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## Teaching and Educational Methods

# Integrating Experiential Learning into a Food Systems Framework: An Application to Promote Food Deserts and Food Access Concepts Among College Students

Renee Shaw Hughner<sup>a</sup>, Claudia Dumitrescu<sup>b</sup>, Lauren Chenarides<sup>a</sup>, Christopher Wharton<sup>a</sup>, and Gina Lacagnina<sup>c</sup>

Arizona State University<sup>a</sup>, Central Washington University<sup>b</sup>, Glendale Unified School District<sup>c</sup>

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### Abstract

Food access is a transdisciplinary topic that may or may not be included in college curricula. Central to this concept is the notion of a “food desert,” or an area without access to food outlets that sell nutritious foods at affordable prices. The U.S. Department of Agriculture provided competitive grants to higher education institutions to develop course modules that raise awareness of the issue of food deserts among future decision makers and equip them with the problem-solving skills needed to address this social problem. In this paper, we describe the outcome of one such educational grant, a course module focused on the introduction of food deserts and the factors involved in addressing the problem of access to healthy food for lower socioeconomic segments of the population.

## 1 Introduction

*“Tell me, and I will forget. Show me, and I may remember. Involve me, and I learn.*

—Benjamin Franklin

The issue of poor food access—the inability or difficulty to procure healthy foods at an affordable price—is a critical one, as it is a fundamental component of an individual’s ability to achieve food security (FAO 2008; Caspi et al. 2012). Studies have shown a relationship between the inability to access healthy, fresh foods and negative health outcomes, such as obesity and diabetes, which is why many global health organizations have made it a priority to provide resources to underserved communities in an effort to alleviate the burdens associated with poor food access (Wrigley et al. 2003; Moore and Diez Roux 2006; Black and Macinko 2008; Treuhaft and Karpyn 2010; Ver Ploeg and Wilde 2018; Office of Disease Prevention and Health Promotion 2019). The inability to access fresh food has only intensified as the COVID-19 pandemic has heightened our awareness of the hardships people living in low-access areas face in order to safely secure nutritious foods. Given the significance of this topic, its persistence in society, and the lack of formal coursework on this issue, this paper provides a framework for instructors to integrate a 1-week learning module on this topic into undergraduate courses in agribusiness and/or other pertinent courses.

The concept of food access is made up of many components. Caspi et al. (2012) identify one dimension of food access as “food accessibility,” which refers to the geographic or locational aspect related to acquiring food and is often measured as the physical distance to the nearest supermarket or large grocery store. The U.S. Department of Agriculture (USDA) defines areas with extreme food inaccessibility, “food deserts,” as “urban neighborhoods and rural towns without ready access to fresh,

healthy, and affordable food" (USDA 2020). Not only are these communities devoid of supermarkets and large grocery stores generally associated to carry fresh produce and perishable items (Cobb et al. 2015; Chenarides and Jaenicke 2018), but they are often overwhelmingly served by fast-food restaurants and convenience stores that offer few healthy, affordable food options (Cooksey-Stowers et al. 2017). An estimated 17.1 million Americans, or 5.6 percent of the population, reside in so-called food deserts (USDA-Economic Research Service 2019) despite attention given in the popular press to the issue of food deserts; the challenge of improving food access persists, with the USDA noting the number of low-income, low-supermarket-access census tracts increasing slightly over the 5-year period from 2010 to 2015 (Rhone et al. 2017).

Considerable research suggests that areas of poor food access are the result of conditions that would not make it profitable for a supermarket or large grocer to enter (Bitler and Haider 2011; Ellickson 2007, 2013; Cleary et al. 2018). These factors include low demand coupled with high fixed costs of entry. A myriad of policies exist to incentivize demand (e.g., SNAP) and offset costs for retailers to enter those areas (e.g., Healthy Food Financing Initiative), yet countless communities remain without adequate access to affordable, healthy food.

Understanding the issue of food access requires a firm grasp of topics that span supply chain management, agribusiness, economics, marketing, sustainability, and nutrition, among other fields. Through informal conversations with several faculty at the authors' institutions, it was learned that the issue of food deserts is not widely discussed in business and agribusiness classes. Further, upon querying students in their classes—representing core business disciplines—the authors discovered that their upper-level college students (from two higher education institutions in the Southwest and Northwest) are largely unfamiliar with the term food desert and with the broader issue of fresh food inaccessibility in lower socioeconomic neighborhoods. Addressing the issue of food deserts involves the coordination of several fields; due to its transdisciplinary nature, it is critical that students from a diverse set of disciplines be educated on the issue of food accessibility. Moreover, an appreciation of the multitude of lenses through which professionals from diverse fields might approach this issue is essential (Abubakari 2018).

When seeking to address the issue of poor food access, and the resultant host of social, health, and economic costs of insufficient access, university classrooms can serve as a platform to educate future professionals on these issues and challenges. Indeed, the project presented in this paper was funded by a USDA educational challenge grant. The USDA lists as one of their strategic initiatives for 2018–2022, the provision to all Americans of "access to a safe, nutritious and secure food supply," specifically, stating the goal of "ensuring Americans have access to food and a healthful diet" (USDA 2018). In this paper, we present a course module that aligns with the USDA initiative.

## 2 Issue and Objectives

There is a void in business and agribusiness educational material on food deserts. The authors searched large databases in the fields of agriculture and business (e.g., Agricola) for college-level instructional materials on food deserts. While much research has been done in this area, the authors did not find any type of instructional module similar to what they have compiled. Additionally, the aforementioned USDA grant was awarded because of the perceived need for such a module. The teaching module presented in the current paper addresses this need by offering a brief, 1-week course module that integrates a current policy issue with research training. The authors aimed to educate college students on food deserts—what they are and why they exist—and to use the example of food deserts to guide students in developing critical and creative problem-solving.

