score (4). Hence the range is 5. The value of the minimum and maximum values in a set of data also can be used to provide an assessment of dispersion.

Standard deviation: Standard deviation is a way of expressing how much the observations made during an experiment, survey, etc deviate from the mean. Standard deviation is a common method used as a measure of dispersion and is used as an estimate of the dispersion in the broader population from which the sample is taken. The standard deviation provides an indication of how widely the values in the sample vary. The standard deviation is small if values for sensory scores are all very similar. Sensory scores that vary widely for a particular sample will produce a larger standard deviation.

The standard deviation is calculated as:

$$s = \sqrt{(d_1^2 + d_2^2 + d_3^2 + d_4^2 + \dots + d_{10}^2)/(n-1)}$$

Where d = deviation of the sample score from the mean:

d_1 = score 1 - X_m for sample code A

d_2 = score 2 - X_m for sample code A

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where n is the number of sensory observations used in the calculation for the coded sample. If there were 10 panelists who provided a sensory score for a sample with a specific identification code, the value of n would be 10.

Example: In sensory analysis of a new blend of cranberry juice and peach juice using 10 panelists the following scores were obtained (9 = like extremely; 1 = dislike extremely)

Panelist	score	deviation (sensory score – mean)	deviation squared
1	5	-1.4	1.96
2	8	1.6	2.56
3	6	-0.4	0.16
4	7	0.6	0.36
5	6	-0.4	0.16
6	8	1.6	2.56
7	6	-0.4	0.16
8	4	-2.4	5.76
9	9	2.6	6.76
10	5	-1.4	1.96
Sum = 64		0	22.4
Mean = 6.4			

Standard deviation is the square root of the variance where variance is the sum of the squared deviation divided by n-1 (e.g. $22.4/9 = 2.49$). The standard deviation is the square root of the variance (e.g. $\sqrt{2.49} = 1.57$). Hence the mean \pm standard deviation is 6.4 ± 1.57).

The standard deviation can provide a measure of the degree of confidence justifiable in a set of data (e.g. Sensory scores for milk), when the scatter in the data is known to be a result of random errors only. A large standard deviation would suggest a low degree of confidence in the data while a small standard deviation would suggest a higher degree of confidence in the data. We often express data as the mean \pm standard deviation. The mean \pm 1 standard deviation would include 68% of a normally distributed population. The mean \pm 2 standard deviations would include 95% of a normally distributed population. Thus the standard deviation can provide us with an estimate of the reliability of the mean value that has been calculated from a set of measurements. The more care we take in trying to eliminate biases and errors in our measurement technique, the closer the mean value will be to the true value that we are attempting to determine with our measuring tool (e.g. Sensory panel scores; milk yield values; sugar concentration in a beverage; protein content in a food item; caloric content of cattle feed; food intake during a feeding trial; yield of corn/hectare, etc.)

Frequency distributions of sets of observations

Data that is normally distributed will have a uniform distribution of values about the mean and

observations is to be skewed to the right (positively skewed distribution) because the frequency curve slopes to the right. You can plot a frequency distribution curve for one of the products tested by plotting the number of responses for each possible score (e.g. # of panelists choosing a score of 12 (like extremely) # of panelists choosing a score of 0 (dislike extremely) and plotting those numbers (on the y axis) as a function of the sensory score (0 to 12) on the x-axis of the graph (histogram). The mean, median and mode in skewed frequency distributions will have different values while those values will be the same in a set of observations that are normally distributed.

Data analysis

Each member of the group should be able to calculate the mean, median and standard deviation for at least two of the coded samples tested. Once the values have been calculated, please collate the data, on the following sheet of paper, according to sample code.

Keeping the Food in Nutrition

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BRIEF SUMMARY AND BACKGROUND INFORMATION:

Brooklyn College is a dense urban, extraordinarily diverse public university in New York City. Here, within the framework of the Introductory Foods course (both lecture and laboratory), over a span of close to two decades, various sustainable food practices have been introduced to and applied by students working towards becoming Registered Dietitians, majoring in Foods, Nutrition and Dietetics.

The Introductory Foods course is grounded in food fundamentals; production, selection, preparation, preservation, science, and nutrition. The laboratory section emphasizes practical food handling skills; a range of food and cookery techniques are introduced, practiced, repeated and reinforced to establish a working foundation of food handling skills. Safety and sanitation measures are emphasized as essential practices in the preparation of safe and wholesome recipes. The interdependence of food and culture is explored in the context of field trips to food stores within New York City neighborhoods.

LEARNING OBJECTIVES/OUTCOMES:

Upon completion of the course, students should be able to:

- identify a broad range of different foods, their sources, seasonality, food chemistry and nutrient makeup and behavior in cookery.
- follow recipes and produce wholesome preparations.
- employ safe and sanitary measures during food handling.
- be aware of roles of food in the local and wider environment in a broad/holistic range of perspectives including cultural, ecological, etc.
- apply sustainable food practices in personal and professional lives.

AUDIENCE OR SETTINGS:

The course has two prongs- didactic and practical. The lecture component meets for three hours each week over the course of a fourteen week semester. Here, food fundamentals are introduced in lecture and discussion format. Practical applications correspondingly follow in the foods laboratory. There, student work stations are set up like a mini-home kitchen i.e. each with a four burner stove, an oven, supply cabinet and work counter. These work stations are surrounded by supply cabinets, refrigerators and a pantry. Students work in teams loosely matched for those who do and do not have previous food preparation experience.

PROCEDURES:

- Both didactic lessons and field explorations consider food's seasonality and regional origin. Students study maps of the United States and of the world, alongside discussion of growth, harvest, transport, preservation, storage, and food marketing. These discussions are coordinated with field trips to a Green Market, a nearby Whole Foods market, and a neighborhood supermarket to both familiarize students with who provisions food, how they provide food, where they provide food, for whom and at what price.
- Right from the start of the course and continuing throughout the semester, fundamental food handling skills such as peeling, chopping, slicing, dicing, simmering, sautéing, stewing, braising, kneading, mixing, folding, etc. are demonstrated to and practiced by students. The skills are introduced as those that would help students survive if they were stuck on a desert island without gadgets or appliances but with basic tools like a knife, a cooking pot or pan, measuring utensils, straightforward recipes and raw ingredients. Sanitation, science and safety measures are woven in as a natural component of food preparation.

- Food is tasted and evaluated objectively and subjectively. After food sampling- and second or third helpings, as desired- students are encouraged to package and take leftovers with them after class. Students return clean recycled containers in which they packaged their food for use by others.
- Plastic, glass, and other containers or wrappings that may be generated from food sources are identified for re-use or recycling, as appropriate.
- Produce peels and trimmings generated in the foods laboratory are collected for composting. For most of the last twenty years, this organic matter was taken off campus to compost further down Flatbush Ave. at the Floyd Bennett Community Gardens of Gateway National Park. I then brought compost at varying stages of decomposition back to the lab for students to examine it carefully- looking, feeling, smelling, identifying components in the process of kitchen scraps breaking down to humus, and discussing this work-in-progress.
- Recent practices- Just this past year, having become a Master Composter, I conducted student workshops on starting a compost bin and on compost bin maintenance.

Then, we partnered with a community garden adjacent to the Brooklyn College football field. Now, students bring organic matter from the Foods Lab to deposit directly there. Student members of the Health and Nutrition Sciences Club have taken on composting as one of their dedicated Club activities and they maintain the compost bin.

- Outside of the Foods Lab, campus-wide collection, transfer and deposit of organic material is being explored by the Health and Nutrition Sciences Student Club and the college's Sustainability Task Force.
- In a field assignment called *Neighborhood Food Exploration*, students explore a Brooklyn neighborhood from a food perspective. Students identify neighborhoods that are cultural clusters different than how they identify themselves and then travel to the neighborhood with a lab partner. There, they visit the local food establishments- the bakery, the butcher, fish monger, produce stand, grocery store. They identify five foods that are completely new to them. They try to learn about daily and celebratory foods within the community. These requirements encourage students to engage with local merchants and shoppers. Students describe their experiences in class presentations.

An Ethnographic and Culinary Introduction to the Farmers' Market and Seasonal Food

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BRIEF SUMMARY:

This farmers' market project acquaints students with the social, cultural, economic and sensory characteristics of local food in the farmers' market. The goal is to have the students experience a farmers' market and seasonal, local food while gaining valuable communication, critical thinking, and research, economic and culinary skills. Small teams of students attend a farmers' market and describe the people and activities of the market using ethnographic survey methodology. A market inventory is also completed which lists the types, varieties and cost of the food sold at the market. The price of the market food is then compared with the price in the grocery stores. Finally, a culinary evaluation of a selected food from the farmers' market and grocery store is completed. The students summarize the experience with an analysis of the benefits and challenges of local seasonal foods from the farmers' market.

LEARNING OBJECTIVES/OUTCOMES:

Students completing this activity will:

- Conduct an ethnographic survey of the farmers market
- Apply food service inventory procedures to farmers' market food
- Complete a culinary analysis and compare a farmers' market food and grocery store food
- Analyze the benefits and challenges of farmers' markets and local seasonal foods

AUDIENCE OR SETTINGS:

A food preparation class for dietetic majors and nutrition minors.

BACKGROUND:

Dietitians are increasingly required to incorporate local food system and culinary knowledge in all practice areas. In community nutrition, local foods as part of gardens and farmers' market coupon programs are promoted to improve diet quality (1-3). Food service operations are increasingly including local foods and considering environmental concerns in food production (4). Farmers' markets are also important places that reflect the economic, social and cultural interactions of the community (5-6).

Students may come to our programs with limited knowledge of seasonal local foods and food preparation. This small group project was developed to familiarize students with the farmers' market and the variety of local foods available. The project also applies culinary and food service management skills in analyzing a selection of foods, and is included in the advanced culinary foods course.

MATERIALS NEEDED:

- Transportation to market (if needed)
- Food scale (optional)

PROCEDURES:

The project involved three steps: conduct an ethnographic survey of a farmers market, compare the price of farmers market produce with grocery store produce and complete a culinary analysis of two varieties of produce with one equivalent grocery store variety. Student groups of two or three were asked to attend a farmer's market. Table 1 describes the three steps of the project, the variables studied and the skills which students develop.

At the market, the students complete the ethnographic survey and the inventory of foods for sale. The ethnographic survey is a description of the farmers market, vendors, customers and

activities. The students become acquainted with the farmers market as a social and cultural place within a community. Next the students complete an inventory of the farmer's market. The inventory includes: foods and varieties, specific agriculture practices, prices per unit and grocery store equivalents, when possible. This is followed by a culinary evaluation comparing two varieties of produce with a variety from the grocery store. The culinary evaluation helps students balance taste, color, and varietal availability with cost. The summary is an analysis of the benefits and challenges of buying seasonal local food. The student-chef perspective allows the student to appreciate the culinary aspects of local foods within a cultural context.

TIME NEEDED:

This activity will take one to two class days.

DISCUSSION QUESTIONS:

How does a farmers market reflect community characteristics? What food knowledge can be gained from a farm market vendor that is valuable to the chef? How is the food in the market different than in the grocery store? How is menu planning changed by eating seasonally?

ADAPTATIONS AND EXTENSIONS:

The farmers' market visit may be assigned by geographic location, neighborhood characteristics or size, and then compared. Each of the three components of the project can be divided in different food service courses. The ethnographic study may be conducted early in the course curriculum in a beginning foods or food system course. The inventory may be part of a food service management course. The culinary evaluation may be incorporated into an advanced culinary course. The proj-

ect may also be reinforced by a visit to the following: farm tour, restaurant or hospital tour that incorporates local food, kitchen incubator, or value added facility. Local farm market products may be incorporated into the foods lab to explore varietals, food production and processing methods. Students may use the seasonal food inventory for cycle menu planning assignments.

ATTACHMENTS:

Farmers' Market Assignment Worksheets

REFERENCES:

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Table 1. Farmers' market project components, variables considered and skills gained.

Project components	Assignment variables	Skill familiarity
Ethnographic survey	Observations of market (place, accessibility, activities); vendor (age, gender, cultural background); customer (age, gender, cultural background); market factors (display designs, WIC coupons, senior citizen coupons)	Survey technique Community food security assessment skills Communication skills Marketing Teamwork
Product inventory	Seasonal food availability, market characteristics, unit pricing, comparative pricing, niche market,	Seasonal food familiarity Non-uniform food standards Unit pricing Economics Sustainable agricultural products
Culinary evaluation	Sensory evaluation, culinary considerations,	Culinary distinctions in varietals, sensory differences, product evaluation

Farmers Market Assignment Worksheets

Ethnographic study form: Through observation and interview, complete the following questions. You may take pictures or videos as part of your report.

Questions	Answers
General Market Information:	
Date of market visit	
Time you visited the market	
Market location (city or town)	
Is there a sign advertising the market? Is this sign permanent or temporary?	
Is the market located near a shopping district?	
Is the market near a bus stop?	
Is the market accessible by walking or biking?	
How many stall or tables are there filled with farmers?	
How many stalls are covered with an awning or other shading?	
Are there other activities at the market besides selling food? Note any cooking demonstrations, music, craft activities, etc.	
Is there an information table or booth? If not, is someone apparently "in charge".	
Farmer Information:	
What is the approximate age range of the farmers?	
How many people selling are women?	
What cultural groups do the farmers represent? (Note the language spoken, groups you know are represented in the community and you may politely ask their cultural heritage)	

List any specific production method that is promoted. This includes organic, biodynamic, grassfed, pastured, etc. Next to the production method you list, add the number of farmers who are promoting this in their product.	
How many vendors accept WIC coupons? They should have the sign indicating this displayed at their stall.	
How many vendors accept senior citizen coupons? Again, the sign should be displayed at their stall.	
What is the general activity of the market, e.g. very active, very quiet, crowded, etc.?	
What type of information do farmers give customers?	
Briefly describe differences that you notice regarding the different display of food. What marketing elements are more appealing to you?	
Customer description	
What is the age range of the customers?	
What are the cultural background of the shoppers?	
Describe the predominant customer shopping (Note age, gender, cultural group, etc.)	
What other products are sold besides food? If so, what are these? This may include crafts, woven products, value added products such as jams, jellies, soaps, etc.	
What is most surprising to you about the farmer's market?	
What are the advantages of shopping at the farmer's market that you observed?	
What are the disadvantages of shopping at the farmer's market that you observed?	

Farm market inventory procedure:

1. Use the table below as a template for your farm market inventory. Go to the farmers market and list the foods that are being sold. These foods include: fruits, vegetables, meat, eggs, fish, etc. Do not include value added foods such as cheese, sauces or jellies, baked goods, etc.
2. Note that you will have to compare the same units in both the farmer's market and the grocery store. Food is sold by weight (pound or ounce), by container (box, bag or basket) or by number (3 apples per dollar). For instance, the farmer may sell by the box rather than the pound while the store sells by the pound or package. You will need to figure out how to compare these two. One option is to weigh the farmer's market produce or ask the farmer for the approximate weight. Or look at the number of pieces and compare relative sizes at the store, thereby getting the pound weight. You may also check out one of the scales from the food lab and record the weight from the farmer's market.
3. Go to a local grocery store and find the price of the comparable food, record the price. Compare the price of the farm market produce to the grocery store.

Complete the inventory using this format:

Group Members (alphabetical):						
Food (produce, meat, insects)	Variety	Indicate any specific production method such as certified organic, grassfed, pastured, etc.	Price per unit (examples: \$1.00/bulb or \$0.90/#) Note: if prices vary by farmer list each price.	Number of farmers selling this produce	Grocery store price/unit* (identify the store here: _____)	Price difference Subtract the farm produce price from the store price. Note this will either be plus (+) or minus (-).
Example: Potato	Russet		\$0.90/#	7	\$0.95/#	+\$0.05/#
Potato	Yukon gold		\$1.10/#	1	Not available (N/A)	
					*Units must be identical to farmers' market.	

Culinary evaluation and comparison using local food and grocery store food:

1. Choose two varieties of your assigned vegetable or fruit from the farmers market (lab units 1-3: tomato; lab units 4-6: apple)
2. Buy 2 pounds each of two produce varieties from the farmer's market. Buy the equivalent amount of that produce from the grocery store.
3. Complete the culinary evaluation as listed in the form below. Note each individual completes a culinary evaluation.
4. Cooking directions: In minimal amount of oil, add cubed sections of the tomato and sauté gently until cooked. For tomatoes, reduce to a thickened sauce. Lightly salt. You may microwave or steam the apples in a scant amount of water. Be sure to use the same amount of water for all varieties of apples, if microwaving. Cook all varieties for the same amount of time.
5. Each person completes an assessment of the cooking and tasting quality of the prepared dish using the format below.
6. Discuss the individual assessments as a group and write a 1 page group assessment. What variety is preferable raw? How would you use each variety in cooking? What characteristics determined this decision? Summarize the culinary advantages and disadvantages of the varieties.

Name:			
Culinary Characteristic:	Variety #1:	Variety #2:	Grocery store variety
Raw comments:			
Color			
Texture			
Taste (primary, secondary, after-taste)			
Cooked comments:			
Color			
Texture			
Taste (primary, secondary, after-taste)			
Culinary notes: Cooking differences, use of product in different dishes, color changes while cooking, etc.			

Planning for Sustainability in a Quantity Foods Practicum

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BRIEF SUMMARY:

Food and Nutrition Students at Montana State University take a two course series including Food Service Systems Management and a Quantity Foods Practicum. In the Practicum students are organized into teams of 4 to 5 that plan, purchase, prepare, and present a dinner for 30 guests with attention to an assigned nutrition constraint (such as low sodium, diabetic diet, wheat free etc.). In addition to the actual dinner presentation, teams submit each component of the assignment in the form of a virtual notebook. The Planning section of the notebook includes the development of a mission, vision, goals and objectives, job descriptions, a master schedule, a general food safety and sanitation plan, a marketing plan, an evaluation plan, and finally a sustainability plan. Other sections of the virtual notebook include Nutrition and Food Safety, Budget and Financial Analysis, Marketing and Education, and Evaluation. The focus of this educational resource is on the *sustainability plan* in the context of this assignment.

LEARNING OBJECTIVES/OUTCOMES:

- In the context of quantity foods, consider all aspects of sustainability including ecological sustainability, economic viability, and the advancement of social justice.
- Develop a plan for addressing all aspects of sustainability in a quantify foods project.
- Provide a presentation of the sustainability plan to the invited audience.
- Conduct an evaluation of the implementation of the sustainability plan.

AUDIENCE OR SETTINGS:

This activity is most appropriate for students who are planning a quantity foods project. Regardless of the other components

of that assignment, adding a sustainability planning component will be a beneficial exercise.