Food deserts are an outcome of a complex food system. Introducing students to the Food Systems Framework (National Research Council 2015), which illustrates the complexity of the food system, along with its interconnectedness to the environment, provides students a robust framework to address a variety of food supply, distribution, and consumption issues. Mere lecturing or reading about these

problems, the authors believe, are not as compelling as “doing” or “experiencing.” Access to food is regarded as a key indicator of well-being for American households (Azétsop and Joy 2013), yet students may be graduating college without having an understanding of the food system and its complexity. Thus, the objectives of this project and paper are to provide college educators with a 1-week course module that engages students and meets the following learning objectives:

1. Introduce students to the concept of food access and deserts, as well as their antecedents and consequences;
2. Introduce and incorporate a Food Systems Framework into the discussion of food deserts;
3. Discuss the different approaches to research and their importance and value;
4. Impart an appreciation for the complexity of approaches and solutions needed in addressing complex social issues, such as food access and food deserts.

The current paper aims to present the efficacy, in terms of engagement, output, and student evaluation, of an experiential learning (EL) lesson that utilizes a Food Systems Framework to educate students on the issue of food deserts.

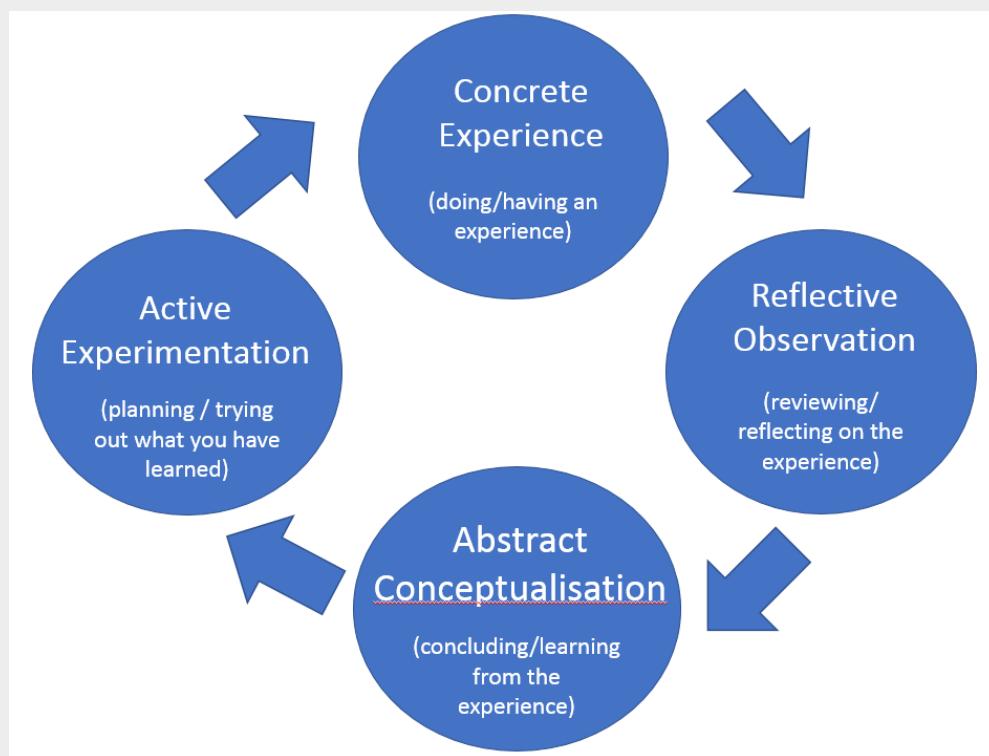
This paper is organized as follows. It begins with a discussion of EL and Kolb’s Learning Theory, the framework upon which the module was designed. Following this, the goals and components of the course module, and the methodology used to develop them are presented. To determine efficacy, a post-execution assessment of students’ interest, engagement, and subject matter knowledge is developed and administered. The paper concludes with a discussion of limitations, educational outcomes attained, and implications.

## 3 Experiential Learning (EL) Theory

The issue of food deserts presents a subject matter that lends itself readily to EL. EL has been demonstrated to more effectively engage students (Kolb 1984) and to allow students to think more deeply about complex issues. Unlike traditional lecture and reading approaches, EL enables the issue of food availability to become more tangible to students. Engaging in activities where they can directly manipulate data and see outcomes, students become more involved with the issue, than simply hearing the data in lecture format. Reflection is a key component in the learning process as it allows students to process the information provided during the experience and learn from their experience. Therefore, the authors based their module on one of the most widely used learning theories—Kolb’s Experiential Learning Cycle (Kolb 1984). EL allows students to grapple with the issues, while removing the risks inherent in an actual decision scenario. This frees students of the possibly negative outcomes associated with suboptimal decisions and allows for the development of more creative, or potentially risky, ideas. Kolb’s theory also allows for different learning styles.

Kolb offers educators a learning framework in which he posits a four-stage process by which learning takes place (see Figure 1).

Briefly, for effective learning to occur, Kolb identifies a series of stages through which students should progress: (1) first, students must be actively involved in the experience (termed “concrete experience”); this is followed by (2) observation of and reflection on that experience (i.e., “reflective observation”), which leads to (3) the analysis and conceptualization of the experience (“abstract conceptualisation”), which culminates in (4) new ideas gained from the development and testing of hypotheses (“active experimentation”). A key feature of Kolb’s theory is that individuals pass through each stage of the learning cycle, and that activities and material are developed to take students through the entire process, so as to ensure different learning styles are accommodated. Intertwined with this framework is the assertion that individuals have different learning styles; what may work well for one



**Figure 1. Kolb's Experiential Learning Cycle**

Source: Kolb 1984.

person, may not work as well for another. Kolb advanced his learning cycle based on the learning preferences of individuals. The key point is that following the sequence of stages ensures that students are exposed to each learning style, resulting in greater efficacy, regardless of an individual's preferred method of learning. It is for that reason that Kolb posits effective learning only occurs when a learner is able to execute all four stages of the model. Table 1 depicts how Kolb's Cycle of Experiential Learning is employed in the design of the food desert course module.

EL encompasses a more robust theory of learning that includes both cognitive and behavior-based learning. It is the learning "by doing" aspect which differentiates EL from traditional classroom learning. Included in EL are activities (e.g., cases, projects, simulations) that seek to emulate or address real-world issues and provide students with hands-on experience addressing these issues. Several researchers have documented the efficacy of EL techniques, with publications citing evidence of greater learning and engagement, enhanced critical thinking and problem-solving skills, and greater retention of material and understanding of the issues (see Hickcox 1991 for a review; Radford et al. 2015). Galea (2007) notes there are many pedagogical merits of EL, which have been widely documented; "however, one that is often overlooked is that teaching and learning in an experiential setting is great fun—for both teachers and students alike. And there's nothing like having fun to really generate one's creative juices and to make real learning stick" (Galea 2007, p. 10). As the workplace has continued to shift toward a knowledge-based economy where creative thinking and ingenuity are a requisite for successful employees (and companies), it is the task of educators to adapt to the considerably different learning needs that such a shift demands. Notably, Galea (2007, p. 10) states "there is a need for new and non-traditional teaching approaches that deep learning needs ultimately to be experiential: that is, learning while doing rather than a passive absorption of facts and figures." Perrin (2014) notes that EL is an ideal approach to achieving the tenets of an empowering education, allowing students the opportunity to gain

**Table 1. Food Desert Module Components Using Kolb's Cycle of Experiential Learning Framework**

Stage	Activities Employed
<b>Concrete experience</b>	External readings; Hands-on experimentation with Food Access Research Atlas; students identify the region's food deserts and fast-food outlets; visit to a food desert; qualitative data gathered via observation and interviews; analysis of data and identification of themes.
<b>Reflective observation</b>	Consideration of the region's food deserts and related demographic indices; interpretation of data; reflection report on research findings (e.g., observations and conversations). In the reflection, identify the pertinent issues. Meet with teammates to discuss issues and identify problems.
<b>Abstract conceptualization</b>	Developing suggestions to address the issues identified; turning their ideas into a paper and presentation.
<b>Active experimentation</b>	Suggestions presented to class; role-play as simulations; practical exercises, e.g., making a presentation, debate.

Source: University of Leicester 2019.

greater control over their learning experiences, further increasing learning engagement. Experience-based projects allow instructors “to deliver content holistically,” connecting subject-matter “to broader disciplines, and connecting learners to each other in collaborative environments that reinforce development of problem-solving and interpersonal skills” (Radford et al. 2015, p. 468). In a university setting, internships and class projects are common EL tools employed, and other tools, such as experiencing and/or executing concepts and ideas, may lead to the discovery of new relationships and theories. EL tactics all serve to achieve the same end goal—engaging students more deeply in the ideas, concepts, and material presented to them.

## 4 Course Module Development

The module is created to be applicable across pertinent fields of study, including agribusiness, business, economics, nutrition, social work, sustainability, and other fields relevant to the issue. The teaching materials are designed for students in their junior or senior year of college. The course module encompasses three distinct aspects of food deserts, which, in their entirety, address the issue of “access.” The three module units are explained in the following. For instructors on a twice-a-week schedule, Units 1 and 2 can be combined into one session.

## 4.1 Unit 1: Food Access and Food Deserts

The first unit of the module is discussion-based. The goal of this unit is to introduce and discuss the concepts of food deserts, food access, and the consequences of inadequate access to affordable and fresh food (e.g., health and societal outcomes, ethical considerations). The official definition and characterization of a food desert, based on the USDA description, are presented, as well as the other terminology (e.g., food swamp). More recently, the USDA has minimized the use of the term “food desert” in favor of the more general term “access.” Subsequently, a discussion of framing the issue of access is also presented. Societal implications of food deserts, such as poor health, which may contribute to a host of negative individual and societal consequences, are also discussed. During these discussions, student input is actively solicited and probed. At the end of this discussion, students are introduced to the USDA’s Food Access Research Atlas (formerly the Food Desert Locator), a mapping tool that provides a geographic overview of food access indicators by census tract using different measures of supermarket accessibility (e.g., car ownership and distance from a supermarket; USDA- Economic Research Service 2019). With the Food Access Atlas, students can look specifically at census tracts in their region to assess supermarket accessibility. For their first assignment, students experiment with the Food Desert Locator individually. Students are asked (1) to identify the food deserts in their region—city, county, state (using the Food Access Research Atlas on the USDA, Economic Research Service site) and (2) to find the number of fast-food restaurants, convenience stores, and grocery stores on neighborhood maps. Additionally, they are asked to think about and be ready to discuss the consequences associated with these findings. Our experience is that this hands-on tool is an eye-opener for virtually all of the students, as regions of low accessibility are identified within close environs. Students are required to identify regions relatively close to campus. The learning objectives of this unit are to impart knowledge and understanding of the issues of food deserts and food access and to apply the USDA’s Food Access Research Atlas to identify food deserts in specific regions.