BACKGROUND:

Sustainable food systems conserve and renew natural resources, advance social justice and animal welfare, build community wealth, and fulfill the food and nutrition needs of all eaters now and in the future. Food service operations can have a significant impact on food system sustainability through procurement, food preparation methods, waste management, financial resource management, and human resource management practices. A plan might include the following: Local sourcing of foods to minimize food miles; minimizing food waste, and other solid waste as a result of the project; conserving energy while cooking; composting inedible food scraps or leftovers; and avoiding paper waste. How should economic viability be addressed? Perhaps local businesses are being supported in developing and presenting the quantity foods project. The food budget is reasonable and within given constraints. Menu prices adequately cover food costs and other costs associated with delivering the meal. Does the plan take social responsibility into account? For example, are hypothetical employees treated fairly, paid fairly, and involved in decision making? Is the organizational structure of management conducive to decision making that benefits all members of the team?

MATERIALS NEEDED:

Students will need a clear understanding of how sustainability is defined, and of the ecological, economic, and social justice aspects of sustainability. The food system sustainability conceptual diagrams located in the beginning of this educator's resource may be useful for this purpose.

PROCEDURES:

As students plan their quantity foods project they consider

and develop their plan for sustainability, addressing the various aspects of sustainable food systems as appropriate and including measurable outcomes as much as possible. They implement the plan in the context of the quantity foods project, present the plan to audience members by oral presentation or educational handout, and then evaluate their success in follow the plan.

DISCUSSION QUESTIONS:

- How did you address ecological, economic, and social justice in your sustainability plan?
- Which aspects of sustainable food systems were easiest to address in your plan and which were most challenging?
- How successful was the implementation of your plan?

ADAPTATIONS AND EXTENSIONS:

This assignment can be used as an add-on for any quantity foods project.

RESOURCES:

American Dietetic Association Sustainable Food System Task Force. (Lollar, D., Harmon, A., Hartman, B., O'Neil, C., Raimondi, M., Roberts, S., Tagtow, A., Wilkins, J., Devlin, C., & Holler, H.) (2007). *Healthy Land, Healthy People: Building a Better Understanding of Sustainable Food Systems for Food and Nutrition Professionals: A Primer on Sustainable Food Systems and Emerging Roles for food and Nutrition Professionals*. Chicago, IL: American Dietetic Association. Available at http://www.hendpg.org/docs/Sustainable_Primer.pdf.

Sustainable Chef: How Green Can You Go?

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BRIEF SUMMARY:

This learning activity challenges upper-level dietetics undergraduates to utilize knowledge and skills regarding the chemical and physical properties of food acquired in the experimental foods class to investigate effects of an ingredient in a food product as well as incorporate their expertise in sustainable food practices and fair trade. Students, divided into teams of three to four, will ultimately face off in a frenetic eco-friendly culinary battle! Teams chose a recipe including the ingredient they want to investigate. The investigative ingredient must be one with a distinct functional property so when it is manipulated, results will be as clear as possible. In addition, students must incorporate eco-friendly ingredients (such as organic, locally-grown, and/or fair trade) and trace each ingredient back to its origin along with the miles it took for each ingredient to travel to Southern Illinois University Carbondale. Two requirements of the research project are: 1) the product must be nutritionally healthy; and 2) it must be healthy for the environment. The teams compete at the end of the semester to determine which team is the greatest and the greenest amongst the experimental food scientists. In addition to department faculty, local chefs, and classmates judge the final products. A final report including an introduction, literature review, methodology section, results and discussion section, and conclusions is completed one week after the “battle” to allow teams to include results from their recipe evaluations.

LEARNING OBJECTIVES/OUTCOMES:

- Students will demonstrate knowledge and skills related to chemical and physical properties of food gained in the experimental foods class by successfully manipulating a functional ingredient in a recipe as judged by the actual product outcome.
- Students will demonstrate an understanding of simple sensory evaluations as judged by observation.
- Students will demonstrate an understanding of environmental impact of food sustainability practices and fair trade as judged by their final report.

- Students will perform basic experimental food research projects using proper methodology as demonstrated by their final report.

AUDIENCE OR SETTINGS:

The Sustainable Chef learning activity is intended for upper-level dietetics students who are completing a food science course that incorporates classroom and lab instruction. Prerequisites for the course are food service sanitation and quantity food production. The activity takes place in the foods lab.

BACKGROUND:

Research indicates active learning activities are highly favorable in the college setting. Active learning improves course content understanding and knowledge retention.¹ Team-building learning activities such as this one, facilitate conflict resolution skills and students’ taking ownership of their project.² Moreover, active learning activities encourage social integration of students which improves student retention rates.¹ The Sustainable Chef project is a unique active learning activity designed to encourage students to work together, learn from each other, and utilize knowledge and skills gained over the course of the semester.

MATERIALS NEEDED:

Foods laboratory with appropriate food preparation utensils and equipment and recipe ingredients

PROCEDURES:

Planning of experiment:

1. Teams select a recipe including an ingredient with a distinct function for easy manipulation. Instructor approval required.

2. Conduct a two-component background study.
Component 1: Conduct a literature review of the chemical and physical properties of the investigative ingredient.
Component 2: Discuss food sustainability practices in relation to ingredients used for the experiment.
3. Write an introduction. The introduction will be a summary of the background study.
4. Write methodology section. This will be a two-part section similar to the background study. Section 1: Specifically describe how to execute the experiment. Include the nutritional information and cost for both the experimental recipe as well as the control recipe. Describe the ingredient that will be manipulated and how it will be manipulated such as change in amount used, replaced with healthier ingredients, etc. Discuss how the experimental product will be evaluated (sensory evaluation, measurement of dimension (size), and/or measurement of consistency). Include a list of materials and equipment.
Section 2: Trace each food item in your recipe from where it was grown/produced to the university. Calculate the number of miles each product traveled to arrive in your kitchen. Internet map program may be beneficial for this. Discuss how this impacts the environment.

Execution of Experiment:

Teams are responsible for purchasing recipe ingredients, preparing the experimental recipe and control recipe, and hosting a taste test on the pre-established date documented in the course syllabus. On competition day, teams will:

1. Prepare the experimental recipe as well as the control recipe. Have both recipes readily available for judges and peers to review.
1. Explain your experiment to judges and present for taste test.
1. Collect data for your evaluation.

Complete Written Report:

1. Analyze data collected on competition day. Write results and discuss findings as well as answer discussion questions.
1. Write the conclusion.

Grading (see grading rubrics):

- Concept & Execution Evaluation - 25%
- Written reports - 50%
- Judges input - 25%

TIME NEEDED:

One hour during classroom time to discuss project and answer questions plus one two-hour food lab for the competition.

Teams are encouraged to discuss their projects during down-time in lab or schedule a team meeting outside of class time.

DISCUSSION QUESTIONS:

1. Why did you choose to manipulate the ingredient you did?
2. How did the functional qualities of the manipulated ingredient compare to the control?
3. Discuss differences or similarities in structural qualities of the experimental product compared to the control.
4. Discuss nutritional and cost changes that occurred in the experimental product compared to the control.
5. How has this project affected your knowledge about sustainable food practices and fair trade?
6. How will your knowledge of sustainability impact your future as a dietitian?

ADAPTATIONS AND EXTENSIONS:

The Sustainable Chef activity can be modified and adapted to a variety of dietetics classes including quantity food production and food production management.

ATTACHMENTS:

Timeline
 Scoring Rubric

REFERENCES:

1. Braxton J, Jones W, Hirschy A, Hartley III H. The role of active learning in college student persistence. *New Directions for Teaching & Learning* [serial online]. Fall 2008;(115):71-83.
2. Scott-Ladd B, Chan C. Using action research to teach students to manage team learning and improve teamwork satisfaction. *Active Learning in Higher Education* [serial online]. November 2008;9(3):231-248.

RESOURCES:

American Dietetic Association Sustainable Food System Task Force. (Lollar, D., Harmon, A., Hartman, B., O'Neil, C., Raimondi, M., Roberts, S., Tagtow, A., Wilkins, J., Devlin, C., & Holler, H.) (2007). *Healthy Land, Healthy People: Building a Better Understanding of Sustainable Food Systems for Food and Nutrition Professionals: A Primer on Sustainable Food Systems and Emerging Roles for food and Nutrition Professionals*. Chicago, IL: American Dietetic Association. Available at http://www.hendpg.org/docs/Sustainable_Primer.pdf.

Sustainable Chef: How Green Can You Go?

Timeline

<i>Beginning of Semester</i>	
	1. Assign teams of 3-4 students for each lab. Teams will work together each week in lab to establish a working relationship.
<i>5 weeks prior to competition day</i>	
	1. Explain “Sustainable Chef: How Green Can You Go?” assignment and competition.
<i>3-4 Weeks prior to competition day</i>	
	1. Assist teams with recipe selection and ingredient manipulation. Answer questions.
<i>2 Weeks prior to competition day</i>	
	1. Invite guest judges including chefs and faculty members. 2. Obtain equipment lists from students; ensure labs are equipped with necessary equipment and supplies.
<i>1 Week prior to competition day</i>	
	1. Purchase any necessary supplies. 2. Prepare judges scorecard
<i>Competition Date</i>	
	Bring: 1. Judges’ scorecards 2. Clipboards and pencils
<i>1 Day after competition day</i>	
	1. Tally judges’ scorecard results and determine a winner. Award prize/certificate at next class period.
<i>1 Week after competition day</i>	
	1. Write thank you notes to guest judges. 2. Makes notes as to changes needed for the next semester.

Sustainable Chef: How Green Can You Go?
 Concept & Execution Evaluation (25 points)
 Scoring Rubric

Team:

Category	Poor 0-1 Points	Fair 2-3 Points	Good 4 points	Awesome 5 points
ORIGINALITY & CREATIVITY	Without thought or creativity involving the manipulated ingredient.	Not very creative use of manipulated ingredient	Chose recipe with 5 or more measured ingredients & creative use of manipulated ingredient.	Chose recipe with 6 or more measured ingredients & very creative use of manipulated ingredient.
RECIPE	Chose recipe with fewer than 3 measured ingredients.	Chose recipe with 4 measured ingredients.	Chose recipe with 5 measured ingredients.	Chose recipe with 6 or more measured ingredients.
TIMELY PLANNING & EXECUTION	Products not ready on time for judges testing. No explanation to judges on manipulated ingredient.	Products ready on time for judges testing. Little to no explanation to judges on manipulated ingredient.	Products ready on time for judges testing. Short explanation to judges on manipulated ingredient.	Products ready on time for judges testing. Detailed explanation to judges on manipulated ingredient.
SUSTAINABILITY & FAIR TRADE	No explanation to judges on use of sustainable food products or fair trade products used in experiment.	Very brief explanation to judges on use of sustainable food products or fair trade products used in experiment.	Short explanation to judges on use of sustainable food products or fair trade products used in experiment.	Detailed explanation to judges on use of sustainable food products or fair trade products used in experiment.
SAFETY AND SANITATION & CLEAN UP	Did not incorporate food service sanitation guidelines. Materials and equipment not put away after cleaning.	Incorporated some food service sanitation guidelines. All materials and equipment put away after cleaning.	Incorporated food service sanitation guidelines. All materials and equipment put away after cleaning. Counters clean.	Incorporated food service sanitation guidelines. All materials and equipment put away clean and in proper place. Counters clean and sanitized. Kitchenette immaculate.
Total Points				

Community Nutrition

Creating a Healthy and Sustainable Menu for the Future:

Incorporation of a Food System and Sustainability Module into a Dietetic/DPD Community Nutrition Course

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SUMMARY:

In order to ensure that dietetic students were well-informed about timely and wide-ranging environmental, economical, ethical – not to mention health - issues surrounding food choice and behavior, a comprehensive and intensive module was incorporated on the food system and sustainability into the senior-level Community Nutrition course offered at Virginia Tech in the fall of 2008. The workbook, *Menu for the Future*, published by the Northwest Earth Institute, acted as the cornerstone of this module. It includes six different sections, each with a compilation of essays, designed to elicit discussion through its discussion questions and by the nature of the viewpoints: What's eating America; Anonymous Food; Farming for the Future; You are What You Eat; Toward a Just Food System; and Choices for Change. The workbook covers a broad range of topics concerning agriculture, food, culture, society, and ecology by notable authorities in the field, including Wendell Berry, Marion Nestle, and Michael Pollan. Although many of the viewpoints in *Menu for the Future* are controversial, the workbook acts as a springboard for discussion and allows students an opportunity to critically evaluate "evidence" as it relates to these topics, especially with additional readings, activities, and a video.

The course as a dietetics didactic tool challenges students to look at their personal and future professional practices, as they live in an environment that favors convenience, affordability, and accessibility over sustainability. With the majority of the sustainability module addressed in the first few weeks of the course, students also have the opportunity to examine existing food assistance and nutrition education programs, covered during the remainder of the course, for their potential to be more ecologically-friendly and to create a community nutrition program. They may witness "local foods" efforts at the end of the growing season. Additionally, the course provides students with an expanded view of the environment through activi-

ties that examine transportation and current transportation systems in their community. Students will ultimately learn to see food as more than just fuel for the body but a world-wide staple that plays a key role in the environment and economy.

LEARNING OBJECTIVES:

- To broadly understand the environmental, economical, ethical, and health impacts of different agricultural practices and consumer food purchases and practices
- To learn about the origin of food products and ingredients and the globalization of the food system.
- To consider cost- and culturally-effective means for creating sustainable food systems.
- To examine the local food system, including the built food environment and infrastructure at the university and in the local community
- To gain insight into the role of Farmer's Markets within a community and its impact on the food system and economy
- To explore and discuss the dietetic practitioner's role in sustainable food systems.

AUDIENCE/SETTING:

The course is directed towards upper-level dietetic students in community nutrition courses under a DPD curriculum. The workbook and activities could also be used in dietetic internships as part of the program planning process within the community rotation or, with journal articles, as part of a multi-disciplinary graduate course.

MATERIALS NEEDED:

Menu for the Future,™ Northwest Earth Institute, Portland, OR. Assignments (in appendix)
A book on sustainable foods, such as:

1. Kingsolver B. *Animal, Vegetable, Miracle*. New York: HarperCollins; 2007.
2. Pollan M. *In Defense of Food: An Eater's Manifesto*. U.S.A.: The Penguin Press; 2008.

King Corn™ video: Woolf A, Cheney I, & Ellis C. King Corn, Mosaic Films, Incorporated. 2007. Available at: <http://www.kingcorn.net/>. King Corn: A feature documentary from Mosaic Films Incorporated. King Corn explores the journey of two friends with one acre of corn and how this subsidized staple food impacts our fast-food nation. The two friends Ian Cheney and Curt Ellis, from the east coast, move to the heartland to grow their corn crop, but interesting and troubling questions arise about what we eat and how we farm when they try to follow their corn's journey into our American food system.

Other Options: YouTube videos of interviews with experts in agriculture, food systems, sustainability, and nutrition.

* It is highly recommended that students have access to a local Farmer's Market (although a farm could be substituted) to enhance the learning experience.

PROCEDURES AND TIME REQUIRED:

Students are divided into "community" groups of six or seven. Each week for six weeks, one of the sections of *Menu for the Future* is discussed in class. All readings, including the designated section, and assignments for that week are expected to be completed outside of class and submitted prior to class. Each student is expected to facilitate or co-facilitate discussions for one of the six sections of *Menu for the Future* with another student writing down overall comments and questions to be shared with the whole class during the last 10 minutes of the class. Once students have ample time to discuss the questions in the workbook as a community group, the entire class convenes and discusses overall comments, concerns, and questions. This format was used in order to allow for other material to be covered in the course, such as conducting needs assessments, and so that there is sufficient time to conduct out-of-class activities to enhance readings and class discussions. The module has been set up to be six weeks long with discussions lasting during one 50-minute class; two sections could be combined if classes were longer. The time required for homework assignments varies from week to week but generally requires around 2-3 hours.

Week 1:

This week focuses on the effects of modern industrial eating habits on culture, society, and ecological systems.

Reading: *Menu for the Future* Section 1: What's Eating America

Discussion Questions:

1. Wendell Berry contrasts an "agricultural eater" with an "industrial eater." Which are you and why?
2. How do you feel about the suggestions for "responsible eating"?
3. Looking at what (from your food log) and how you eat, how could you incorporate these suggestions into your own eating habits?

Project: Food System Log and Food System Assessment

Week 2:

This week explores the historical shifts from small-scale family farming to large-scale industrial farming and questions and confrontations that arise with genetically modified foods and organics. Students will examine ecological and economic impacts that accompany historical changes.

Reading: *Menu for the Future* Section 2: Anonymous Food

Discussion Questions:

1. How do you make food choices? Do you consider short-term, long-term, or environmental impacts when you buy or eat food?
2. Discuss how you feel about large-scale organic farming and genetically modified foods. Take into consideration threats on organic standards and consequences of genetically modified foods on health and food extinction.
3. Based on your assignment, where do your foods come from? To what degree, can you comment on how they were grown? processed? and transported? And their safety?
4. How might your food or diet be different than someone, say, 30 years ago?

Project: Food Miles Calculation. View "King Corn."

Week 3:

This week explores how individuals can make food choices that lead to a more sustainable food system by highlighting key growing practices and the benefits of supporting a local food economy.

Reading: *Menu for the Future* Section 3: Farming for the Future; Book for book review

Discussion Questions:

1. What are the benefits of organic foods? “local” foods?
2. If someone asked you if they should choose organic or “local,” what would you say?
3. In what ways would it be easy or difficult to eat exclusively local-based (or sustainable) foods and meet dietary recommendations?

Project: Book Review for *Animal, Vegetable Miracle* by Barbara Kingsolver or *In Defense of Food* by Michael Pollan

Week 4:

This week explores the heart of the relationship between dietetics and sustainable food systems. This week looks at our food system and the impact it has on human health and nutrition.

Reading: *Menu for the Future* Section 4: You are What You Eat

Discussion Questions:

1. What are the potential positive and negative health impacts of our current food system? Consider dietary variety and preservatives and/or chemicals.
2. What current food trends do you think impose the biggest problem for unhealthy eating in America and why?
3. What types of foods are available in your food environment?
4. In what ways do transportation and your physical environment contribute to your food purchasing patterns and diet? health? How are your behaviors similar and/or different to clients you may serve as a dietitian?
5. In what ways can you support sustainable food systems as a dietitian? Consider limited resource audiences in your response.

Project: Neighborhood Food Assessment and Transportation and Neighborhood Walking Assessment

Week 5:

This week focuses on hunger, equity and Fair Trade. Students

will discuss how various governments, communities, and peoples can play a part in creating a more just food system.

Reading: *Menu for the Future* Section 5: Towards a Just Food System

Discussion Questions:

1. If a country as poor as Brazil can have cities with food programs such as the ones at Belo Horizonte that enable all people to have access to healthy foods, why doesn't the U.S.?
2. In reference to the reading, “Bananas,” how did you react to the fact that modern day slavery may exist in a new form?

Project: Visit a local farmer's market and write on experience. Create a day's local food menu and write on experience.

Week 6:

This week will put all the learning together by offering encouragement and practical guidance on taking steps to create a more sustainable food system.