## 4.2 Unit 2: Food Systems

The goals of the second unit are to introduce students to the Food System Framework (see Figure 2) and to impart the necessity of a systems approach to problem-solving. Discussion is focused on introducing students to the complexity of the food system and encouraging students to consider the interconnectedness of its facets in addressing the food deserts issue.

Central to the Food System Framework is the illustration and explanation of the retail fresh produce supply chain. Issues of timing, storage, and transportation are introduced and discussed. The topic of food deserts, at its core, requires a general awareness of supply chain logistics, and the Food System Framework presents the intricacies in safely delivering fresh foods to retail outlets, which might further illuminate the outcome of poor food access in some communities.

Students are also instructed to use the USDA’s Food Environment Atlas, another data-driven resource provided by the Economic Research Service. Factors such as “store/restaurant proximity, food prices, food and nutrition assistance programs, and community characteristics, interact to influence food choices and diet quality” (USDA-Economic Research Service 2020, p. 1). These interactions help inform some of the factors that need to be considered in designing effective policy interventions. They also provide a hands-on tool with which students can experiment.

In Unit 2, the perspectives of other important stakeholders are discussed; drawing from the literature to inform these viewpoints. For example, Bitler and Haider (2011) present a model consistent with economic theory that explains the supply and demand side forces that give rise to food deserts (the “why food deserts exist” question), but argue that data challenges prevent researchers from empirically answering the “whether food deserts exist” question. At the time of their publication, little empirical evidence existed; thus, much uncertainty remained regarding the consequences of living in food deserts.



**Figure 2. A Framework for Assessing Effects of the Food System**

Source: National Research Council 2015.

Since 2010, more research on this topic has been conducted. Zhen (2021) presents an extensive review of the literature published since 2010 that empirically examines the causal relationship between living in food deserts and nutritional disparities. He finds that nutritional disparities are explained by food demand or consumer preferences rather than the supply of supermarkets that sell healthy foods. Thus, in Unit 2, we acknowledge both the theoretical framework, as presented in Bitler and Haider (2011), without undermining the findings from recent empirical studies, as discussed in Zhen (2021). Students also learn the importance of understanding the consumer decision-making process; specifically, key factors that influence consumer decision making are discussed. These include personal, social, psychological, and situational factors that affect consumer choices and demand. It is emphasized that availability is only one factor in the purchase and consumption of fresh food.

Students are instructed to form self-selected groups of a minimum of three and a maximum of four students per group. For their second assignment, students are provided access to various qualitative data in the form of interviews with growers and distributors. These interviews are conducted to understand the barriers in providing fresh produce to food deserts. Students are instructed to read the transcripts and identify themes that are conveyed by growers and distributors; essentially, to identify the issues surrounding the supply of fresh produce to these areas. Students are encouraged, but not required, to visit an area—in the neighborhood—designated as “low access” on the Food Access Research Atlas. They are also encouraged to envision having to secure affordable groceries to prepare dinner. It is suggested,

but again, not required, that they talk to store owners and residents about the issue of accessing fresh food. If unable to visit a region, students are instructed to research secondary information about their areas. If possible, recommendations include identifying local markets and calling store owners to discuss barriers to carrying perishable food.

Being equipped with the knowledge and information provided by the previously assigned readings, the interview data, and class discussions, students are challenged to think creatively and holistically about the issue of food deserts and to write and present a report about next steps or considerations needed, in order to address food deserts. In doing so, they have to consider the various stakeholders. Additionally, students are told that the written report should include an introduction, review of the literature, statement of the problem, and recommended considerations/next steps. Table 2 includes grading rubrics for both assignments.

Last, a brief discussion on creativity and how creativity is fostered, is delivered and students are directed to employ some creativity techniques in arriving at their suggestions. Creativity is defined simply as thinking outside of the box, or in an original or unconventional way. The creativity discussion is accompanied by viewing a former Nightline episode, which features a product design firm, IDEO (Films Media Group 1999). Students are challenged to adopt some of the techniques (e.g., no “nay-saying” ideas, brainstorming with post-it notes, and piggy-backing on outrageous suggestions) in an effort to develop creative suggestions.

**Table 2. Grading Rubrics**

**Grading Rubric (First Assignment): Mapping Food Deserts**

Scoring: 0 = lowest                    100 = highest

**Skills Assessed:**

**Discipline-specific knowledge:** (40 points)

- Identifies food deserts using the USDA Food Access Research Atlas
- Identifies the number of fast-food restaurants, convenience stores, and grocery stores on neighborhood maps using Google Maps
- Use of required external readings and additional external research to identify the issues surrounding supplying fresh produce to food deserts

*Discipline-specific knowledge score =*

**Critical thinking:** (40 points)

- Analyzes and uses supporting information
- Draws conclusions from the facts in the case

*Critical thinking score =*

**Communication:** (20 points)

- Uses appropriate and relevant discipline-specific concepts and terminology
- Demonstrates proper use of mechanics—spelling, grammar, and punctuation

*Communication score =*

**TOTAL POINTS =**

**Table 2 continued.****Grading Rubric (Second Assignment): Written Report**

Scoring: 0 = lowest      100 = highest

**Skills Assessed:****Discipline-specific knowledge: (40 points)**

- Identifies themes/barriers to providing fresh produce in food deserts using interview transcripts with growers and distributors
- Use of required external readings and additional external research to identify the issues surrounding supplying fresh produce to food deserts
- Consideration of environmental stakeholders (e.g., nutrition, sustainability, supply chain)

*Discipline-specific knowledge score =***Critical thinking: (40 points)**

- Summarizes the problem or issue
- Identifies the main points in the case
- Analyzes and uses supporting information
- Draws conclusions from the facts in the case

*Critical thinking score =***Communication: (20 points)**

- Uses appropriate and relevant discipline-specific concepts and terminology
- Demonstrates proper use of mechanics—spelling, grammar, and punctuation

*Communication score =***TOTAL POINTS =**

The learning objectives of Unit 2 are to evaluate the complexity of the food system and its role in addressing the food deserts issue and to apply the USDA's Food Access Research Atlas to identify food deserts in specific regions.

### **4.3 Unit 3: Exploring Ideas**

In the final unit, students are required to synthesize their knowledge and the information available, and prepare a set of considerations, ideas, and/or recommendations to address the food deserts issue. The goal here is reflective “abstract conceptualization,” learning from their experiences. Students are given leeway to present a “next step” in addressing the issue of food deserts, a discussion of alternative channels of distribution that have the potential to be successful in the distribution of fresh produce to food deserts, or to hone in on a particular obstacle and discuss it.

Drawing on both primary and secondary research, students present their thoughts for next steps, issues that need to be addressed and/or recommendations to the class. They are tasked with considering the challenges from the perspective of various stakeholders involved, including consumers, retailers, distributors, growers, and health care professionals, among others, spanning the fields of supply chain management, agribusiness, economics, marketing, sustainability, and nutrition. Consequently, students need to consider the interests of these stakeholders. It is emphasized that identifying the obstacles and considerations inherent in alleviating poor food access (identifying the issues surrounding supplying fresh produce to food deserts) is just as important as developing recommendations. Indeed, identifying

stakeholder interests is the task at hand, but students seem keen on wanting to advance recommendations, as well. As mentioned earlier, students are required to provide a written report, in which the issue, objectives, and considerations/recommendations are discussed. The learning objective of this unit is to examine the information/data available and prepare a set of considerations, ideas, and/or recommendations pertaining to food deserts.

Each unit's purpose, learning objectives, approaches, and pertinent materials (e.g., readings, videos, activities, assignments) are included in Table 3. Additionally, lecture slides are available from the lead author upon request.

## 5 Module Evaluation

The course module was delivered at two universities. In total, the food desert module was implemented in four classes: upper-level classes in agribusiness, marketing, sustainability, and business consulting. Class sizes ranged from eight to seventeen students. At the beginning of each class, students were queried on their familiarity with the term "food deserts." The Sustainability class was the only class in which more than one student indicated their familiarity with the term. Students were also asked about their knowledge of the issue of food accessibility in lower socioeconomic neighborhoods, as well as whether students had been introduced to this topic in other classes. Again, the students in the sustainability class were the only students in which more than a couple of students indicated that they had previous knowledge and/or had been exposed to discussion of this issue in other classes. These polls were done informally, in a discussion forum.

**Table 3. Supplemental Materials**

Module Unit (i) Purpose and (ii) Learning Objectives	State in Kolb's Experiential Learning Cycle/Approach	Readings/Activities/Assignments— Instructors may choose which to assign.
<b>I. Food Access and Food Deserts</b>  (i) To introduce and discuss the concepts of food deserts, access, and the consequence of inadequate access to affordable and fresh food.  (ii) To impart knowledge and understanding of the issues of food deserts and food access.  To apply the USDA's Food Access Research Atlas to identify food deserts in specific regions.	Active Experimentation  Interactive Lecture & Discussion/Individual Hands-on Activity/Assignment	<p><b>Readings for Instructors and/or Students:</b>  <i>Access to Affordable, Nutritious Food Is Limited in "Food Deserts" (Ver Ploeg 2010)</i></p> <p><i>Access to Affordable and Nutritious Food: Measuring and Understanding Food Deserts and Their Consequences, Report to Congress (Ver Ploeg et al. 2009)</i></p> <p><b>Assignment: Mapping Food Deserts</b>            Using the Food Access Research Atlas found on the USDA, Economic Research Service site, identify the food deserts in your region (city, county, state). Were your results surprising? Explain.            Then, using Google Maps, identify the number of fast-food restaurants, convenience stores, and grocery stores on neighborhood maps. Discuss your findings and offer an opinion on whether the presence or lack of presence of these establishments has positive or negative consequences.</p>

**Table 3 continued.**

<b>Module Unit</b> <b>(i) Purpose and (ii) Learning Objectives</b>	<b>State in Kolb's Experiential Learning Cycle/Approach</b>	<b>Readings/Activities/Assignments— Instructors may choose which to assign.</b>
<b>II. Food Systems</b> (i) To introduce students to the Food System Framework and to impart the necessity of a systems approach to problem solving. To impart an understanding, and encourage consideration, of the dynamic environmental opportunities, constraints, and conditions that impact the supply of food.  (ii) To evaluate the complexity of the food system and its role in addressing the food deserts issue. To apply the USDA's Food Access Research Atlas to identify food deserts in specific regions.	Concrete Experience Reflective Observation  Interactive Lecture & Discussion / Group Activity and Group Assignment	<b>Readings for Instructors and/or Students:</b> <i>A Framework for Assessing Effects of the Food System</i> (Institute of Medicine and National Research Council 2015)  Article and brief video to illustrate the importance of systems thinking:  <i>Slashing Food Stamps Hurts the Poor. It Also Hurts Their Supermarkets</i> (Meyersohn 2020)  <i>Video: Slashing Food Stamps Hurts the Poor. It Also Hurts Their Supermarkets</i> <sup>1</sup>  <i>Conceptualizing Food Systems for Global Environmental Change Research</i> (for instructors) (Erickson 2008)  <i>An Economic View of Food Deserts in the United States</i> (for instructors) (Bitler and Haider 2011)  <i>Food Deserts: Myth or Reality?</i> (for instructors) (Zhen 2021)  <b>Activity: Tapping Into Creativity</b> Watch this Nightline classic of IDEO, <i>The Deep Dive</i> . Show in class or assign; discuss the main takeaways. <sup>2</sup>  For additional reference: IDEO U <i>Observe Experts Brainstorming</i> (2 minutes and worthwhile) <sup>3</sup>  <i>Ted Talk How to Build Your Creative Confidence/ David Kelley</i> (12 minutes, for students and/or instructor) <sup>4</sup>  <b>Activity: Visiting a Food Desert</b> Understanding the perspective of residents (consumers) and retailers (store owners). Go to a food desert. Imagine you had to go