Reading: *Menu for the Future* Section 6: Choices for Change

Discussion Questions:

1. How would you describe “responsible eating”?
2. In what ways can “responsible eating” be tied into existing programs?

Project: Write a “letter to the editor” for your school or local newspaper. What did you learn from the readings? What can students and/or consumers do simply to eat better, be healthier, and live more sustainably?

ACKNOWLEDGEMENTS

The food log and assessment assignment, food miles calculation, and transportation and neighborhood walking assessment were adapted with permission from another Virginia Tech course, UAP 5424, Planning Healthy, Sustainable Communities, from the Instructors, Joe Schilling, PhD & Kimberley Hodgson, MS, RD.

Undergraduate Student Team Activity in Sustainable Food Systems

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BRIEF SUMMARY:

Undergraduate students at Clemson University have the opportunity to participate in student team activity, called Creative Inquiry, designed to encourage reasoning and critical thinking skills, ethical judgment, communication skills and research skills. A team of DPD students focused on sustainable food systems visited the campus student organic farm, a local farmers' market and developed a calendar highlighting a monthly food in season locally.

LEARNING OBJECTIVES/OUTCOMES:

- Students will analyze availability of local foods and develop materials to increase awareness of seasonal, local foods among their peers.
- Students will demonstrate the ability to work as a team member, to communicate information about nutrition and sustainable food systems, and to identify accurate nutrition information.

BACKGROUND:

Clemson University has developed a campus-wide initiative called Creative Inquiry which focuses on intensive, discovery-oriented approaches to learning. Emphasis is placed on providing a meaningful experience that will promote reasoning and critical thinking skills, ethical judgment, and communication skills as well as a deep understanding of the methods of scientific and/or humanities research. Project goals focus on developing student capacities to find, analyze, and evaluate information¹.

Undergraduate DPD students at Clemson University participate in multi-semester, student-driven team projects, called Creative Inquiry, designed to encourage critical thinking and research skills. DPD students enroll for one credit hour most semesters of their sophomore, junior and senior years. One

of the teams in the Department of Food Science and Human Nutrition focuses on sustainable food systems. Students decided to further narrow the focus to local foods produced in a sustainable way.

PROCEDURES:

Students visited the Student Organic Farm on campus where they heard about organic food production, heirloom vegetable production and organization of a campus farmers' market. Additionally, they visited an area farmers' market and had a discussion session with a representative of a locavore group.

Students decided to focus on raising awareness of local and sustainable foods among their peers. After discussing various strategies, they decided to develop a calendar highlighting a food that is available locally each month. They obtained information from the SC Department of Agriculture and the Carolina Farm Stewardship Association about seasonal availability of fruits and vegetables. Each member of the team selected a food and month. Students obtained information about nutrient content, selection, storage and preparation of that food and a recipe using that food that would appeal to college students.

Students developed a format for the calendar and standardized each presentation for each month. They also had a recipe testing session. Most recipes were then slightly modified based on student feedback; one recipe (for popovers) was eliminated after students realized that its preparation required a higher skill level than they (and their peers) had. One student analyzed the recipes for nutrient content using the Genesis R&D (version 6.5; ESHA Research, Salem, OR) software program, which allowed for generation of Nutrition Facts panels which they included in the calendar. Another developed a modified food color guide and a seasonal food chart to be included in the calendar. A small group of students developed the cover and did the final editing and formatting.

Students discussed distribution of the calendar and decided to sell the product rather than give it away and decided on location and timing of the sale.

Students were required to write a reflection on the semester activities. Reflections indicated that most students had never been to a farmers' market and were unaware of the variety of foods available through them. Students also expressed satisfaction with completion of a project of this magnitude in

a semester and with improved knowledge of local foods and presentation of nutrition and food information to their peers.

REFERENCES:

1. Creative Inquiry. Clemson University Undergraduate Studies Web site. http://www.clemson.edu/ugs/creative_inquiry/ Accessed January 12, 2009.

More than “just something to eat”:

Exploring human bio-social evolution, food systems and sustainability through an introductory Food and Society class

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COURSE SUMMARY AND BACKGROUND:

According to food scholar Warren Belasco,¹ “eating entails a host of personal, social and even global factors that, in their entirety, add up to a complex *food system*.” (p.7) This food system both shapes and is shaped by the larger ecological context in which it exists. Food is, by far, much more than just something to eat.

“Food and Society” is a course designed and taught by a nutritional anthropologist/registered dietitian at Ithaca College. It is offered as an undergraduate nutrition elective course for Nutrition Emphasis students in the Health Science major, many of whom go on to pursue graduate work in nutrition and dietetics. The course can also be taken as a general elective for students in other disciplines. Course content draws from several disciplines to provide a thorough exploration of the story of human food use at personal, socio-cultural and global levels connecting the topics of human bio-cultural evolution and food use with issues of health and sustainability. Topics follow two overlapping conceptual threads: space, moving from individual to global concerns; and time, examining biosocial evolution and history. Within these threads, the course is structured into three broad themes: Food and Identity; Food and Community; and Food Citizenry.

LEARNING OBJECTIVES/OUTCOMES:

Class discussion and lecture, readings, film, journaling, interviews, participant observation, and cooking and eating activities are used to address student learning objectives including: (1) explore individual and cultural bases for food preference and behaviors; (2) examine the significance of food preparation, food traditions, commensality, marketing, and consumerism for individuals and societies; (3) describe forces of social change that have impacted food systems throughout human history; (4) discuss the role of food systems in contributing to environmental degradation, animal welfare concerns, and human malnutrition; and (5) describe models of food production and consumption that can support well-being at individual, social and global levels.

In addition to class readings and discussion, students work in small groups to complete a food product analysis, as similarly described by Wilkins.² Students also investigate cultural and regional food economies and cuisines in a “Slow Foods - Food Traditions” research and class cooking project. This article focuses on the third core class activity, which is journaling. Through this learning tool students explore their reactions to and reflections about assigned activities and topics that span the course of the semester. The following discussion presents examples of journaling activities used in the class to encourage students to put a finer point on their food related beliefs, attitudes and practices.

“YOU ARE WHAT YOU EAT” JOURNALING ACTIVITY

The “You Are What You Eat” journaling activity is a multi-faceted tool comprised of a series of short activities and reflective writings completed throughout the semester. Each activity coincides with and is intended to facilitate affective learning related to the three primary themes of the class.

Journaling about Food and Identity explores identity as a whole, asking students “If you had to express who you are with a meal, what would it be and why?” Students journal on this question, then ask it of a friend and reflect on the response. Other assignments in this theme include exploring personal taste and food preferences,^{3,4} describing memories tied to food,^{1,5,6} interviewing a parent or caretaker who was involved in feeding and role-modeling about food during the student’s formative childhood, and investigating food heritage by selecting and eating a food “that your great-great-grandparents would have eaten.”

Next, the Food and Community theme broadens the exploration to include the cultural dimensions of food and its role as a medium of communication. Students write about the personal and social significance of an “everyday food ritual” that they regularly engage in. This prompts students to explore the use and meaning of food and activities centered on food as means of communication and *commensality*, which Belasco¹ defines as the “almost magical properties [of turning] self-seeking indi-

viduals into a collaborative group” when food is shared. (p.20) Another project related to the communal aspect of food asks students to investigate the use of food *in art* or food *as art* by selecting an example of either, in any medium of artistic expression, and presenting their interpretation through discussion with the class and through journaling.

The final theme of the course, Food Citizenry, is introduced by asking students to interview an adult 50 years or older regarding their observations and opinions of how the food landscape has changed in their lifetime. Interviews are used again as a tool for exploration when students interview five individuals from varied backgrounds about their attitudes, beliefs and practices regarding carnivory. This exercise is preceded by class readings,⁷⁻¹² film¹³ and discussion about the controversial production model of factory farming and confined animal feeding operations (CAFOs), as well as the health concerns associated with meat-centered diets.

Two exercises utilize students’ observational skills. A 48-hour food marketing log calls upon students to record food marketing messages that they encounter during the course of two days then write an analysis of their observations based on concepts raised by materials in the class.¹⁴⁻¹⁶ Another participant observation activity sends students to a grocery store and a farmers market to observe and compare the settings in terms of social interactions, environment, available foods and personal experience.

In the final journaling assignment, students reflect on guest visits to the class by a local organic cheese farmer and local coffee roaster who participates in fair-trade practices. Discussion is partly framed by class readings from the work of Tom Lyson, who presents his model of “civic agriculture” as a solution to contemporary food system ills.¹⁷

ADAPTATIONS AND EXTENSIONS:

Recently, the Secretary General of the United Nations Ban Ki-moon underscored the importance of personal behaviors for addressing concerns of global climate change and poverty.¹⁸ Behavior change starts with personal reflection and awareness. The journaling activities described above provide opportunities for students to reflect on many of the personal and social forces that shape and are impacted by food choice. Such activities could easily be integrated into other nutrition courses to facilitate personal exploration regarding food behaviors that have both personal and global health implications.

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Local and cultural feast:

Facilitating students' learning in the area of sustainable food practices among different cultural/ethnic groups

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BRIEF SUMMARY:

This Learning Activity is designed for instructors of Cultural Food to facilitate students' learning in sustainable food practices in cultural contexts. Utilizing Bloom's Taxonomy¹ and various pedagogical approaches, such as hands-on assignments, interviews at the Cultural Food lab and in-class discussions, instructors will be able to teach this topic in a comprehensive manner. Major outcomes of this Learning Activity include: 1) define and describe sustainable food practices, 2) examine factors associated with sustainable and healthy eating 3) evaluate current cultural practices for sustainable food systems and food culture preservation, and 4) develop strategies for promoting sustainable food practices to ethnically and culturally diverse populations.

LEARNING OBJECTIVES/OUTCOMES:

The learning objectives/outcomes of this Learning Activity correspond to different levels of Bloom's Taxonomy. At the end of the learning activities, students will be able to:

- Define and describe sustainable eating (Remembering and Understanding)
- Examine factors associated with sustainable and healthy eating (Analyzing)
- Evaluate current cultural practices for sustainable food systems and food culture preservation (Evaluating)
- Develop strategies for promoting sustainable food practices to ethnically and culturally diverse populations/clients (Creating)

AUDIENCE OR SETTINGS:

Undergraduate students who are taking a cultural food class.

BACKGROUND:

Promoting sustainable food systems has been gaining great attention among nutrition professionals in this country. Nutrition professional organizations are now dedicated to promoting healthy, sustainable food choices, as well as a local and sustainable food supply that protects human health. My preliminary findings show that more than 90% of the students taking the cultural food class would like to promote locally grown/produced food in the community.²

Different ethnic/cultural groups bring unique skills and traditions, such as healthful eating habits and knowledge of ethnic products. During acculturation to U.S. mainstream culture, as well as due to globalization, their traditional foods are replaced with processed foods high in fat, sodium, and sugar. These ethnic groups continually face challenges in preserving their food cultures while effectively utilizing locally available food ingredients. To date, there has been little discussion of educational strategies for incorporating traditional food practices among ethnic groups into the promotion of sustainable food systems in this culturally diverse country. Discussing those means in the classroom will enhance future nutrition professionals' ability to promote healthy and sustainable food practices to culturally diverse populations. Moreover, research shows that nutrition educators need guidance on student projects and class activities that promote discussion.³

MATERIALS NEEDED:

Assignments and Group activity sheets (resources #1-7) (see the pages following this lesson plan)

Documentary film

Articles for assignments

PROCEDURES:

Activity #1: In-class discussion to define and describe sustainable food practices

On the first week of the class, a group activity, using group activity sheet 1 (Resource #1), addresses students' knowledge and perceptions of sustainable food systems and their relationship to ethnic/cultural groups. Students form a group of 4-5 people and discuss the questions listed in the activity sheet. Each group will present the results of the group discussion.

Activity #2: Ethnic food market visit to examine factors associated with sustainable eating among different ethnic/cultural groups

Students will complete a mini-project involving visiting an ethnic food market and submit the summary of their participant observations (Resource #2). Students are also asked to choose a recipe of an ethnic cuisine and find out which ingredients are available at the market.

Activity #3: Interview with a Cultural Food lab guest speaker to examine factors associated with sustainable eating among different ethnic/cultural groups:

Each student will become a presenter at the Cultural Food lab, invite a guest speaker and ask the guest speaker how s/he obtains cultural food products and/or ingredients to cook her/his cultural foods (see resource #3). The student will have questions for the guest speaker about challenges and opportunities in obtaining and/or cooking cultural foods and facilitate discussions with other students.

Activity #4: Assignment, documentary film and group discussion of the Slow Food Movement to evaluate current cultural practices for sustainable food systems and food culture preservation (1):

Students are asked to research the Slow Food Movement and submit a summary of their research. In the classroom, students will watch some clips of thought provoking and/or controversial films related to globalization, sustainable food systems and food culture (e.g. Mondovino, Global Banquet, Future of Food). Students form groups of 4-5 and discuss the topic (Resource #4). The students will then present their discussion results with the rest of the class.

Activity #5: Reading assignment followed by in-class activity to evaluate globalization, cultural practices for sustainable food systems and food culture preservation

Students are asked to read the article about globalization in Mexico and summarize their thoughts on the article (Resource #5). Subsequently, students will be divided into small groups

of 5-6 students and discuss the relationship between globalization and food culture (Resource #6).

Activity #6: In-class activity to develop strategies for promoting sustainable food practices to a culturally diverse population:

Based on the results of the previous activities (Activities #1-5), students will form groups of 4-5 and develop strategies for promoting sustainable food practices to a culturally diverse population (Resource #7). Specifically, they will integrate the following statements suggested by Harmon et al³ with their culturally appropriate strategies:

- Encourage dietary variety among and within food groups and consumption of heirloom varieties.
- Encourage consumption of food produced with fewer agricultural inputs (e.g., certified organic, grass-fed or range-fed meats, pastured poultry).
- Encourage the consumption of locally produced foods through farm stands, farmers' markets, food cooperatives, and community supported farms.
- Work to improve access to locally produced foods.
- Get involved in a buy-local campaign.
- Encourage connections between local producers and local institutions.
- Encourage consumption of fresh or minimally processed foods.
- Encourage consumption of protein from plant sources.
- Encourage economic food purchasing that also reduces packaging waste.

TIME NEEDED:

Activity #1: In-class activity 20 minutes

Activity #2: Assignment 1 hour

Activity #3: Interview and discussion 20 minutes

Activity #4: Assignment 30 minutes, documentary film 15 minutes, in-class discussion 15 minutes

Activity #5: Assignment 1 hour, in-class discussion 15 minutes

Activity #6: In-class activity 20-25 minutes

DISCUSSION QUESTIONS:

See Resources #1-7 for specific discussion questions for each activity.

ADAPTATIONS AND EXTENSIONS:

- For Activity #2, it is desirable if the instructor discusses qualitative research methods, including participant observations, prior to this assignment.
- The interview for Activity #3 can be conducted outside the food lab instead.
- Instead of showing a documentary film in Activity #4, students may be asked to read a relevant article prior to the class session.
- For Activity #5, the article for the assignment can be modified based on the focus of region on that week (e.g. Mexico, Southeast Asia, etc.).

REFERENCES:

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Resource #1

In –Class Group Activity

Group members _____

Discussion questions:

1. What does the phrase “sustainable food systems” mean to you?
2. Do you see any connection between sustainable food systems and obesity prevention? If yes, please explain why.
3. How do you think globalization has affected cultural food habits among different ethnic groups in the U.S.?
4. As a nutrition/health professional, would you like to promote locally grown/produced food in the community? Why and why not?

Resource #2

Visit an Ethnic Food Market

1 page, single-spaced, type-written.

Your assignment is to visit an ethnic market and, using the readings from class, write an analytical statement about what you observe. Any kind of ethnic market is acceptable:

The purpose of this assignment is to go to an ethnic market and discuss your observations. Once you choose which ethnic market you want to visit, please do the following:

- 1) Select a recipe of a cuisine commonly consumed among that particular ethnic group.
- 2) Find out which ingredients for the recipe are available at the market.
- 3) Find out where those ingredients come from. Are they imported from the country of origin?
- 4) Identify similarities and differences between that ethnic market.
- 5) Write a one-page description of your findings based on your observations. Using the readings on ethnicity from your textbook and/or other sources, discuss and analyze your observations. Also, compare your pre-conceived notions of such a market with your actual observations.

Modified from "Ethnic food market assignment" by Janet Chrzan, In 'Teaching Food: Agriculture, Food and Society Syllabi and Course Materials Collection'

<http://food-culture.org/ASFS-AFHVS-Syllabi2003.pdf> pp 580

Resource #3 Laboratory Leadership Presentation Project: Inviting a Guest Speaker

You will serve as a discussion leader for the laboratory session and one of your responsibilities is to invite a guest with intimate knowledge of the culture being studied and hosting him/her during the laboratory session. As a leader, you are expected to:

- Introduce yourself, your affiliation to the school, course, and purpose of your call
- Give the guest the date, time and location of this speaking engagement
- Give the guest an opportunity to speak to the class about the following topics related to the foods of the particular culture:
 - (1) Meal patterns and styles of service
 - (2) Similarities and differences, as well as adaptations of their food selection/preferences after his/her move to America.
 - (3) Information regarding meal sequence and patterns, variety of food items, division of labor regarding food acquisition, consumption, and preparation
 - (4) Information about foods associated with rituals or life transition periods, such as pregnancy, birth, adulthood, marriage, birthdays, death, etc.
 - (5) Challenges and opportunities in locally obtaining cultural foods and/or ingredients for cooking them.
- Prepare at least five appropriate questions that the guest will know PRIOR to the presentation
- You may ask the questions, have the class ask the questions or just have the speaker answer those questions on his/her own
- Let the guest know that he/she may speak for as long as he/she feels comfortable (but with a maximum of 50 minutes)
- Write a “thank-you” letter to guest following the laboratory

Resource #4 Group Activity about Slow Food Movement
Group members

1. How is the Slow Food Movement related to the clip of “Mondovino” we just watched?
2. What health effects do you think the Slow Food Movement can have?
3. How would the Slow Food Movement in the U.S. influence immigrants’ food habits in this country?

Resource #5 Assignment:

Please read the following article (available at the library) and summarize your thoughts on the article (one-page, double-spaced).

Leatherman TL, Goodman A.
Coca-colonization of diets in the Yucatan
Soc Sci Med. 2005 Aug;61(4):833-46.

Resource #6 Group Activity

Group members _____

Q1. Discuss challenges people in Mexico may be facing regarding the preservation of their own food culture in Mexico.

Q2. Discuss challenges Mexican immigrants may be facing regarding the preservation of their own food culture in this country.

Q3. Suppose you work as nutrition consultants working for the Ministry of Health in Mexico. What would you do to address the challenges identified in Q1?

Q4. Suppose you work as nutrition professionals in a county in the U.S. where you have a large Latino population. What would you do to address the challenges identified in Q2?

Resource #7

Group Activity

Group Members _____

Please discuss the following questions:

Q1. Fifty years from now, what do you think will happen to food cultures in the world?