**Table 3 continued.**

<b>Module Unit</b> <b>(i) Purpose and (ii) Learning Objectives</b>	<b>State in Kolb's Experiential Learning Cycle/Approach</b>	<b>Readings/Activities/Assignments— Instructors may choose which to assign.</b>
		<p>grocery shopping for groceries for the week. Park and attempt to do so. Is there a market (of any kind) in the region you chose? If so, locate it. What could you buy for dinner for the night? For the week? Describe your efforts to procure groceries. Talk to the store owner. Does s/he encounter any challenges in carrying perishable proteins and produce?</p> <p>NOTE: Most low access areas near campus are safe neighborhoods. However, be sure to know where students intend on going. If they visit an area designated as a food desert, follow these simple guidelines to help ensure their safety: go during the day; go with a group; be respectful of the people and the neighborhood you are visiting; only get out of your car or public transportation, if you feel it is safe to do so. If visiting a food desert is not viable, provide transcripts of interviews—with growers and distributors—to students and have them interpret the transcripts. Also, rely on the suggested readings for Unit I.</p> <p><b>Activity: Data Analysis</b>      Students are provided transcripts of interviews with growers, retailers, and distributors. The interviews focus on the activity of supplying fresh food to food deserts. Respondents are queried on their beliefs about the challenges, opportunities, and criteria required for successful supply. Six interview transcripts are provided to students. Students then analyze the transcripts and include their analyses in the written reports.</p>

**Table 3 continued.**

Module Unit	State in Kolb's Experiential Learning Cycle/Approach	Readings/Activities/Assignments— Instructors may choose which to assign.
<b>III. Exploring Ideas</b> (i) Purpose and (ii) Learning Objectives (i) To encourage critical and creative thinking. Reflective “abstract conceptualization,” learning from experiences. (ii) Examine the information/data available and prepare a set of considerations, ideas, and/or recommendations pertaining to food deserts.	Abstract Conceptualization Group Assignment	<b>Assignment: Written Report. Developing Ideas/Next Steps</b> Based on the previously assigned readings, interviews data, and class discussions, students should now be equipped with enough knowledge and information to develop their own ideas, employing a systems perspective, to address the problems associated with living in a food desert. They do not need to “solve” the problem of food deserts, they can simply choose one obstacle that should be addressed, or a “next step.” The requirement for this project will include a written report and/or oral presentation. The report should have an introduction, review of the literature, statement of the problem, and recommended considerations, next steps and/or suggestions.

### How the Food Desert Issue Has Been Addressed

Instructors may want to wait until after students present their ideas to discuss what has been done. The list below contains several examples of communities that have successfully employed innovative ideas to distribute fresh produce to food deserts. You can either present/read and synthesize for students, or direct them to the readings. A word of caution—local food is not a perfect solution. It requires extensive resources: external funding, time, and commitment, and oftentimes, poor financial return and the lingering issue of rapid perishability. You can use this as another point of discussion.

*Know Your Farmer Know Your Food* (USDA 2012): Provides several examples of communities successfully distributing fresh produce to food deserts.

**Table 3 continued.**

Module Unit (i) Purpose and (ii) Learning Objectives	State in Kolb's Experiential Learning Cycle/Approach	Readings/Activities/Assignments— Instructors may choose which to assign.
		<i>Community Gardens</i> (Centers for Disease Control and Prevention 2010): When discussing Community Food Gardens, this website should be useful.
		<i>Why Whole Foods Is Moving Into One of the Poorest Neighborhoods in Chicago</i> (Badger 2014): This <i>Washington Post</i> article is a good article that talks about food deserts and why companies may want to rethink their strategies. It ties together many of the concepts discussed in the module and may provide a good article to assign post-module coverage to encourage students to consider the possibilities.
		Related: <i>OPINION: Englewood Whole Foods Doesn't Adequately Improve Access to Fresh Food in Neighborhood</i> (Mitchell 2019)
		<i>What Really Happens When a Grocery Store Opens in a 'Food Desert'</i> ? (Devitt 2019) Presents considerations and reinforces the necessity of taking a systems approach in understanding how to alleviate the problem of healthy food consumption.
		<i>Food Deserts in America (Infographic)</i> (Tulane University 2018). Published on the blog page of Tulane University's School of Social Work. Provides a wealth of information about food deserts and current innovations in addressing this problem. Designed in an informative and interesting format.

<sup>1</sup><https://www.cnn.com/2020/01/29/business/grocery-stores-food-stamps-snap/index.html><sup>2</sup><https://digital.films.com/PortalPlaylists.aspx?wID=11854&xtid=9249><sup>3</sup><https://www.youtube.com/watch?v=WIVIACbAWio><sup>4</sup>[https://www.ted.com/talks/david\\_kelley\\_how\\_to\\_build\\_your\\_creative\\_confidence?language=en](https://www.ted.com/talks/david_kelley_how_to_build_your_creative_confidence?language=en)

Upon completion of the module, students were given a survey that included questions asking them to comment on their evaluation of the course module and topic area, as well as whether the project differed from other class projects. The surveys were anonymous, and the instructor left the classroom

while students completed them. Students were told that the instructor was evaluating whether to keep, modify, or eliminate the week's lesson from future courses. We chose to rely on qualitative research due to the rich insights qualitative research provides. Additionally, we anticipated small class (and hence, sample) sizes because this module was administered in upper-level elective classes, which tend to be much smaller than introductory and/or required courses.

The qualitative responses (students' evaluations) were categorized into several themes that included module evaluations of the following categories: awareness; engagement; applied and EL; creative critical thinking; and a systems approach to problem-solving. These themes are discussed briefly next.

## 5.1 Awareness

Many of the students indicated that they had been unaware of the issue of food deserts and/or food inaccessibility, and many indicated they were surprised to learn of the pervasiveness of poor food access. Several responses mirrored the sentiment expressed by Student 17, "I didn't know what a food desert was until this project." Some mentioned experimentation with the Food Desert Locator as being enlightening, and their surprise in learning about nearby regions that constituted low access regions. As Student 14 stated, "I never thought that going to a grocery store would be hard in [location named] because they're everywhere. This has made me realize that's not always the case for everyone." Student 4 echoed this heightened awareness, "It was eye-opening to actually go to a food desert. It was someplace that I could see driving through and not thinking that this is a food desert, but now that I know what a food desert is, I'm aware of the issue.

## 5.2 Engagement

Many students also indicated that the module was "interesting," "valuable," "worthwhile"—in a nutshell, "engaging." In explaining their responses, students pointed to the idea that their work mattered because they were addressing a current issue. "It was different because it focused on a very current and relevant issue in our country" (Student 17). Several students explicitly mentioned that addressing a "real-world" problem that focused on developing solutions helped to make the project more interesting. Examples of responses are: "It was really fun to create a solution to a real-world problem" (Student 9); "I was implementing a plan to help society" (Student 8); "People are really trying to tackle this problem and could even use some of our solutions" (Student 24).

## 5.3 Applied and Experiential Learning

Some comments also indicated that the experience of visiting a region on the Low Access Map made the experience more real and more understandable. "I didn't think downtown [location omitted] was a food desert, but the food desert map said it was, so we went down there. It didn't feel poor, but there weren't any grocery stores, and we saw a couple of homeless people on the corner. So, I guess it was helpful to actually go down and see the neighborhoods" (Student 23). "It was cool getting out of our car and saying ok, we don't have a car, where's the closest grocery store. And it was about 2 miles away. There was no way I'd walk four miles with groceries. We parked our car at a mini-mart that was pretty sketchy. It was the middle of the day, and we were in a group, so I didn't feel unsafe. But it was kind of unsettling" (Student 14).

## 5.4 Creative Critical Thinking

Responses also included direct reference to the creative component of the module and project. Students were encouraged to be creative in their suggestions, and naysaying was discouraged. Several students indicated their appreciation of this aspect of the project: "It was a good learning exercise. I liked that we could get creative in our suggestions" (Student 6); "There was more than one right way" to address the

problem (Student 14); “It had more opportunities to find creative solutions” (Student 19).

## 5.5 Systems Approach to Problem-Solving

Especially gratifying, were the comments that students made that indicated their view of the issue of food access had been broadened. “This module had you think in a more political way than a consumer way. It was interesting to find a way to create a policy around market research” (Student 15). One student (Student 8) was motivated to keep exploring this issue: “I’m a senior and looking for a thesis ... and haven’t covered this topic in any of my classes. It seems like a good fit for the supply chain.” And, one business student suggested that incorporating more material from other fields would help him/her better understand the issue: “I think it would be great to incorporate documentaries about food scarcity and the impact of nutritional eating habits” (Student 15).

Overall, the comments written were overwhelmingly positive. As the response from Student 5 illustrates, “I thoroughly enjoyed the class. I respect this side of marketing immensely. Thank you for keeping us all intrigued and excited to learn.”

## 6 Limitations

An important limitation of the module is that it has only been deployed in relatively small-sized classes. Nevertheless, with adequate teaching support, instructors could successfully transfer the lessons to larger-sized classes. Using the suggested teaching supplements (see Table 3), there are materials that can be easily scaled to larger-sized classes (e.g., readings and videos). Additionally, for larger-sized classes, the use of clickers has been shown to enhance students’ engagement and participation in course material, as well as their performance and satisfaction (Premuroso et al. 2011; Rana and Dwivedi 2016). This learning module lends itself well to the types of questions used with clickers to engage students. For example, questions pertaining to knowledge of food deserts, beliefs about consumer behavior, constraints to supplying fresh food, and so on, provide good questions with which to launch class involvement and discussion. Further, group work is still highly recommended. Having larger group sizes (e.g., four to five students) may allow for greater allocation of the work, which addresses the time challenge that students mentioned in their evaluation of this module. Nevertheless, with larger-sized classes, class presentations might not be feasible due to time constraints. One suggestion to overcome this is to have groups record their presentations and post to the course website. Students can then be required to view and comment on the presentations posted. The instructor can also ask students to think about one key point of these presentations and, when they meet in class, have them discuss their takeaway with the person next to them. The use of technology—for example, clickers and web-based course management software—helps students be actively involved in large classrooms and encourages them to stay on task (Lloyd-Strovas 2015). It is also believed, and hoped, that the module can be deployed successfully across a greater number of disciplines. It would be a great opportunity to reach across disciplines and invite supply chain management, marketing, sustainability, nutrition, and other discipline-related faculty to guest speak.