Q2. In your opinion, how does eating local foods relate to preserving traditional food cultures in this country?

Q3. Some argue that many ethnic cuisines are dependent on imported ingredients. How can you promote eating local foods to ethnic groups/immigrants who try to preserve their own food culture.

Q4. What kind of role, if any, can nutrition professionals play in the preservation of traditional food cultures and sustainable food practices?

Q5. If you were responsible for teaching a course entitled “globalization, sustainable food systems and nutrition”, what topics would you cover and what kinds of activities/projects would you include in your class?

Developing a Regional Weekly Menu Plan Based on the USDA Thrifty Food Plan

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BRIEF SUMMARY:

This learning activity is designed to be part of a comprehensive community food assessment project conducted by a local Food Policy Council or similar organization. Development of a USDA Thrifty Food Plan weekly menu based on regional preferences is the first stage of an interdisciplinary three stage process to gather information about local food costs and access to food in the community. For Stage 1, Dietetics students develop a one week menu plan that meets the nutritional guidelines of a target population and the current cost guidelines for the USDA Thrifty food plan. Based on the menu plan, the students develop a shopping list that will be used by Stage 2 students for field data collection. Stage 3 students use that data to conduct Geographic Information Systems (GIS) analysis to summarize the availability and costs of food in the community.

LEARNING OUTCOMES:

At the end of this project, students will be able to:

- Describe the development and significance of the USDA Thrifty Food Plan
- Compose an appropriate individual or family unit that reflects the target population of the assessment project.
- Use the USDA website to access up to date thrifty food plan average monthly cost information
- Develop menus appropriate to the geographical region which meet nutritional standards and cost limits.
- Create a shopping list, based on the menus, which will be used in the food store survey instrument.

AUDIENCE OR SETTINGS:

Dietetics students familiar with basic menu planning, recipe and food costing, and a working knowledge of food and nutrient analysis computer programs. This project would be appropriate for courses focusing on public health nutrition, community assessment, or a food service management course.

BACKGROUND:

The Thrifty Food Plan (TFP) is designed to maximize nutritional value at the lowest possible food prices and is used to determine Supplemental Nutrition Assistance Program (formerly Food Stamp) value. The average cost of the TFP for a reference family of four can be found on this web site: <http://www.cnpp.usda.gov/USDAFoodCost-Home.htm>. This project offers dietetic students an opportunity to develop menus appropriate to their region that meet the current cost and nutritional standards set by the US government agencies. Through this process, students will become familiar with the challenges of providing a healthy diet for a family with limited income and resources.

MATERIALS NEEDED INCLUDE ACCESS TO:

USDA Food Plans: Cost of Food
[<http://www.cnpp.usda.gov/USDAFoodPlansCostofFood.htm>]

USDA Choose MyPlate Menu Planner
[<http://www.choosemyplate.gov/>]

U.S. Census Bureau American FactFinder
[<http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>]

Food and nutrient analysis program (e.g., Food Processor SQL, Nutritionist Pro)

USDA publications related to the Thrifty Food Plan:

Carlson, A., Lino, M., Juan, W., Hanson, K., & Basiotis, P. P. (April, 2007). Thrifty Food Plan, 2006 (No. CNPP-19). Washington, D.C.: U.S. Department of Agriculture, Center for Nutrition Policy and Promotion.

Center for Nutrition Policy and Promotion Staff. (1999). Thrifty Food Plan, 1999 Administrative Report (No. CNPP-7). Washington, D.C.: U.S. Department of Agriculture.

Hogbin, M., Davis, C., & Escobar, A. (September, 1999). Preparing nutritious meals at minimal cost (No. CNPP-7B). Washington, D.C.: U.S. Department of Agriculture, Center for Nutrition Policy and Promotion.

Watkins, S. R., & Anand, R. S. (May, 2000). Recipes and Tips for Healthy, Thrifty Meals (No. CNPP-11). Washington, D.C.: U.S. Department of Agriculture, Center for Nutrition Policy and Promotion.

PROCEDURES:

1. Conduct an information session for students to describe TFP background and development.
2. Class reading and discussion on community food assessments and food deserts (see resources below).
3. Students compose appropriate individual or family unit representative of target population for project (Adults, families, children, or senior citizens).
4. Students create menus for one week that meet cost and nutritional requirements as well as taking into consideration regional acceptability, ease of preparation, time involvement, taste, availability of ingredients and cooking equipment needed.
5. Students analyze menus for nutritional standards.
6. Students do initial costing of ingredients.
7. Students compile weekly menu, nutritional analysis, cost analysis, and recipes.
8. Students develop shopping list for the weekly menus with specific foods and ingredients and appropriate amounts.

TIME NEEDED:

Tasks	Estimated Time Needed
Class readings and discussion of community food assessments and concept of food deserts	2 hrs

Attend background information and training session on Thrifty Food Plan and related readings	2 hrs
Student participants meet for implementation planning	1 hr
Develop one day menu plan with recipes	1.5 - 2 hrs (per student, assuming 7 students)
Conduct initial nutrition analysis, adjust menu & re-analyze	1 – 1.5 hrs
Develop shopping list and calculate cost of ingredients	2 hrs
Student participants meet to review total menu, compile shopping list and adjust as needed	2 hrs
Total Time Needed Per Student	12-13 hrs

DISCUSSION QUESTIONS:

1. What are some limitations of the Thrifty Food Plan in determining the real cost of feeding a family?
2. Could you or your peers follow the TFP menu that you developed?
3. What are some of the challenges your target population may face in following the menus that you will (or did) take into account when developing the TFP menu?
4. How could you test the applicability of the menus to your target population?
5. Discuss the challenges you encountered in developing and adjusting the menus to meet the DRIs and the Dietary Guidelines.

ADAPTATIONS AND EXTENSIONS:

1. Student participants follow their thrifty food plan menus for one week.
2. Test the menus with a “Family” that meets the selected target population
3. Collaborate with Geography students to conduct the second stage activity, the grocery pricing survey, as outlined in the following learning module.

RESOURCES:

Dietary Guidelines for Americans – (<http://www.cnpp.usda.gov/DietaryGuidelines.htm>)

Community Food Security Assessment Toolkit – (<http://www.ers.usda.gov/publications/efan-electronic-publications-from-the-food-assistance-nutrition-research-program/efan02013.aspx>)

Getz L. Food Deserts: Where Healthy Options are Only a Mirage. *Today's Dietitian*. 2008 Oct;10:48-52.

Surveying Food Retail Outlets for Cost of Thrifty Food Basket

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BRIEF SUMMARY:

This learning activity is the second of three service learning activities designed as part of a community food assessment project conducted by a local Food Policy Council. The substantive purpose of the project is to gather data with which to identify the existence and features of possible food deserts. A food desert is defined as a district with limited or no access to healthy foods at affordable expense. Stage 2 students use materials produced by students in stage 1 (see previous lesson: *Developing a Regional Weekly Menu Plan Based on the USDA Thrifty Food Plan*) of this community food assessment to develop a survey instrument and a field plan for data collection, and then conduct and report the results of food retailer surveys. While the primary data gathered is quantitative and will be analyzed by students in the next learning module, students also create qualitative data in the form of field notes. Field notes are discussed in class to reflect on the data-gathering experience and (urban) geography of grocery retail shaping those experiences.

LEARNING OUTCOMES:

At the end of this project, students will be able to:

- Create and use a survey instrument using Microsoft Excel and Microsoft Word
- Cull records from an electronic database for assignment of survey targets.
- Conduct surveys
- Report survey data in readable format.
- Create and use PivotTable Reports in Microsoft Excel
- Identify and discuss different utilities of quantitative and qualitative data.

AUDIENCE OR SETTINGS:

This learning activity is suitable for students in a range of disciplines, including those with established field traditions such as geography and sociology, and others with related substantive interests such as nutrition science or public health.

BACKGROUND:

Food deserts, defined as a district with limited or no access to healthy foods at affordable expense, are a significant problem in some areas. Policy-makers can use information about the distribution of food retail to shape future land uses, and thereby ensure more equitable access to affordable healthy food. Grounded, site-specific empirical data is needed in order to assess the distribution of food retail outlets. This project offers students an opportunity to design and implement the collection of retail outlet data for this purpose.

MATERIALS NEEDED:

Shopping list compiled by dietetics students in preceding learning module (in stage 1, see previous lesson: *Developing a Regional Weekly Menu Plan Based on the USDA Thrifty Food Plan*)

Database of retail food outlets in geographic study area (names, addresses, store managers, contact information)

Microsoft Word

Microsoft Excel

Cover letter from instructor to store managers explaining project

* In addition, many if not most students will need access to wheeled transportation to reach their target food retailers.

PROCEDURES:

1. Class reading and discussion of scholarship on food deserts (see selected sources below)
2. Information session on goals of the community food assessment project and the structure and desired outcomes of the service-learning activity
3. Students individually import Stage 1 shopping list into USDA retail survey template and make adjustments as needed to develop survey instrument.
4. Students then evaluate all the survey instruments produced and agree on the best format.
5. Instructor and students agree on a field plan – assigning students to particular stores and setting a timeframe for completion of the survey.
6. Students conduct surveys.
7. Students write field notes describing and reflecting upon their field experience.
8. Students input survey data into a master database (spreadsheet).
9. Students conduct PivotTable analyses in Excel, arranging and re-arranging the data so as to highlight different patterns, including the range of costs of completing food basket, items showing most and least deviation in price, proportion of study area stores selling entire food basket, among other possibilities.
10. Students reflect upon and discuss in class the relative merits of qualitative and quantitative data in this exercise, as they inform a developing understanding of the geography of food retail.

DISCUSSION QUESTIONS:

1. How do different scholars define a food desert?
2. Do you have any experience living in what you would think of as a food desert?
3. To what extent is a food desert a public policy problem and to what extent is it something to be resolved, or not, by the market?
4. How important is the quality of fresh produce available in a given retail outlet to your assessment of the existence of a food desert?

TIME NEEDED:

Task	Estimated time needed
Read and discuss assigned readings on food deserts	3 hrs
Attend background information and training session	1 hr
Develop survey instrument	1 hr
Discuss colleagues' survey instruments, agree on best model	45 minutes
Conduct surveys and document process in written field notes	1 hour per retail outlet
Input survey data into spreadsheet	30 minutes
Create PivotTable Reports and summarize findings	3 -4hrs
Total Time Needed Per Student	10-11 hours

ADAPTATIONS AND EXTENSIONS:

1. Students conduct more extensive fieldwork using g observation to collecting qualitative data both inside and in the neighborhood vicinity of each surveyed store.
2. Focus attention on transportation limitations for people living in poverty; require students to get to store without a car wherever possible, and to include in their field notes some documentation of and reflection upon the time/cost of transportation to and from the store.
3. Students can collaborate with the dietetics students in the collection of data, and reflect on the different disciplinary perspectives they each bring to the task.
4. To streamline the learning module, the instructor can create the survey template rather than assigning students to the task.

RESOURCES:

Mead M. The sprawl of food deserts. *Environmental Health Perspectives*. 2008;116: A335-A335.

Morton LW, Bitto, EA, Oakland MJ. Solving the problems of Iowa food deserts: Food insecurity and civic structure. *Rural Sociology*. 2005;70:94-112.

Shaw H. Food Deserts: Towards the development of a classification. *Geografiska Annaler* 2006B;88:231-247.

Smoyer-Tomic KE, Spence JC, Armhein C. Food deserts in the prairies? Supermarket accessibility and neighborhood need in Edmonton, Canada. *Professional Geographer* 2006;58:307-326.

Sparks L. Food deserts: a practical guide. *Environment and Planning B-Planning & Design*. 2003;30:934-935.

Whelan A., Wrigley N, Warm D, Cummings E. Life in a 'food desert'. *Urban Studies*. 2002;39:2083-2100.

Analyzing Food Store Survey Data using Geographic Information Systems (GIS)

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BRIEF SUMMARY:

This learning activity is the last of three interdisciplinary service learning activities designed for a comprehensive community food assessment project conducted by a local Food Policy Council or similar organization. The goal of this activity is to better understand geospatial distribution of food stores and the availability and costs of food they provide to the local community. Geography students process the food store survey data produced by students in Stage 1 and 2, compile 2000 Census data, and conduct Geographic Information Systems (GIS) analysis. The resulting outcomes of this activity include the indexes summarizing the availability and costs of food included in a regional weekly market basket (food basket) based on the USDA Thrifty Food Plan, and maps overlaying those indexes along with neighborhood socioeconomic status (SES). This activity also intends to provide an experiential learning opportunity for Geography students to apply their knowledge and skills in GIS to real-life situation and to recognize their potential role in promoting nutritional health of people in the local community.

LEARNING OUTCOMES:

At the end of this project, students will be able to:

- Code food store survey data into a systematic format using Microsoft Excel
- Calculate indexes summarizing the availability and costs of foods included in the food basket using Microsoft Excel
- Compile appropriate 2010 Census files and data from the U.S. Census Bureau website and other resources
- Geocode food stores to census block groups
- Compare the indexes of food availability and costs by the food store type and neighborhood SES

- Create maps overlaying food store survey data and 2010 Census data

AUDIENCE OR SETTINGS:

This learning activity is for Geography students who are familiar with Microsoft Office programs, ArcGIS version 9.2, and basic GIS analysis.

BACKGROUND:

Geographic Information Systems (GIS) refers to computer-based programs to collect, store, retrieve, and statistically manipulate geographic or location-based information¹. In the past decade, GIS has become a powerful tool for combining geographic and attribute data in map format to examine and analyze the spatial relationships that might influence possible health outcomes in public health². Using GIS in food and nutrition research is relatively new, but has provided the potential to find structural explanations for the inability of some people to follow the dietary recommendations beyond the traditional individual factors^{3,4}. Exploring the geospatial distribution of food stores and what they provide (availability, quality, and price) within the local community is critical to better understand the challenges and opportunities local citizens face to follow healthy dietary patterns. This understanding is essential to strengthen the capacity of the local food system to provide nutritious, high quality, and affordable foods to people of all socioeconomic levels and in all type of geographic locations.

MATERIALS NEEDED INCLUDE ACCESS TO:

USDA Food Plans: Cost of Food

[<http://www.cnpp.usda.gov/USDAFoodPlansCostofFood.htm>]

U.S. Census Bureau, Data Sets, Decennial Census

[<http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>]

GIS Lab equipped with computers, Microsoft Office programs and ArcGIS version 9.2 Software

PROCEDURES:

1. Information session on the community food environment assessment project including a food basket based on the USDA Thrifty Food Plan, food store survey procedures and data, and analysis strategies
2. Students enter the food store survey data into an Excel spreadsheet.
3. Students compile TIGER 2010 Census Geography Files and 2010 Census of Population and Housing summary Tape files 3A for the local community, and create a neighborhood SES index determined by combining each standardized four census block group summary statistics (Percent living below the poverty line, percent of female headed households, male unemployment rate, and percent of families receiving public assistance).
4. Students calculate indexes summarizing the availability of foods included in the food basket, and compare them by the food store type and neighborhood SES index. For example, the total and average number of missing items among food stores, the percentage of items missing in each store, the number and proportion of stores missing individual food items etc.
5. Students calculate indexes summarizing the costs of food included in the food basket and compare them by the food store type and Neighborhood SES index, e.g., average price of individual food items or per unit of each food category
6. Students calculate the total cost for the food basket and compare it with a national reference price for the USDA Thrifty Food Plan.
7. Students conduct GIS analysis including geocoding the stores, mapping the food stores, calculating the indexes of food availability and costs, and overlaying these indexes with the neighborhood SES index.
8. Students prepare a summary report and maps.

TIME NEEDED:

Task	Estimated time needed
Information session	1 hr
Process the food store audit data	2 weeks
Compile and process 2010 Census Data	1 week
Calculate food availability and cost indexes	1 week
Conduct GIS analysis	3 weeks
Prepare a summary report	1 week

DISCUSSION QUESTIONS:

1. What do you think about the availability and costs of food across different food stores and neighborhood SES in the community? Do all people in the community have access to the kinds of and reasonably-priced food to prepare a menu based on the USDA Thrifty Food Plan?
2. How GIS can help different players in a local food system (farmers, retail food stores, local food policy council, local government, consumers, etc) improve food access? What are the strengths and limitations of GIS to address food access issues in the community in general or more specifically in this activity?
3. What other kinds of data would you like to include in the GIS analysis (e.g., bus routes, etc)?

ADAPTATIONS AND EXTENSIONS:

Extend the analysis to examine the relationships between the availability and costs of food and nutritional health status of residents in a community (e.g., obesity, chronic conditions, physical function)

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RESOURCES:

USDA ERS publications related to analyzing food store audit data: Cohen B, Andrews M, Kantor LS. Community Food Security Assessment Toolkit: U.S. Department of Agriculture, Economic Research Services; 2002. E-FAN-02-013.

Andrews M, Kantor LS, Llino M, Ripplinger D. Using USDA's Thrifty Food Plan to assess food availability and affordability. *Food Review.* 2001;24(2):45-53.

Community Food Security Assessment Project

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BRIEF SUMMARY:

This lesson is one component of three integrated interdisciplinary core courses, the Land, Food and Community series, in the Faculty of Land and Food Systems at the University of British Columbia.

The concept of sustainability requires a systems approach to critical thinking and problem solving. A professional in the field of human nutrition can no longer make adequate dietary recommendations by focusing on a single part of a client's diet; to be most effective, she/he needs to understand the links among food, soil, nutrients, and ecosystem and human health. In the era of climate change-induced food system vulnerability, the food professional must incorporate environmental determinants into their work. There needs to be an awareness of the entire food system, from production to processing and consumption to productive disposal of food cycle end products. The food we eat is part of a larger system than supermarkets, shelf-lives and kitchens; lessons that broaden the knowledge and analyze all system components benefit the learner in creating an understanding of the complex relationships among the health of human populations, individuals and the ecosystem. Each of these activities presents the notion that our food systems envelop broad concepts such as cultural preferences and system analysis, and that the best nutritionist/dietitian has a profound awareness of the entire food system and how it relates to sustainability.

This end-of term project comprises the entire final unit of our course. It is a research project to be completed in working groups of 5-7 members. The goal of the project is to gain a better understanding of the food security issues in a city (in our case, Vancouver, BC) and where possible, to contribute to improved food security. We have had students participate in the project for 9 years, creating an on-line memory of all the previous projects. Each team has access to 8 previous years' research, and will contribute to the "collective memory" of the Food Security Project.

The question that the project addresses is how secure is the food system of a city? A secure food system provides food that is **A**ffordable, **A**vailable, **A**ccessible, **A**ppropriate (culturally, morally and nutritional), **S**afe and **S**ustainable (environmentally, socially and economically). These aspects of food security are mutually dependent. The concept is defined by the Provincial Health Services Authority of BC as follows:

"Community food security exists when all citizens obtain safe, personally acceptable, nutritious diet through a sustainable food system that maximizes healthy choices, community self-reliance and equal access for everyone." (Provincial Health Services Authority, 2008: 7)

LEARNING OBJECTIVES/OUTCOMES:

- Apply the concepts of systems and sustainability to food systems of a local community in relation to food security
- Articulate the concept of food security and sustainable food systems and its relation to globalization and world hunger, and the vulnerabilities and strengths of the global food system and its local manifestations in a city
- Identify the value assumptions and paradigms involved in problem definition in research and the extent to which the paradigms influence the gathering of information
- Design methodologies to answer specific research questions
- Conduct a collaborative research project, analyze the data and present your findings and observations to a larger audience
- Identify recent development in food policy in the city and its potential impacts on food security.

- Explore the concept of the foodshed
- Identify elements of the foodshed relevant to a city
- Develop personal management, team-building, leadership and problem solving skills
- Identify and justify indicators of food security and of the sustainability of the local food system
- Identify criteria and indicators of food security of significance for the community
- Identify and understand communication enhancers and crashers
- Apply principles and knowledge of effective communication strategies in written, verbal, visual and electronic communication

AUDIENCE OR SETTINGS:

Incorporation of the Food System and Sustainability into Dietetic/DPD courses.

BACKGROUND:

The project integrates all the components of the course and the assessment of community food security requires the use of all the course components. It emerges from concerns about the vulnerabilities and sustainability of our global food systems¹⁻³. On the one hand, our global food system has delivered a revolutionary and unprecedented capacity to increase food production. However, this has had a striking impact on the environment and depletion of natural resources without resolving the problems of global food security and child malnutrition⁴. According to the recent High Level Conference on World Food Security, “securing world food security in light of the impact of climate change may be one of the biggest challenges we face in this century”⁵. In the past, food security was associated primarily with obtaining sufficient food, however, the concept has evolved to encompass a broader set of social, ecological and economic considerations including nutrition, moral and cultural acceptability or appropriateness, safety, ecological sustainability, self-reliance, social justice and human dignity⁶. Although food security issues may be most apparent in developing countries, issues including hunger, obesity, and vulnerability to ecological crises, also exist in Canada⁷⁻⁹.

PROCEDURES:

Teams should address in a paper, group presentation and power point file at **least** the following at aspects:

- Summary of community characteristics and any previous research on the assigned community.

- Identification of lacking information and brief summary of information available in each component of the Environmental Scan (found in the Community Food Assessment Guide)
- Developments in food security issues within your assigned community as a result of changes (transportation issues; commercial development; changes in housing opportunities; changes in food venues, governance, etc) within your assigned community. In other words, identifying how the context contributes to community food security.
- Prepare an inventory of existing services and resources related to food security in your assigned community.
- Opportunities to increase food security in your assigned community, or (in the case of community found to be food secure) the contributions your community could make to support others found food insecure and particularly vulnerable.

TIME NEEDED:

Depending on class size and course structure, the time needed for the project may vary. An important aspect of the project is having groups interact with members of the community that are involved with food organizations and who hold food system positions. We allow the students approximately one month, including a total of about 30 class hours to research the community, contact community organizations, conduct interviews, and prepare a final group oral presentation and written report.

ADAPTATIONS AND EXTENSIONS:

This exercise has been extended to run for an entire term and enlarged upon to form the core of the second course in our Land, Food and Community series. The latter course aims to consider food security in rural and suburban as well as urban communities near the university campus.

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Field Trip to a Small Scale, Organic Farm

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BRIEF SUMMARY:

This lesson is one component of three integrated interdisciplinary core courses, the Land, Food and Community series*, in the Faculty of Land and Food Systems at the University of British Columbia.

The concept of sustainability requires a systems approach to critical thinking and problem solving. A professional in the field of human nutrition can no longer make adequate dietary recommendations by focusing on a single part of a client's diet; to be most effective, she/he needs to understand the links among food, soil, nutrients, and ecosystem and human health. In the era of climate change-induced food system vulnerability, the food professional must incorporate environmental determinants into their work. There needs to be an awareness of the entire food system, from production to processing and consumption to productive disposal of food cycle end products. The food we eat is part of a larger system than supermarkets, shelf-lives and kitchens; lessons that broaden the knowledge and analyze all system components benefit the learner in creating an understanding of the complex relationships among the health of human populations, individuals and the ecosystem. Each of these activities presents the notion that our food systems envelop broad concepts such as cultural preferences and system analysis, and that the best nutritionist/dietitian has a profound awareness of the entire food system and how it relates to sustainability.

A field trip to a small scale, organic farm is one of the most poignant experiences for university students involved in food system analysis. A farm is a living, interactive classroom: the ideal setting for exploring and discussing the relationships between agriculture, ecosystem health, human nutrition, the economic viability of farming, and farming as a lifestyle. Through experiencing the people and the landscapes of a working farm, students are made aware of the fundamental complexities of our food systems. In the context of our course, the UBC Farm is used as an example of the key issues in the interface of food

security, sustainable food systems and sustainable urban designs. The future of the cities requires urban agriculture.

LEARNING OBJECTIVES/OUTCOMES:

Upon completion of this exercise, students will be able to:

- Identify characteristics of sustainable land management (in the context of a small scale, organic farm)
- Explore the relationships between sustainable farm processes, ecosystem health, and human nutrition
- Identify current and potential integrated-educational uses of a sustainable farm system

AUDIENCE OR SETTINGS:

A small scale, organic farm.

BACKGROUND:

Most university students enrolled in food system programs have never set foot on an actual working farm. Currently in Canada, approximately 2% of the population resides on farms¹, yet everyone is a daily participant in agriculture and plays an influential role in our food systems through what they eat and where they buy their food. By setting foot on an actual farm and meeting the people who have decided to make their living through the land, the true realities of agriculture and our food systems are brought to the forefront of the students' consciousness. Witnessing the physicality of a farm imposes the full weight of our food system by demonstrating where our food originates and the efforts required to feed our cities. Often student comments reflect their lack of awareness of the difficulty of the work and the commitment to the lifestyle

of farming, fostering respect for the people and processes of growing food. This respect forms the foundation for the rest of their studies regardless of their backgrounds, be they food sciences, dietetics, agroecology or global resource management.

PROCEDURES:

If possible, visit the site to meet the farmer and gather an understanding of his/her farming operation and philosophies. There are many ways in which to organize an on-site visit; however, we find that creating small groups, stations, and a rotating schedule, allow for more intimate learning opportunities and break the material into more digestible sections. This requires a number of speakers that feel comfortable at each station and requires some forethought as to the path of travel for the students. On our farm tour, we discuss the importance of soil; the role of diversity on the farm; land use issues; the relationship between community and the social-cultural aspects of a farm. There is no shortage of material to cover and the discussion tends to cover more topics than intended. Students often comment that visiting the farm is one of the most eye-opening, informative, and memorable experience of the course.

TIME NEEDED:

2-4 hours on site plus additional traveling distance. Students

circulate in several groups through stations to illustrate different components of a sustainable agroecosystem.

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RESOURCES:

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ELECTRONIC RESOURCES:

To find a local organic farm in North America, go to <http://www.localharvest.org/>

The University of British Columbia in Vancouver has an on-campus, student driven organic farm suitable for this exercise and within walking distance of the main campus. For more information, please visit <http://www.landfood.ubc.ca/ubcfarm/>.

Using Service Learning and Community Partnerships to Focus on Local Food Systems

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BRIEF SUMMARY:

Students in community nutrition and nutrition policy courses have the option to participate in Service Learning opportunities by working with community partners on community identified projects. All projects focus on developing community capacity and strengthening the local food system.

LEARNING OBJECTIVES:

- To experience and understand collaborative relationships between university academic departments and community food security organizations
- To integrate experiential learning, academic study and community service through the application of concepts learned via academic studies and through the connection of experiences to theory presented in the classroom
- To enable community and individual capacity development
- To experience the role of the nutrition professional as a partner in social change
- To experience project work in a collaborative team setting

AUDIENCE/SETTING:

A collaborative team consisting of third and fourth year university students, community-based organizations and university academic faculty

BACKGROUND:

Recent food and nutrition professional discourse has focused on the need to take undergraduate education programs back to their roots of foods, food systems and food security.¹⁻² Over the decades curricula have become entrenched in minutia of nutritional science to the exclusion of basic understandings of food and society. Given that community-university partnerships for teaching and research have been gaining momentum as an approach to addressing the determinants of a community's health³⁻⁵, this appears to be a potential technique for expanding classroom learning^{6,7}. Service learning, an experiential pedagogical technique that allows students to work with a community agency on a community defined problem⁸, emphasizes connections between classroom theory and real-world situations. Evidence indicates that community-university partnerships facilitate research and learning for education and training of health professionals^{6,9}. Such experiential learning develops capacity of individuals, communities and systems¹⁰, which is central to health promotion programming that aims to enable people to gain control over their health¹¹. This community empowerment leads to further social action and development of local health systems. In this particular case, the local food system was addressed as a means to strengthen local food production and marketing structures.

PROCEDURES:

Upon reviewing the available community organization identified projects, interested students write a 1-page response stating their reasons for choosing this course option. (Other students complete a more traditional term paper assignment). Projects are completed by teams of 2 to 4 students in conjunction with a community partner organization. Due to the limited number of placements, all students applying may not

be accepted for this alternative assignment. Once the project planning begins, brief weekly project updates allow students to report completed tasks and planned next steps, which further assists the instructor with anticipatory guidance for the project work. Assessment is based on copies of finalized materials for the community partner and a project report submitted to the course instructor.

TIME NEEDED:

Students: 10-20 hours extra-classroom time over 8-10 weeks of the regular academic term; Instructors: requires two to three times the hours spent on term paper option.

DISCUSSION QUESTIONS:

1. How do you anticipate that your service learning experience will fit into your current and future courses at university? To your future practice? To your ability to address health determinants? To your future work with community organization as a partner?
2. What were the most useful components of the service learning orientation, i.e., working as a partner rather than a leader, working with many different schedules and capabilities, etc.?
3. What do you think were the main benefits or achievements of your participation in service learning?
4. Based on your experience, what would you recommend to other health professionals undertaking similar tasks and why?
5. How has your understanding of working with the community changed based on this experience? Why?

ADAPTATIONS AND EXTENSIONS:

The types of projects vary widely based on community determined needs, though all must fit the pedagogical needs of the course involved. Projects may include planning and marketing of a community forum to discuss local or global food security; development of print or electronic awareness-building materials to bring understanding of local food system issues; development of advocacy materials for use during a provincial or federal election campaign; and research assistant activities including data collection and analysis, preparation of an annotated bibliography, report generation or grant proposal preparation.

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Using Zea as a Learning Experience

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The concept of sustainability requires a systems approach to critical thinking and problem solving. A professional in the field of human nutrition can no longer make adequate dietary recommendations by focusing on a single part of a client's diet; to be most effective, she/he needs to understand the links among food, soil, nutrients, and ecosystem and human health. In the era of climate change-induced food system vulnerability, the food professional must incorporate environmental determinants into their work. There needs to be an awareness of the entire food system, from production to processing and consumption to productive disposal of food cycle end products. The food we eat is part of a larger system than supermarkets, shelf-lives and kitchens; lessons that broaden the knowledge and analyze all system components benefit the learner in creating an understanding of the complex relationships among the health of human populations, individuals and the ecosystem. Each of these activities presents the notion that our food systems envelop broad concepts such as cultural preferences and system analysis, and that the best nutritionist/dietitian has a profound awareness of the entire food system and how it relates to sustainability.

"Zea" is an impressionistic 5-minute film based on pure images and music, devoid of context or scale. It allows the viewer to take a journey of interpretation of what he/she sees through the unfolding of beautiful colours and shapes and music. This activity illustrates complex problems in personal perceptions and the philosophy of knowledge, avoiding excessive abstract conceptualization and concentrating instead on the significance of experiences with the aid of images and

metaphors. This lesson also demonstrates the validity of personal experience as a key learning resource.

LEARNING OBJECTIVES/OUTCOMES:

Upon completion of this exercise, students will be able to:

- Recognize and validate the role of personal experiences and personal interests in the study of nutrition and agricultural sciences.
- Articulate the implications of personal experiences, interests, and ideals for science in general (and nutritional and agricultural sciences in particular).

AUDIENCE OR SETTINGS:

Incorporation of the Food System and Sustainability into Dietetic/DPD courses.

The activity works well at all levels of university courses, in small classes or large lecture halls.

BACKGROUND:

When we initially teach about sustainable food systems and community sustainability, systematic efforts are made to help students understand and appreciate the importance of paradigms, values, and critical thinking in scientific research and in professional practice. We encourage conversation with the whole class early in our courses, asking students (and ourselves) questions such as "What has the global food system delivered? What way of seeing and thinking is behind this food system?" "How do we know what we know?" "How do we identify what we do not even know that we do

not know?” “How does the context of knowledge influence learning?” “How do personal stories and the communities and cultures we come from influence our academic interests and professional goals?” These questions are used to elicit dialogue and convey the practical importance of “ways of seeing” (epistemology) and its companion values and ensuing ethical basis. Without embracing any particular rigid epistemological position, we explicitly encourage students to learn to “think out of the box” of their specialization, and to overcome discipline “tunnel vision”. We introduce students to the idea that fragmentation of knowledge and over-specialization needed by industrialization and the consequent inability to see the entire picture, are ultimately key contributors to the crisis of agriculture and are behind the unsustainable nature of our contemporary civilization.

MATERIALS NEEDED:

- Audio-visual equipment
- The film “Zea” (National Film Board of Canada)

PROCEDURES:

While the film is showing, the students are asked to take notes describing what they see as the film progresses. Afterwards when exploring what each student has observed at the various moments, the exercise reproduces (without any need for jargon) many of the important dilemmas of the theory of knowledge and the debates that philosophers often make inaccessible to ordinary people. As a result, the students’ observations acquire relevance and significance through contrasting their personal perceptions. In the end, when they discover what they were actually viewing (i.e. a frying pan with boiling oil and popcorn on which the camera was zooming

in and out through the bubbles, with a musical background) give all participants a hint of a personal breakthrough: the demonstration that we spontaneously see, feel and think differently, and perceive different things even when given the same data. It is an effective demonstration that the observer is an active creator of what is observed.

TIME NEEDED:

Film Duration: 5min, 17sec
Length of discussion varies.

DISCUSSION QUESTIONS:

- What did you think the film was showing?
- As the film progressed, did you change your mind about what you were seeing?
- Although we were all watching the same film, many of us came to different conclusions about the content and context? Why is this and how does this relate to your future role as a professional?

RESOURCES:

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Barnga Game

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BRIEF SUMMARY:

This lesson is one component of three integrated interdisciplinary core courses, the Land, Food and Community series, in the Faculty of Land and Food Systems at the University of British Columbia.

The concept of sustainability requires a systems approach to critical thinking and problem solving. A professional in the field of human nutrition can no longer make adequate dietary recommendations by focusing on a single part of a client's diet; to be most effective, she/he needs to understand the links among food, soil, nutrients, and ecosystem and human health. In the era of climate change-induced food system vulnerability, the food professional must incorporate environmental determinants into their work. There needs to be an awareness of the entire food system, from production to processing and consumption to productive disposal of food cycle end products. The food we eat is part of a larger system than supermarkets, shelf-lives and kitchens; lessons that broaden the knowledge and analyze all system components benefit the learner in creating an understanding of the complex relationships among the health of human populations, individuals and the ecosystem. Each of these activities presents the notion that our food systems envelop broad concepts such as cultural preferences and system analysis, and that the best nutritionist/dietitian has a profound awareness of the entire food system and how it relates to sustainability.

Barnga (Thiagarajan and Thiagarajan 2000) is a classic simulation game on cultural clashes. Participants experience the shock of realizing that despite their good intentions and the many similarities among them, people interpret things differently from one another in profound ways, especially people from differing cultures. Players learn that they must understand and reconcile these differences if they want to function effectively in a cross-cultural group. The activity experientially breaks down the assumption that we all operate within the

same "rules of the game" in daily life and assists the student in learning the art of walking in another's shoes.

LEARNING OBJECTIVES/OUTCOMES:

Upon completion of this exercise, students will be able to:

- Recognize and validate the role of personal experiences and personal interests in the study of food, nutrition, health and agricultural sciences.
- Recognize and appreciate cultural differences and identify the challenges and learning opportunities provided by intercultural communication.

AUDIENCE OR SETTINGS:

- Incorporation of the Food System and Sustainability into Dietetic/DPD courses.
- The activity works well at all levels of university courses, in small classes or large lecture halls.

BACKGROUND:

The objective of this classroom activity is to create opportunities to experience the expression and learning value of diversity. When we initially teach about sustainable food systems and community sustainability, systematic efforts are made to help students understand and appreciate the importance of paradigms, values, and critical thinking in scientific research and in professional practice. We encourage conversation with the whole class early in our courses, asking students (and ourselves) questions such as "What has the global food system delivered?" "How do personal stories and the communities

and cultures we come from influence our academic interests and professional goals?" These questions are used to elicit dialogue and convey the practical importance of "ways of seeing" (epistemology) and its companion values and ensuing ethical basis. Without embracing any particular rigid epistemological position, we explicitly encourage students to learn to "think out of the box" of their specialization, and to overcome discipline "tunnel vision". We introduce students to the idea that fragmentation of knowledge and over-specialization needed by industrialization and the consequent inability to see the entire picture, are ultimately key contributors to the crisis of agriculture and are behind the unsustainable nature of our contemporary civilization. We also emphasize the cultural pluralism that is part of working in modern cities and the need to be aware of cultural differences in food related issues.

MATERIALS NEEDED:

- A room with tables and chairs that can accommodate the set-up of the game.
- Sets of playing cards, organized appropriately for the game.
- "Rules" and "Tournament" handout for each table

PROCEDURES:

The Barnga Game¹ and the experience of cultural diversity is a simulation game. Students are provided with instructions to play a simple card game. They are seated at a dozen tables and told that winners will move to tables of higher numbers and losers to ones with lower numbers. After practicing and learning the rules, printed instructions are collected and speaking and writing for communication among players are forbidden. Based on their previous experience, participants are confident they can play the game, know the rules and know how to win. However, they are not told that the initial instructions given to each team were slightly different, and soon confusion and frustration appear, which often develops into unspoken conflict. The teams are then debriefed and it becomes clear that the game is a metaphor for experiencing another culture ("rules of the game"). This experience vividly and experientially demonstrates that if we assume that the new rules of "game" are already known, then we are likely to make serious errors when adapting to a new cultural context. This assumption also equally affects both newcomers and members of the mainstream receiving culture. The discussion following the game is always impressive and profound.

TIME NEEDED:

The length of the game depends upon the number of players and iterations within the game; 60 minutes is typically sufficient.

Length of discussion/debriefing varies.

DISCUSSION QUESTIONS:

1. How did you feel while playing the game?
2. What were some of your strategies for overcoming your communication barriers?
3. How can this experience help you in your future role as a dietitian?
4. How do the lessons in this game help one understand the complexities of the food systems and cultural preferences?