One caveat, as it relates to these units, is that it is not recommended to suggest students visit food desert areas if the instructor is not personally involved; among other information, instructors should be apprised of, and approve of, the time of day, mode of transportation, number of students, and areas to be visited.

Other limitations stem from the student feedback received. These include the need to make the goals and expectations clearer before starting the module, provide more background to help with recommendations, and to incorporate documentaries and TED Talks about food scarcity. Furthermore, there are a few students who believe that the amount of time allocated for the module is not sufficient.

## 7 Conclusion

The goal of this course module is to raise students' awareness of the plight of inadequate access to nutritious food and to equip them with the problem-solving skills needed to address this social problem. The module that has been developed does just that. In developing this module, contributions from faculty in agribusiness, marketing, nutrition, and sustainability are elicited. Using Kolb's Theory of Experiential Learning as a framework, within which to develop and incorporate learning activities, along with a systems approach to framing the problem, it enables students to realize the complexity of the issue, as well as the interconnectedness of actions. Systems thinking recognizes that systems are inherently interconnected and dynamic; a change in one component of the system may affect other components. As such, a systems approach to problem solving requires deep exploration, critical thinking, and holistic consideration (Palmberg et al. 2017). It encourages looking at relationships between and among the parts of a system, rather than solely the parts themselves, and it helps to understand the implications of those relationships over time. Palmberg et al. (2017, p. 4) state that "The challenge for education is to develop a pedagogy that provides individuals with knowledge about how different choices affect society." Students grapple with the implications of various actions while simultaneously analyzing "real-world" problems; this initiative moves students to appreciate their complexity.

There are several beneficial outcomes of this module. Briefly, the module:

- Provides a cross-disciplinary, systems approach to a complex issue that historically has not been introduced across disciplines. This may lead to more awareness of the issue and more creative ideas when these students enter the workforce.
- Aids professors in the preparation and development of a course module that presents a current issue.
- Provides a module that is easily transferred across disciplines.
- Provides a module that is well received by students across disciplines.
- Exposes students with differing academic backgrounds to a current issue and recognizes the importance of their contributions.
- Exposes students to the importance of taking a systems approach to problem solving.
- Facilitates EL, resulting in deeper comprehension of material.

Overall, upon completion of the module, students indicate increased awareness and interest in the issue of food accessibility. They learn that there are myriad factors contributing to the poor health of residents who live in food deserts—access being only one of them. Students also learn that addressing the problems associated with food deserts involves the coordination of several fields, among which include agribusiness, economics, marketing, nutrition, supply chain management, and sustainability.

Subsequently, to effectively consider the issue of low access, students need an appreciation of the food systems operating within these regions. The identification of the viewpoints of multiple stakeholder disciplines can provide this appreciation, as well as a more complete approach to addressing the issue of food deserts.

Using the topic of food access and food deserts, it can be stated that understanding and developing solutions to complex social issues require a multidisciplinary approach. Actively involving students from a diversity of disciplines moves society closer to developing long-lasting, effective solutions to the issue of healthy food access. It also enhances the learning process and leads to greater creativity. "Some of the most meaningful learning occurs when students are asked to reflect on the link between the concepts they learn and real-world issues, their lives and how their learning is likely to change them personally and professionally" (Gravois et al. 2017, p. 72). The EL approach—which includes experimentation with the Food Access Research Atlas, visiting low access neighborhoods, and presenting team recommendations—instills a deeper understanding and appreciation of the issues involved. A

multidisciplinary view is not only espoused in teaching, but reflected in our sample, which, in two of the classes, includes a mix of majors. This is promising as the module is implemented successfully to students in a diversity of disciplines.

While a limitation of the module is that it has only been deployed in relatively small-sized classes, it is believed that instructors will have success transferring the lessons to larger sized classes, as well. Additionally, it is hoped that the module is deployed successfully across a greater number of disciplines, and instructors will continue to tweak and improve upon the module advanced in this paper. As one reviewer notes, assigning groups to represent different stakeholders and their interests, would be one way of illuminating their different, and often competing, interests and concerns.

Finally, the issue of food access has been highlighted by the current environment brought on by COVID-19 (O'Hara and Toussaint 2021). Now, addressing concerns about poor food access are quite timely as “individuals living in neighborhoods with already limited access to grocery stores and restaurants are likely experiencing additional difficulties due to business closures and transit restrictions” (Siddiqi et al. 2020, p. 1). Providing students an understanding of the roles, functions, and viewpoints of multiple stakeholder disciplines is a more complete approach to help them appreciate the underlying issue resulting in the lack of access to fresh foods in some communities, which may leave nutritional inequalities intact.

**About the Authors:** Renee Shaw Hughner is Associate Professor at Arizona State University (corresponding author: [reneeshaw@asu.edu](mailto:reneeshaw@asu.edu)). Claudia Dumitrescu is Associate Professor of Marketing at Central Washington University. Lauren Chenarides is Assistant Professor at Arizona State University. Christopher Wharton is Assistant Dean of Innovation & Strategic Initiatives at Arizona State University. Gina Lacagnina is Wellness Coordinator at Glendale Unified School District, Glendale, CA.

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