ADAPTATIONS AND EXTENSIONS:

This is an excellent lesson to be undertaken before the creation of groups or working teams. After the Barnga experience and discussion, our instructors set the tone by sharing their personal stories about the communities in which they grew up. Students do the same in their new teams. Then we gather together to discuss the notion that to value diversity positively is the opposite of not talking about it, as in the caricature hidden behind the notion of "political correctness" that encourages silence about differences as the polite way to go. We encourage the students to consider that our real challenge is to find ways to prevent difference from becoming the basis of discrimination and barrier to equal opportunity. Thus, conversation and debate within a safe and respectful environment, together with critical thinking, become integral for learning about complexity and uncertainty.

REFERENCES:

1. Thiagarajan S, Thiagarajan R. *BARNGA: A Simulation Game on Cultural Clashes, 25th Anniversary Edition*. Boston: Brealey, Intercultural Press;2000.

RESOURCES:

BARNGA: A Simulation Game on Cultural Clashes, 25th Anniversary Edition

Rojas A. Towards Integration of Knowledge through Sustainability Education and its Potential Contribution to Environmental Security. In: Allen S, Ed. *Addressing Global Environmental Security through Innovative Educational Curriculum*. Dordrecht, Netherlands: Springer Science;2009:131-153.

Community Design for Community Food Security

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BRIEF SUMMARY:

Students plan their 'ideal communities' on paper using a grid and a list of land use choices pre-determined by the class. Through discussion questions, they learn the consequences of their land use decisions for quality of life, the environment, the local economy, and food security. The class then has the opportunity to discuss and explore the strengths and weakness of their designs and what might be needed for a 'sustainable community'. This activity is clearly an oversimplification of the land use planning process, but one in which students can apply their values to a planning exercise, make trade-offs, and learn more about the implications of land use planning for community food security.

LEARNING OBJECTIVES/OUTCOMES:

- Describe different land use alternatives.
- Explain the pros and cons of different land use alternatives related to the areas of job creation, taxes, leisure opportunities, environment and food security.
- Give examples of the trade-offs involved in land use decisions.

AUDIENCE OR SETTINGS:

This activity works best in the dietetic or nutrition curriculum in a community nutrition course or one focused on food security.

BACKGROUND:

The decisions community members and leaders make about

how to use land have a great impact on our everyday lives. Good land use decisions can create a healthy local economy, protect the environment, provide recreational activities, and help ensure community food security. Poor decisions can have devastating effects. For example, the character of many small towns has been permanently changed by sprawl from nearby urban centers. New development is often welcomed at first, bringing taxpaying residents and businesses. New houses and businesses require increased spending on infrastructure. Costs for new school buildings, new roads, and new sewage and waste management systems can offset the increased tax revenue. Formerly quiet rural roads can become congested. Farmers can be forced to sell to developers as property values and taxes increase. As a result, the community's capacity for food production is permanently diminished. Community planners often create management and growth plans to avoid this scenario. Zoning is used to reserve sections of a particular jurisdiction for different purposes such as commercial, residential, agricultural or manufacturing. Separating land uses minimizes conflicts and protects public health (Harmon et al. 1999).

MATERIALS NEEDED:

List of land uses and rules for using different alternatives.

A grid to fill in with land uses.

List of discussion questions for small groups.

PROCEDURES:

Together with the class, determine the land use alternatives and accompanying rules that students will use to complete their community design.

A suggested list follows:

COMMUNITY LAND USE ALTERNATIVES:	Rules:
1. INDUSTRY (can be any kind of industry)	To include industry on your community design, you must use 2-4 contiguous squares as this land use requires more space than other alternatives.
2. WILDERNESS (undeveloped area)	A minimum of 4 contiguous spaces must be used in order to include wilderness in your community design.
3. DEVELOPED PARK (ball fields, running tracks, accessible pathways etc.)	Only requires 1 square, more if more parks are desired.
4. DENSE HOUSING (can be apartments or townhouses, affordable or high priced.)	One square of dense housing will accommodate 2000 people.
5. SUBURBAN HOUSING (single family dwellings, affordable or high priced)	One square of suburban housing will accommodate 1000 people.
6. SPARSE HOUSING (estates or rural dwellings, affordable or high priced)	One square of sparse housing will accommodate 500 people.
7. CHAIN BUSINESSES (can be large 'hypermarkets' with accompanying parking lots, outdoor or indoor malls comprised mainly of chain businesses. The owner of the business is typically a corporation or an individual not residing in the community. Community members are employed by the businesses usually starting at minimum wage).	A minimum of 4 contiguous spaces must be used in order to include chain businesses in your community design.
8. LOCALLY OWNED BUSINESS (can be one large locally own business, or several blocks of unique locally owned and operated stores. The owner of the businesses resides in the community and employs people in the community. Wages vary.	Only requires 1 square, more as desired.
9. EXPORT FARM/RANCH (produces commodities that are not typically consumed by the community, unless they are exported for processing and then re-imported as processed foods)	A minimum of 4 contiguous spaces must be used in order to include export farms and ranches in your community design.
10. DIRECT MARKETING FARM/RANCH (an agricultural business that markets directly to members of the community, or is processed locally for local consumption).	Only requires 1 square, more as desired.
11. COMMUNITY SERVICES (includes schools, universities, hospitals, clinics, libraries, post office, roads, government buildings etc.)	Only requires 1 square, more as desired.
12. Miscellaneous (any other items not covered by the list above)	

Individually, students complete the following steps:

1. What would your ideal community look like? Consider this before beginning your Community Design.
2. Plan your ideal community using the grid provided by assigning a land use to each block on the grid. Before beginning to assign land uses, consider the layout of the whole community.

3. Remember that some land uses require more than one contiguous square per unit. You can have more than one unit of any land use.
4. Do not leave any squares blank.
5. The population of your community is 30,000. Consider whether your ideal community will contain adequate housing for all residents.
6. Before coming to class for discussion, answer the following question: How does this land use reflect what is important to you?

As a class, in small groups of 3, students should evaluate their ideal communities and reflect on the strengths and weaknesses of each design. What follows is a list of suggested considerations:

COMMUNITY DESIGN EVALUATION

Consider factors related to the economy:

Adequate Jobs
 Living wages
 Business in which money spent by residents re-circulates in the community
 What land uses support a strong local economy?

Consider factors related to quality of life:

Aesthetics of the community
 Opportunities for recreation
 Environmental health
 Adequate community services
 What land uses contribute to a high quality of life?

Consider factors related to community food security:

Retail outlets for purchasing food convenient to housing.
 Locally produced food is available for residents to purchase
 Food self-sufficiency or self-reliance (where does your food come from?)
 What land uses support community food security now and in the future?

For each community design, the group should develop a list of recommendations for improving food security. Each student should submit a plan for improving food security in their ideal community.

TIME NEEDED:

Two class periods are needed. During the first class period, explain the assignment, determine the land uses together as a class, and provide the written materials. The second class period can be used to review community designs and for answering discussion questions in small groups.

DISCUSSION QUESTIONS:

Does sustainability mean not including an “industry” or “export farms” in your community? How can each benefit community food security?

What are the benefits of each land use alternative?

Which land uses are most important for present and future food security in your community?

How dependent do you want your community to be on other regions for necessities?

How would your planning be different if your community was a remote island, or in a remote location on land?

ADAPTATIONS AND EXTENSIONS:

Invite a city or county planner to class to talk about local land use issues.

Compare students ideal community plans to an actual map of your community. How are they similar and how are they different.

REFERENCES:

Harmon, AH, Harmon RS, Marezki AN. *The Food System: Building Youth Awareness through Involvement*. A guidebook for educators, parents, and community leaders. A Keystone 21: PA Food System Professions Education Project. The Pennsylvania State University, College of Agricultural Sciences: University Park;1999.

Living on \$3/Day to Understand Food Insecurity

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BRIEF SUMMARY:

In this activity community nutrition students attempt to meet their food needs for three dollars per day for five consecutive days. The purpose of the activity is to build empathy for the food insecure, to test student skills in constructing a nutritious diet on a very limited budget, and to build understanding and competence for providing services for low income clients.

LEARNING OBJECTIVES/OUTCOMES:

At the conclusion of this exercise, students will be able to:

- Plan a nutritious diet when constrained by a very limited budget
- Conduct a nutrient analysis to determine an average intake of essential macro and micro nutrients over a five day period
- Keep a food journal for five days, detailing intake as well as physical, emotional, and mental consequences
- Complete an application for SNAP
- Discuss the nutrition status implications of feeding oneself or family on a limited budget

AUDIENCE OR SETTINGS:

This activity is intended for community nutrition students who are concurrently studying issues related to domestic poverty, hunger and nutrition assistance. It is best to provide an alternative assignment for students who cannot or should not attempt this assignment for health reasons or other limiting circumstances.

BACKGROUND:

A significant portion of the global population lives on less than two dollars per day. In Montana, households receiving SNAP get an average of \$281 per month in nutrition assistance, or approximately \$9-10 per day (1). In order to become competent food and nutrition professionals who are prepared to advise low income clients, community nutrition students need to develop the skills required to obtain balanced nutrition on a limited budget. This is a difficult task that is eye opening for students. Through the experience they develop empathy for the food insecure, and opinions about nutrition assistance policy that is grounding in actual experience.

MATERIALS NEEDED:

Students need an electronic copy of a workbook (see below) that guides them through the experience and serves as a daily journal and record keeper for the five days they spend completing the assignment.

PROCEDURES:

Provide students with the assignment instructions and an electronic Workbook:

Feed yourself for \$3/ day Workbook

Introduction:

Approximately two billion of the world's population lives on less than \$3/day. The goal of this activity is to see if you can meet your food needs on \$3/day for five days (\$15/5 days).

The conditions of the assignment include the following:

- Strive for a nutritionally balanced diet.

- Do not accept any free food or charity over the five days.
- Only consume what you have purchased.

Instructions:

This assignment has 5 parts. Complete your answers to Part I before you begin the experience. Complete Part II after you have done your shopping. Complete Part III on a daily basis during the experience and Part IV when you have completed the experience. Part V has questions that should be completed during the experience and after the experience, so read all questions now. Use this workbook as your written log and then electronically submit a typed version of your answers on the due date.

Part I: Planning

Before you begin the experience, reflect on how do you think it might feel (physically, emotionally, and mentally) to be food insecure?

Before you go shopping, what kinds of foods do you think you will buy with your \$15?

Part II: Purchasing

Describe your shopping experience. Where did you shop, what did you buy, and how much did each item cost?

What strategies did you use to maximize your allotted money? (Copy your receipts to turn in with this assignment sheet)

Part III: The Experience

For each day state what you ate and how you felt physically, mentally, and emotionally. Record your observations and insights.

Day :

Date and Day of the Week:

What I ate:

How I felt:

Observations and Insights:

Part IV: Analysis

For each day complete a diet analysis (attach printouts to this assignment sheet). What were your average intakes for the following macro and micronutrients? (State in amounts and percentages of recommended values). Any diet analysis software can be used for this lesson.

NUTRIENT	AVERAGE AMOUNT	PERCENTAGE OF RECOMMENDED VALUE
Calories		
Fat		
Carbohydrates		
Protein		
Fiber		
Vitamin A		
Vitamin C		
Vitamin E		
Calcium		
Iron		
Zinc		
Folate		

Considering nutrients, food groups and other important food components, how well did you meet your nutrition needs?

How could your diet have been improved (within your budget)?

What did you eat that you normally do not eat?

What foods do you normally eat that you have avoided?

Did you have any difficulty complying with the conditions of the assignment?

Could you continue to live on \$3/day? How would doing so change your life?

Part V: Follow-Up

During the five days of the experience visit the county assistance office or other resource and obtain an application for food stamps. Examine and complete the application. Describe this experience. How difficult was it to obtain an application? How difficult was it to complete the application? Consider how the experience might have been different if you had poor reading or writing skills?

After the 5 day experience, visit and volunteer at the food bank for a few hours. Reflect on this experience. How did your 5 day experience affect your view of the emergency food supply and food bank clients?

What are your overall conclusions about this experience? Describe what you learned, your observations and insights.

What are the important things you learned during this experience that would benefit you as a food and nutrition professional?

TIME NEEDED:

The activity takes five days, and it is best to allow the student to determine which five days will be dedicated to this assignment.

DISCUSSION QUESTIONS:

Once all students have completed this assignment, these questions can help guide class or small group discussion:

1. What did you learn about food insecurity from this experience? What did you learn about the food insecure?
2. Have your views changed?
3. What was the hardest part of this assignment for you?
4. How difficult was it to consume a nutritionally-balanced diet? How would you eat differently if you could do it again?

5. What is the impact of food insecurity on diet choices among low-income individuals? Would there be difficulty with complying with prescribed diets?
6. How did this experience better prepare you for your future profession?
7. Was this a worthwhile experience?
8. Should SNAP policy dictate which foods can be purchased?

ADAPTATIONS AND EXTENSIONS:

Although not as powerful, this activity can be done hypothetically as an alternative.

REFERENCES:

USDA FNS. Supplemental Nutrition Assistance Program: Average Monthly Benefit Per Household. Available at: [http://www.fns.usda.gov/pd/19SNAPavg\\$HH.htm](http://www.fns.usda.gov/pd/19SNAPavg$HH.htm). Accessed on January 9, 2012.

RESOURCES:

USDA Food and Nutrition Service Nutrition Assistance Programs. See <http://www.fns.usda.gov/fns/>. The Food and Agriculture Organization of the United Nations. See <http://www.fao.org/>.

Case Study:

Multidisciplinary Student Service-Learning in Sustainable Community Development: Virginia Tech and Heifer International Collaboration

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Experiential learning allows students to discover how theoretical knowledge gained in the classroom functions within a real-world environment.¹ The concept of experiential learning can be adapted and applied to many disciplines. One model of experiential learning involves service-based learning and civic engagement. Service-learning is an effective teaching and learning strategy that integrates meaningful community service with instruction and reflection to enrich the scholastic experience, teach civic responsibility, and strengthen communities. Additionally, when learned skills are executed and applied to relevant situations it allows for a dynamic learning environment.

The College of Agriculture and Life Sciences (CALs) at Virginia Tech (VT) focuses on agricultural and environmental sustainability; food, nutrition, and health; and community viability. It strives to adapt its curriculum to meet the needs of society by offering students opportunities to observe how agriculture, human nutrition and health, and community development are interrelated. To enhance academics through experiential learning, the College funded a proposal to have a faculty led team of nine undergraduate students representing seven departments within CALs to participate in an Alternative Spring Break at Heifer International's Ranch in Perryville, Arkansas (March 2008). Students across multiple CALs departments included: Human Nutrition, Foods and Exercise; Crops, Soils and Environmental Science; Dairy Science; Animal and Poultry Sciences; Agricultural and Extension Education, and Applied Agriculture Economics.

Through participation in this service based learning experience at Heifer International Ranch, students learned how Heifer works to build sustainable communities using livestock to end world hunger and poverty. They learned how plant and animal production practices can in turn, satisfy human nutritional needs, enhance the environmental quality and natural resources while utilizing on-farm and renewable resources. Finally, students broadened their perspectives on global agricultural issues as related to world hunger and poverty, and strengthened their aptitude as partners in a more global agricultural economy. Students received academic course credit for this experience as well. The course title, description, objectives and student learning outcomes are found in Table 1.



FIGURE 1: HEIFER SUSTAINABLE COMMUNITY DEVELOPMENT MODEL²

WHAT IS HEIFER INTERNATIONAL?

For over six decades, Heifer International, a non-profit humanitarian organization, has provided education and livestock to limited-resource communities worldwide to end hunger and poverty, and care for the earth. They have found that education helps bring lasting change in a community's viability. Various skills and knowledge are needed to successfully facilitate and support the process of sustainable and holistic development. Learning opportunities are an integral part of Heifer's program model. The circular graphic in Figure 1 reflects Heifer's model of sustainable community development.² Communities decide what resource they need and which family will receive the Heifer Project, thus strengthening human capacity within a community. Heifer

then provides that family with a “living loan” in the form of livestock. Individuals prepare for their animals by participating in training sessions, building sheds, and sometimes planting trees and grasses. The animals bring milk, wool, draft power, eggs, and offspring to pass on to another community member. Every family and community that receives assistance promises to repay their living loan by donating one or more of their animal’s offspring to another family in need. This ritual of “Passing on the Gift” ensures project sustainability, enriches the community, and enhances self-esteem by allowing project partners to become donors.

During the Alternative Spring Break experience, we lived Heifer’s Model on sustainable community development along with another group of college students from St. Rose College in Albany, New York. The grant funds covered the cost of this experience inclusive of travel, lodging and meals. The meals eaten in the cafeteria were produced from Ranch resources, and throughout the week we were asked to only take what we thought we could eat. Once we finished a meal, we sorted our paper and organic waste which was later placed in the composting station. Our group decided to strive for zero plate waste for the entire week and we were successful! Figure 2 briefly describes the daily activities. The week began with various team activities that required team problem solving skills. This exercise was similar to what communities who desire a Heifer resource must demonstrate, that is, a strong human capacity to build community. Student service learning included composting, planting crops in an organic garden, animal husbandry, and construction in the urban slums. Through these activities, students also learned about resource disparity across the globe, and discussed sustainable solutions to the inequities. We experienced firsthand and discussed the challenges that impoverished communities experience daily around the world.

The culminating experience was spending the night in one of the global villages listed in Table 1 with simply a bucket of resources indigenous to that country, location, or situation. Additionally, the Guatemalan house had water rights while the Appalachian house had wood rights. Our task was seemingly simple, to survive the night with only a flashlight and sleeping bag, and to prepare

a meal with limited resources. To make the experience more realistic, a member of each village was given a specific disability (e.g., a leg was splinted) and someone was to simulate pregnancy. The pregnant member was required to wear a cloth baby carrier with a water balloon inside overnight. They were not allowed to take off the carrier, or it would represent the death of the child. Each village family was also given a biography of that village with a real-world problem that they were facing (Table 3). For example, the Refugee Family had fled Darfur to Chad. They were in an International Red Cross Refugee Camp and told they could return to their village yet risk their lives to do so. None of the choices given were terribly palatable and most involved risk. The journey back to their village would have been extremely dangerous and the Refugees decided to remain in the resettlement camp. The disparity of resources meant that other village members needed to barter with the Guatemalan family to use water or the Appalachian house for wood to start a fire to cook. In all interactions with other village members, we were required to use a consensus model. After students held a United Nations meeting, the decision was made to maximize and pool our resources to

FIGURE 2: DAILY EVENTS AT HEIFER RANCH



prepare a meal for all, including the refugees who had no resources.

After spending 24 hours in the global village with meager resources such as food, water, shelter, and physical ability, we were able to experience first-hand how hunger and poverty affects a population and the necessity of community engagement. In order to meet the basic needs of Maslow’s Hierarchy during the global village stay, students realized the importance of communities combining resources in order to achieve a common goal, a more sustainable efficient environment, and lifestyle.³

STUDENT REFLECTION

Throughout the week, students collectively reflected and discussed the day’s events. They also responded to a post-trip survey about the impact the week at Heifer Ranch had on them (see Table 2). The following quote summarizes most student comments: “I left Blacksburg knowing little about the interrelationship between community, agriculture and world economics. I returned to campus with hands-on experience and a better understanding of the complex yet delicate relationship between the three. I left Heifer Ranch overwhelmed, yet empowered to find sustainable solutions to these complex issues.” Upon returning to Blacksburg, students anticipated establishing community programs that would embrace the

philosophy of Heifer International.

Another student experienced a transformation in their personal and professional outlook. “Being immersed in a culture with self-perpetuating practices demonstrated how effective and practical a sustainable approach to life can be. In the short time spent on the ranch, we gained a true picture of how our personal actions and philosophies impact every living system on a global level. Heifer not only has the right idea about carrying out their mission through practices that allow them to be effective in their actions, but they give true meaning to teaching a person to ‘fish’ so they can eat for a lifetime. I left the ranch with renewed insight, empowerment, and a clear sense of direction for my academic and career goals. I now want to focus on developing self-perpetuating systems that bridge the gap between sustenance and impoverishment.”

LOOKING FORWARD: WHAT NOW?

Subsequent to our trip, we wanted to disseminate the knowledge gained at Heifer and engage students at VT to utilize the cornerstones of Heifer and achieve the Heifer mission. We have had the opportunity to share this experience with multiple constituents including our land-grant colleagues at the North American Colleges and Teachers of Agriculture Annual Conference, the Virginia Tech Service Learning Expo 2008 and the Governor’s Outreach Now Conference. Another trans-

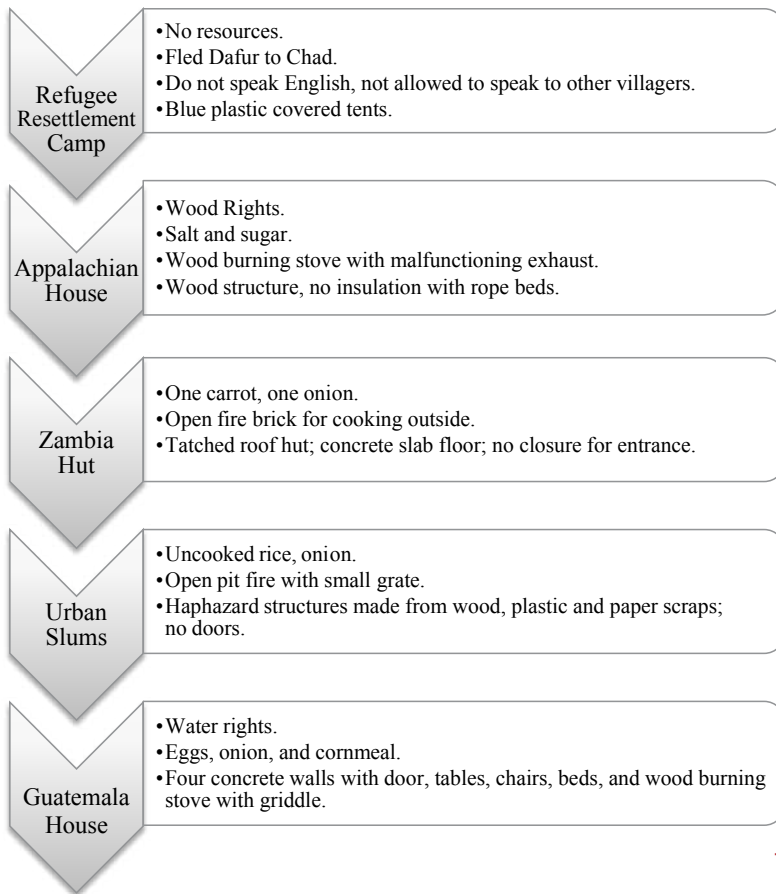
TABLE 1: SERVICE LEARNING COURSE

Course Title	HNFE 4984 Service-learning in Agriculture Sustainability
Course Description	A service based learning experience over spring break at the non-profit Heifer International Ranch to learn how Heifer International works to build sustainable communities using livestock to end world hunger and poverty.
Course Objectives	<ul style="list-style-type: none"> • Enable participants to better understand current global issues related to hunger and poverty. • Provide experience that promotes sustainable solutions to global hunger, poverty and environmental degradation. • Enhance learning and deepen civic and global responsibility by integrating community service with reflective study. • Gain an understanding of the role agriculture and livestock have in ending world hunger while building sustainable community environments.
Student Learning Outcomes	<ul style="list-style-type: none"> • Apply particular concepts from readings and knowledge base to an analysis of lived experiences in the settings provided at Heifer Ranch. • Use the experience provided to construct and articulate the impact of their experience on their understanding of global issues in agriculture sustainability. • Use new knowledge to make decisions and solve problems related to world hunger and poverty. • Reflect and effectively communicate about the experiential learning.

TABLE 2: POST-TRIP SURVEY QUESTIONS

1.	Name 3 things that stand out in your mind about the experience.
2.	What connections do you see between the Heifer Ranch experience and what you have learned in your respective college courses/disciplines?
3.	How has this experience contributed to your growth in any of the areas: civic responsibility, social understanding, and professional development?
4.	How were you different when you left Heifer Ranch compared to when you entered?
5.	What was the best/worst/most challenging thing that happened?
6.	What could the Heifer Team do to address the problems discussed at Heifer Ranch?
7.	What could you do on your own to address the problems discussed at Heifer Ranch?
8.	Where do you/the team go from here? What's the next step?

TABLE 3: GLOBAL VILLAGES AND RESOURCE DISTRIBUTION



of local foods and self-sustainability with home gardens and use of limited resources. Yet another example of Heifer practices being put into action is the facilitation of farm to fork programs within VT's Dining Services. We have now established a Student FoodCorps, who will promote the use of local produce grown under sustainable conditions on campus and throughout the state. Students will be cultivating an organic herb garden for distribution and use by VT Dining Services. Furthermore, we are working on developing a new minor in CALS which will partner with Heifer International to integrate Heifer's Sustainable Community Development into the curriculum. We have applied for a USDA Higher Education Challenge grant to assist in the development of a multidisciplinary, experiential-based curriculum.

Through this Heifer experience plus reflective discussion, students and faculty have broadened their perspectives on global agricultural issues as related to world hunger and poverty, and strengthened their competency as partners in a more global agricultural economy. The Heifer Model for sustainable community development is adaptable to a variety of learning environments, including higher education.

REFERENCES

1. Kolb DA. *Experiential Learning: Experience as the Source of Learning and Development*. Englewood Cliffs, NJ:Prentice Hall;1984.
2. Aaker J. *The Heifer Model: Cornerstones Values-Based Development*. Little Rock, AR, Heifer International;2007.
3. Maslow AH. A Theory of Human Motivation. *Psychol Rev.* 1943;50:370-396.

lational example involves the Student Dietetic Association partnering with the 4H VT Student Club to implement an after school garden program at a local elementary school where children learned about agriculture and sustainability, as well as nutrition. The goal of the program was to increase awareness

Dietetic Internships

Integrating Sustainability Theory & Practice into the UNH Dietetic Internship

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BRIEF SUMMARY:

The University of New Hampshire's Dietetic Internship has integrated food system, food security and sustainability principles and practices throughout its internship program. By identifying key sustainability concepts and applications, emerging food and dietetics professionals become more aware of the interconnectedness of food access, nutrition and health. Though sustainability concepts are integrated throughout the internship, most of the direct application is executed during the summer orientation, food service and community rotations.

LEARNING OBJECTIVES/OUTCOMES:

Throughout the internship, the interns will become familiar with the concepts of sustainability using the food system lens. Particular emphasis is on food production, food systems, food access and environmental impacts and health outcomes. Upon completion of the internship, the interns will be meeting a variety of competencies including those that address, evaluating emerging research, teamwork, developing solutions to problems, using resources responsibly, developing and delivering products, and participating in public policy activities.

AUDIENCE OR SETTINGS:

The primary audience is the dietetic interns but the secondary audiences are the individuals, the campus and community groups that the interns interact with as part of their planned practicum experiences.

BACKGROUND:

The integration of sustainability into the internship is designed to provide emerging nutrition professionals with the knowledge and skills that are needed to be competent professionals in the field of food and nutrition. For far too long, there has

been a "disconnect" between the food that is grown and the dietary advice given to consumers. Historically, little attention has been paid to the food system, food environments, economics and the ability of consumers to purchase foods advocated via major health guidelines.

Since the University campus has an established commitment to sustainability, the internship can access a number of resources including the student run Organic Farm, University staff and programs sponsored by the UNH Office of Sustainability, and participate in a Dining Service that has a commitment to buying local and promoting sustainability initiatives. Interns can also participate in selected activities of the UNH Center for a Food Secure Future. This is a collaborative effort that includes members of the Nutrition Program, Office of Sustainability, Extension, Natural Resources as well as community members and business stakeholders. There is a farmers' market on campus, as well as farmers' markets in surrounding communities.

Additionally, the New Hampshire Food Bank is only 45 minutes from the UNH campus. This progressive food bank is our only centralized bank in the state. The staff has a commitment not only to food distribution, but also to nutrition education and hunger abatement. It has established a working garden, an extensive cooking and education component and has developed a program designed to train under-employed individuals as production chefs. Interns begin to be exposed to a systems approach to addressing hunger, food insecurity and sustainability.

Thus, from farm, to fork, to food security, to health and nutrition outcomes, emerging dietetic professionals are encouraged to think systematically and politically, to act in the context of embracing and promoting food accessibility, and to work toward developing a sustainable food system. Promoting food security and environmental stewardship as integral components of the nutrition & dietetics curriculum and training ensures that nutrition professionals will be positioned to provide the leadership needed to ensure a food secure future.

MATERIALS NEEDED:

- Access to professional journals
- Access to current professional and consumer books (see reference section)
- Farmers markets
- Food banks
- Computers for food cost calculations

PROCEDURES:

Applications vary by initiative (See Table 2.).

TIME NEEDED:

The time required varies by initiative. Pricing of the food items in grocery stores and translating this information into the Food Pyramid and for the \$3.13 Challenge have been the most time consuming of the projects identified.

DISCUSSION QUESTIONS:

1. After each major initiative, there is either written or oral feedback
2. The book and journal reviews provide a very concrete format through which thoughtful discussion is possible.
3. The write up of the report on the organic lunch serves to enhance business and analysis skills, while evaluating the costs, planning and execution of the group work exemplified via the lunch.

TABLE 2: SAMPLE APPLICATIONS

COMPETENCY APPLICATION	
<p>Theoretical Review</p> <ol style="list-style-type: none"> Review a current Academy position paper on Sustainable Food Systems or Sustainable Food Systems Task Force Report¹ Review additional literature associated with sustainable agricultural practices from peer reviewed journals, Hunger & Environmental Nutrition² etc. Read and critiques at least one book on food system or sustainability topics such as those listed as references³⁻⁷. 	<p>Food Bank</p> <ol style="list-style-type: none"> All interns visit food bank orientation Select interns will complete a more in-depth community rotation Interns have worked with the Food Bank to research program effectiveness, etc.
<p>Organic Lunch</p> <ol style="list-style-type: none"> Identify locally available foods available through the campus garden & local farmers' markets. As a team, plan, market, cost, execute & evaluate local/organic lunch to be served to University staff, organic farm staff, internship mentors, etc. 	<p>Food Cost Initiatives</p> <ol style="list-style-type: none"> Various costing of menus have been conducted as part of the internship experience. Interns have collected on food costs to determine the costs associated with eating according to the food pyramid. This information was part of research project with results shared with state Cooperative Extension workers, legislators, and presented at the state-wide dietetics meeting. Interns have conducted cost analysis to determine food costs. The \$3.13 A Day Food Challenge was an interdisciplinary project designed to conduct research and raise awareness of food costs and eating on a limited budget that was comparable to food stamp reimbursement levels.
<p>Harvest Dinner</p> <ol style="list-style-type: none"> Working with University hospitality Management Promote local Harvest dinner during the fall rotation at dining services Interns help to identify products and promote annual event that showcases local foods in the dining halls 	

4. Food costing has been used as part of education and research projects and hence provide rich opportunities for discussion and application

ADAPTATIONS AND EXTENSIONS:

Many of these projects could be adapted to undergraduate students. Indeed, an undergraduate hospitality student worked on the pricing analysis for the \$ 3.13 a Day Food Challenge.

REFERENCES:

1. American Dietetic Association Sustainable Food System Task Force. (Lollar, D., Harmon, A., Hartman, B., O'Neil, C., Raimondi, M., Roberts, S., Tagtow, A., Wilkins, J., Devlin, C., & Holler, H.) (2007). *Healthy Land, Healthy People: Building a Better Understanding of Sustainable Food Systems for Food and Nutrition Professionals: A Primer on Sustainable Food Systems and Emerging Roles for food and Nutrition Professionals*. Chicago, IL: American Dietetic Association. Available at http://www.hendpg.org/docs/Sustainable_Primer.pdf.
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Teaming up for a Tasty, Local & Organic Lunch

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BRIEF SUMMARY:

For the past four years, the University of New Hampshire (UNH) has taken advantage of the campus organic farm and local farmers markets as a way to integrate food system concepts into the dietetic internship. Interns have an opportunity to visit the local farmers market as well as the on-campus organic farm operation. At the campus farm, the interns pick crops and review the farm operations. Interns review available seasonable foods, plan, purchase, cook, cost and evaluate a lunch that incorporates food items that are primarily from these local farms. The interns not only have an opportunity to work together as a team, but also to meet preceptors and staff that are invited to the lunch. Though sustainability is integrated throughout the internship, the organic lunch is planned dur-

ing the summer orientation. It provides a hands-on opportunity to integrate food service management and production skills while promoting team building and leadership skills.

LEARNING OBJECTIVES/OUTCOMES:

This focused activity is designed to highlight the role of local food production, access, taste, values and cost analysis in meal planning. The interns become familiar with the concepts of sustainability, civic agriculture, food safety, edible portions, food costing and preparation. A variety of skills and competencies are addressed via this project; some of the most common ones are identified in Table 1.

TABLE 1: APPROXIMATE HOURS TO COMPLETE TASKS

Hours	Tasks to complete
5-7	Introduce project, consider basics of food systems and sustainability. Consider timely topics such as civic agriculture, review literature, topics such as Community Supported Agriculture (CSA) and food security. Review on campus and farm product availability, decide on a luncheon theme, design an invitation, identify guests, send invitation to identified guests.
3-5	Conduct assessments of anticipated costs of foods based on edible portions of foods and advertised food costs.
2-3	Introduction to and utilization of nutrient analysis software for the selected menu items.
1-2	Visit on campus kitchen. Determine existing resources and plans for seating for meal event.
2-3	Develop production plan and evaluation survey.
4-6	Includes visits to the organic farm, farm stands and grocery stores.
5-6	Includes actual food preparation, serving, networking luncheon and clean up.
3-4	Complete final report based on records kept throughout the project and evaluations by attendees.

AUDIENCE OR SETTINGS:

The primary audience is the dietetic interns but the secondary audiences are the individuals invited to the lunch, including preceptors, faculty, hospitality services and organic farm staff and members of the UNH Office of Sustainability. The interns have a chance to informally meet many of the individuals they will be working with either formally or informally during the internship. Sharing healthy food together provides an enjoyable venue to celebrate local food, to gain food planning, purchasing and production skills, to provide an informal networking opportunity, to build the interns' confidence and to show appreciation to mentors who have come to look forward to this annual event.

BACKGROUND:

Interns enter the internship with varying levels of exposure and knowledge of food systems and sustainability. Hands on knowledge of food procurement and cooking skills are also quite variable. The majority of our interns have not lived on farms, nor do most report extensive gardening, food production, or food preservation skills. The exposure to the farm and the opportunity to use their creative skills to design and plan a lunch based on local and organic foods has proven to be a fun way to launch the internship experience while integrating recipe costing, food service, food safety, and production skills. The use of the local farm product also serves as an opportunity to design recipes that can be shared with the farm for future customers or farm staff use. The lunch provides a very concrete way to promote the importance of local food systems, food security and environmental stewardship as integral components of the UNH nutrition & dietetics curriculum.

MATERIALS NEEDED:

- Access to professional journals for current discussion on food systems, farm trends, community supported agriculture, civic agriculture (etc) (1, 2, 3).
- Access to recipes (interns own, on-line or from books).
- Farmers markets /UNH organic farm for fruits, vegetable and related products.
- Grocery store for local and organic items not available through the farm stands such as oils, some grain and meat products.
- Computers and resource texts for nutrient analysis and food cost calculations.
- Kitchen and related equipment.
 - Since it is summer and other classes are not using the kitchen, we have access to a food production kitchen for the lunch preparation and service
- Secure clean aprons, towels, soap, caps and/or hairnets.
- Determine availability of adequate pieces of cooking equipment, glassware and silverware. Disposables and plastic water bottles are generally avoided unless identified as recycle able.
- Secure name tags for all interns, staff and guests attending luncheon.

PROCEDURES:

- Describe the opportunity to plan an Organic/Local lunch during the internship orientation.
- Provide description of lunch, cost per meal guidelines, and final report expectations so interns can document progress and maintain financial records to complete project report.
- Review available food products that are anticipated to be available at the UNH organic farm by the date of the luncheon and those foods available via local farmers' markets.
 - Interns learn that each growing season is different and that the availability of crops needs to be determined each year.
 - Interns and staff with gardens are welcome to contribute crops if they so desire.
- Give interns the opportunity to choose a theme
 - Any decorations need to be natural or already on-hand. Wild flowers picked on the day of the event, flowers from another University event, or CD players with music from the intern apartments/homes have all added to the ambiance without adding to costs or consumerism.
- Review food safety principles, safe food production practices, and kitchen safety;
 - Establish dress code rules for food production including aprons, hair coverings, hand washing, and avoidance of cross contamination.
 - Despite summer temperatures and a very warm kitchen, interns are reminded of the need for close toed shoes when working in the kitchen the day of the lunch.
 - Visit kitchen to determine cookware, equipment, serving dishes and glassware resources.
 - Determine that gas for the stoves will be turned on for this event since the kitchen is not typically used in the summer.

- Provide interns with an opportunity to work in teams as they work on this project.
 - Design the invitation (Note; Check for accuracy before mailing!)
 - We use electronic message invitations to save trees and costs.
 - Select recipes or use favorites of interns. Ideally conducting taste tests and small batch preparations for all recipes would occur but this is not always feasible. Sometimes interns try new recipes on their own and decide if they will include for the lunch.
 - Conduct cost analysis of recipes, based on edible portion of food items.
 - Conduct nutrient analysis of recipes.
 - Have interns design the final menu.
 - Based on final menu and head count, plan production schedule.
 - Design attendee survey.
- Secure food products that are not at the campus garden a day or two before the event
- Morning of event; visit UNH organic farm and pick produce
 - Proceed to kitchen and prepare food
 - Provide name tags for guests and interns
 - Serve food and enjoy with guests
 - Distribute survey to evaluate menu items and overall meal event
 - Conduct analysis of survey results
- By one week post luncheon
 - Submit group meal report to internship staff.
 - Write thank you notes to those who helped make meal possible, particularly the food science/kitchen support staff

TIME NEEDED:

Time allocated to this project has varied by the orientation schedule and degree of difficulty for the selected food items on the day of the event (Table 1). Additionally, students need various support regarding food cost calculations and designing food preparation strategies.

DISCUSSION QUESTIONS:

1. Consider the concept of food systems, civic agriculture, and local food production. The ADA primer and journal reviews provide a very concrete format through which thoughtful discussion is possible.
2. The write up of the report on the organic lunch serves to enhance business analysis skills, since students evaluate product yields, evaluate costs, document planning and are responsible for the execution of the group work exemplified via the lunch.

ADAPTATIONS AND EXTENSIONS:

Many of these projects could be adapted to undergraduate students.

RESOURCES:

American Dietetic Association Sustainable Food System Task Force. (Lollar, D., Harmon, A., Hartman, B., O'Neil, C., Raimondi, M., Roberts, S., Tagtow, A., Wilkins, J., Devlin, C., & Holler, H.) (2007). *Healthy Land, Healthy People: Building a Better Understanding of Sustainable Food Systems for Food and Nutrition Professionals: A Primer on Sustainable Food Systems and Emerging Roles for food and Nutrition Professionals*. Chicago, IL: American Dietetic Association. Available at http://www.hendpg.org/docs/Sustainable_Primer.pdf. Accessed on March 6, 2013.

Wilkins JL. Eating right here: Moving from consumer to food citizen. *Agriculture and Human Values*. 2005;22:269-273.

Journal of Hunger & Environmental Nutrition, Taylor & Francis, Florence KY. Available at: <http://www.tandfonline.com/toc/when20/current>. Accessed on March 6, 2013.

Salsa and Sustainability

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BRIEF SUMMARY:

This is taught as part of the didactic component of the dietetic internship. However, it could be adapted for use by a discussion class of upper-level undergraduate or graduate students. During 3 weeks in the Dietetic Intern Seminar course, the role of food systems and sustainability is discussed in the context of personal food consumption, regional and national food production, and international food systems.

LEARNING OBJECTIVES/OUTCOMES:

- Participants will examine their own eating habits in terms of sustainability of the production of the foods they typically eat.
- Participants will gain greater awareness of the variety of means of obtaining a more sustainable diet.
- Participants will develop a greater understanding of regional and global food systems, and the impacts they have on the environment.

AUDIENCE OR SETTINGS:

Dietetic Interns or upper level undergraduate or graduate students in a small group seminar / discussion class

MATERIALS NEEDED:

Copies of materials for discussion; ingredients for “Chunky Tomato Salsa”, 1 large bag of plain tortilla chips, water, cups

PROCEDURES:

WEEK ONE – IT’S PERSONAL

Prior to class, prepare 2 separate batches of Chunky Tomato Salsa according to the recipe below. One batch should be pre-

pared with “regular” tomatoes from a supermarket, the other using (same color!) local tomatoes from a Farmer’s Market or Community Supported Agriculture Farm (CSA). Randomly label one container of salsa “A” and the other “B”.

Ask the participants if they think they can tell the difference between a store-bought and a fresh locally grown tomato when it has been prepared in a tomato salsa. Pass out index cards to each person. Have them taste each of the batches of salsa, taking a sip of water between tastes, and then write their “vote” as to which is which on their card. Collect the cards and see how many people of the group were able to correctly identify the local tomatoes. Follow with discussion questions.

Chunky Tomato Salsa:

4 medium tomatoes, seeded and diced
2 - 3 jalapeno peppers, seeded and minced
1 medium red onion, finely chopped
4 tablespoons chopped fresh cilantro
2 cloves garlic, minced
3 - 4 teaspoons lemon juice
1/2 teaspoon salt

Combine ingredients in a container with a cover. Refrigerate until ready to serve.

Makes enough for about 12 people.

Time Needed:

3 -1 hour-long discussion sessions, + about 6 hours advance reading prior to class, also about 20-30 minutes for instructor to prepare “Chunky Tomato Salsa” for session 1.

SESSION 1: IT’S LOCAL

Read the website articles listed below for Session 1. Have participants think about how seasonal and local foods could be utilized in settings outside of individual’s homes. Explore the trade-offs of adding these types of products to food service providers. Discussion centers around what is available in the local and regional area, and the feasibility of incorporating that into institutional food services, restaurants, and other venues.

Websites for Session 1: (or find your own)

Accidental Locavore. Available at: <http://www.accidental-locavore.com/>

Environmental Policy, the Park Slope Food Coop, available at: <http://www.foodcoop.com/go.php?id=39>

Grow New York. Available at: <http://www.grownyc.org/about>

McWilliams, JE. The Locavore Myth. *Forbes Magazine*; August 03, 2009. Available at: <http://www.forbes.com/forbes/2009/0803/opinions-energy-locavores-on-my-mind.html>

Mariani J. Locavore, Shmocavore. *Esquire blogs*. Available at: <http://www.esquire.com/blogs/food-for-men/locavore-movement-052411>

Discussion Questions:

Why would/ should individuals buy locally grown produce. Does it cost more? Does it taste better? Is it more nutritious? Is it “worth it”? What are your experiences with locally grown foods? Have you ever grown or picked your own produce? Raised your own animals for food?

SESSION 2: FARMER’S FACE

Select one of the books listed below to read. Use the discussion questions listed below to explore the impact of putting a farmer’s face on food.

Books for Session 2

Select one of the following books: (or choose others)

Kingsolver B. *Animal, Vegetable, Miracle*. New York: Harper Collins;2007.

Carpenter N. *Farm City, the Education of an Urban Farmer*. New York: Penguin;2009.

Alexander W. *The \$64 Tomato*. Chapel Hill, NC: Algonquin Books;2006.

Discussion Questions:

How does “putting the farmer’s face on the food” impact an individual’s food choices? How much time / effort / money is it worth to accomplish this? Can “slow food” fit into a fast-paced life? How about food service in institutions? (Schools? Hospitals?) Who pays?

SESSION 3: IT’S GLOBAL

Prior to class, read *The Atlas of Food*. Have participants think about the pathways followed by various foods and other resources around the world, and the impacts on hunger, obesity, and the environment.

Book for Session 3

Millstone E, Lang T. *The Atlas of Food, Who Eats What, Where, and Why*. Berkley CA: University of California Press;2008.

Discussion Questions:

Of all the tables / data shown in this book, what did you think was the most striking and why? Does seeing all the various food trade pathways make you think differently about the availability of foods here? What, if any, changes do you plan to make as a result of this?

Nutrition Education K-12

The following activities are intended to be used by university students when conducting nutrition education in K-12 classroom, as service learning, or under the guidance of a university professor.

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Before the Potato, Parsnips Ruled

Note: *This lesson was submitted as part of a Masters Capstone Project at the University of Pennsylvania.*

AUDIENCE:

The following activities can be utilized by dietetics students to conduct community education with students in grades K -12.

SUMMARY:

The purpose of this lesson is to expose students to a less common vegetable in dishes that they are familiar with, to expand the types of food, especially vegetables, in students' diets, and to increase culinary skills. These objectives are met through a hands-on cooking demonstration preparing parsnips three different ways. Divide students into three groups. Have each group prepare one of the following parsnip recipes: Parsnip Chips, Parsnip Puree, and Honey, It's Parsnips. Then have the students describe the dish they made to the rest of the class, along with several facts about parsnips. Encourage students to try all of the dishes and record their experience in their food journals.

Station 1: Parsnip Chips

- Slice parsnips thinly (approximately 1/8 inch)
- Lay flat on a baking sheet
- Brush with vegetable oil
- Sprinkle with seasonings
- Bake on 400 degrees for 15 minutes or broil for 10 minutes (watch closely to prevent burning).

Station 2: Parsnip Puree

- Slice parsnips into ½ inch cubes.
- Boil or steam cubed parsnips for 20 minutes or until tender.
- Add ½ cup milk
- Add ½ teaspoon nutmeg
- Mash all ingredients together. Add pepper for taste. Serve in a large bowl.

Station 3: Honey, It's Parsnips

- Slice parsnips into ½ inch cubes.
- Boil or steam cubed parsnips for 20 minutes or until tender.
- Heat the following ingredients together in a saucepan until melted and mixed together.
 - 2 tablespoon butter
 - 1 tablespoon honey
 - ¼ cup orange juice
 - 1 teaspoon grated orange peel
- Toss in parsnips and season with salt for taste as desired.

Tomato Activity

Note: *This lesson was submitted as part of a Masters Capstone Project at the University of Pennsylvania.*

SUMMARY:

Focus a lesson on a single fruit or vegetable from the garden, e.g. tomatoes. Bring students outside and ask them to identify

the tomato plants in the school garden. Discuss tomato plant anatomy, history of the tomato, and best growing conditions. Harvest several tomatoes. Make tomato sauce and pasta with the students. While the food is cooking, discuss nutritional benefits of the tomato. This lesson can be adapted for a variety of garden produce. Vegetables bought from a local farm and pictures of plants can be substituted if the school does not have a garden available for student learning.

Protein without the Meat

Note: *This lesson was submitted as part of a Masters Capstone Project at the University of Pennsylvania.*

SUMMARY:

Through a hands-on cooking demonstration, the following lesson exposes students to foods that are high in protein, but do not contain meat. First introduce the concept of vegetarian meals and provide reasons for students to consider eating meatless meals. Then set up three cooking stations, with each station devoted to one of the following recipes: Tofu Burgers, Curried Red Lentils, and Hummus. Supervise the students as they prepare each recipe. Then ask a spokesman from each group to describe the dish they made to the rest of the class, along with information about the recipe's primary ingredient. Encourage students to try all of the dishes and record their experience in their food journals.

Station 1: Tofu Burgers

1 package extra firm tofu
¼ cup whole-wheat flour
¼ cup corn flour
¼ cup rolled oats
½ cup chopped parsley
1 teaspoon cumin
1 teaspoon paprika
¼ teaspoon grated ginger
½ teaspoon soy sauce
3 tablespoons olive oil

- Cut tofu into 1 inch cubes, add parsley and mash together.
- Add all other ingredients (except olive oil) and mix well by hand until all ingredients clump together.
- Form into small, thin patties.
- Add olive oil to a frying pan and heat at medium heat.
- Add tofu patties to oil and heat each side 5 minutes, or until golden brown.

Station 2: Curried Red Lentils

¼ cup olive oil
½ teaspoon cumin
1 clove garlic
1 cup chopped onions
1 cup chopped carrots
1 tablespoon grated ginger
1 teaspoon crushed red pepper
3 tablespoons curry powder
2 tablespoons fresh squeezed lemon juice
1 ½ cups lentils
Salt & pepper to taste

- Heat oil in a pot at medium-high heat, add cumin, garlic, onions, carrots and cook for 5 minutes stirring.
- Add rest of ingredients (except lentils) and cook for another 3 minutes.
- Add lentils, salt & pepper.

Station 3: Hummus

1 can chickpeas
¼ cup olive oil
1 tablespoon chopped parsley
¼ cup fresh squeezed lemon juice
2 tablespoons tahini
Salt & pepper to taste

- Add all ingredients into food processor and blend until smooth.

Nigerian Harvest Festival: Be an Earth Helper

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BRIEF SUMMARY:

The purpose of this lesson is to teach values and respect for diverse cultural perspectives on food as well as a healthful meal concept. The lesson is most appropriate for elementary aged students and consists of five components: 1) Introduction- Provide background information for students about Nigerian food, celebrations, and Kwanza. Pass around spices commonly used in Nigerian cooking for students to smell. Discuss the importance of family traditions and rituals. 2) Read the Nigerian folktale "Granny and Why the Sky is Far Away". This story motivates children to be an 'earth helper' and respect what the earth provides for our sustenance. The story contains several other themes including the role of celebrations and how food is central to many celebrations, how previous generations pass down of food knowledge, and how multiple cultures live in balance with nature. 3) Play the "What Am I?" game. In this game, students are asked to correctly identify foods and their corresponding food group: e.g. grains, fruits, vegetables, dairy, and meat/beans. After the identification part of the game, the children will brainstorm ways for their class to be good 'earth helpers' by identifying strategies to reduce pollution and waste. 4) Cook Nigerian stew with the students. First identify and categorize the ingredients of the recipe. Discuss possible recipe variations based on the season.

Nigerian-style Chicken Peanut Stew

Prep Time: 20 minutes
Cook Time: 45 minutes
Makes: 6 to 8 servings

Note: This recipe and activity involves peanuts. Inquire about food allergies among your audience ahead of time.

Stews are an excellent type of dish for fall and winter. As the weather cools, a pot of flavorful meat, vegetables in a richly flavored sauce warms us inside and out. Since lots of ingredients are required, there's a job for everyone. Once

you have mastered one stew, you can change the type of meat, make it meatless, and/or change the veggies to your preference and by what is coming in season. You can put in as many vegetables as your family likes and get your five a day in one meal!

EQUIPMENT:

Plastic or Table Knives
Cutting Boards
Vegetable Peelers
Chef's Knife
Large pot
Wooden Spoons
Tongs
Whisk
Oven Mitts
Measuring Spoons and Measuring Cups
Mixing Bowls (one each: large and small)
Plastic Spoons (for tasting, reusable)
Plastic Plates (reusable)
Food Service Gloves (disposable)

INGREDIENTS:

¼ teaspoon Cinnamon
2 teaspoons Ground Cumin
¼ teaspoons Cayenne Pepper flakes
2 teaspoons Thyme Leaves
2 teaspoons Paprika
3 tablespoons Peanut Oil
6-8 pieces Chicken (assortment of breast, thigh, and legs)
2 pounds Root Vegetables (turnips, parsnips, etc., washed not peeled)

- 1 Onion
- 3 Plum Tomatoes
- ¼ cup Creamy Peanut Butter
- 4 cups Chicken Broth
- ¼ cup Tomato Paste
- 1 bunch Kale
- 8 ounces Okra, fresh or frozen

DIRECTIONS:

(Child) MEASURE the cinnamon, cumin, pepper flakes, thyme leaves, and paprika into a small bowl. Mix well and spread onto plate.

(Child) COAT the chicken pieces in the spice mixture, wearing food service gloves.

(Adult) HEAT the peanut oil in the pot over high heat.

(Child) SAUTE the chicken in the peanut oil until browned on both sides (4-5 minutes). Remove chicken from the pan and reserve.

(Adult) SLICE the onions, root vegetables, and the plum tomatoes.

(Child) DICE the sliced vegetables, and ADD to the pot with the hot oil from the chicken. COOK over low heat, 5 minutes, stirring occasionally.

(Child) While the vegetables are cooking, BLEND the peanut butter and tomato paste into 1 cup of the chicken broth measured into a small bowl. WHISK until smooth.

(Child) ADD this mixture and the balance of the chicken broth to the vegetables when they are cooked.

(Child) ADD the chicken to the pot, bring to a boil, reduce heat to medium and continue cooking about 30 minutes.

(Child) SLICE the okra and set aside. TEAR up the kale and set aside.

(Child) ADD the okra and kale after about 20 minutes, and cook everything 10 minutes more.

(Adult) CHECK seasoning in the last 5 minutes, adding salt as needed.

SEASON	VARIATIONS
Fall/Winter	Diced or blanched winter squash (pumpkin, butternut or acorn squash) Sliced mushrooms Beet, mustard or collard greens Chestnuts
Spring	Asparagus String beans Cilantro
Summer	Summer squash Asian greens Bell peppers

For more information visit: www.familycookproductions.com

Sustainability Education Briefs

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LOCAL FARMERS' MARKET ASSIGNMENT

Have students visit a local farmer's market or local farm. Complete a taste test and appearance comparison of produce purchased or sampled at the Farmer's Market or farm with the same type of produce from a retail grocery store.

ONE-DAY MENU ASSIGNMENT

Ask students to create a one-day menu using various local foods that are available in your area within a 100-mile radius or whatever distance you determine as "local". Allow students to choose whichever season they want as long as that produce is in season and regionally available. Menus should include breakfast, lunch, and dinner, as well as two snacks. Recipes within the menu must be foods that the student would consume and find appealing.

FOOD SYSTEM LOG AND FOOD MILES CALCULATION ASSIGNMENT

Part 1: Have students record 3 consecutive days of their individual food/beverage purchasing and consumption behavior. Encourage specific details to be recorded including time of day, location of eating, portion/quantity, location of purchase, and origin of the food/beverage. Then require students to assess their purchasing and consumption behavior, considering the following questions:

How would you rate the nutritional quality of your 3-day diet?

What factors influenced your food/beverage purchasing decisions?

What factors influenced your food/beverage consumption decisions?

What are the health and nutrition implications of your purchasing and consumption behavior?

What are the environmental implications?

What factors are under your control? What factors are out of your control?

Part 2: Food Miles Calculation Assignment: Using one of the days from the Food System Log Assignment, have students calculate the transportation miles of the food they consumed from farm to plate for the entire day. Be sure that students include ALL ingredients, including spices. For example, for spaghetti and meatballs, consider source of spaghetti noodles, meat, tomato sauce, onion, garlic, Parmesan cheese, oregano, etc. Remind students that foods are not necessarily produced at the location of the "distribution center" indicated on a label.

BOOK REVIEW ASSIGNMENT

Ask students to select a book written for the general public about local food. After reading the book, have students summarize how effective the book was at delivering local food related information to a person without a working knowledge of nutrition, including specific examples from the book to support their position. Ask students to include any information they learned about local foods or insights on how to eat better from reading the book. Submitted by Elena Serrano, Instructor, Associate Professor/Extension Specialist, Department of Human Nutrition, Foods, & Exercise, Virginia Tech, Blacksburg, VA.

TRANSPORTATION BEHAVIOR LOG AND NEIGHBORHOOD WALKING ENVIRONMENT ASSESSMENT ASSIGNMENT

Part 1: Choose 3 consecutive days (at least 2 must be a week-day). Record your individual transportation behavior including such details as a description of the physical activity/mode of transportation, time of day, length of time, purpose of trip, destination, and level of exertion. Then assess your physical activity and transportation behavior. Consider the following questions in your response:

How would you rate your physical activity?

What factors influenced your physical activity habits?

What factors influenced your transportation habits?

What factors are under your control? What factors are out of your control?

Part 2: Within a 1-mile radius of your home or work, conduct a walking audit of the environment and answer the following questions.

How would you rate your community's overall active living environment?

How would you safely and conveniently recommend for someone to be more physically active in your neighborhood?

Consider the following factors in your response: pedestrian safety, pedestrian signalization, sidewalks, crosswalks, pedestrian/bike facilities, bicycle lanes or bicycle friendly streets, road width, intersection design, traffic, parking, transit, recreational facilities and parks.

