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Food Insecurity: Rudimentary Education for Local Youth (FIREFLY)

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FOOD INSECURITY:

Rudimentary Education for Local Youth (FIREFLY)

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and Jane E. Krause, MS, RPh; *College of Pharmacy*

ABSTRACT

As service-learning becomes recognized as a significant teaching-learning tool for college students, the authors of this article came together to apply for the Purdue University Service-Learning Sustainability Projects Grant. Upon receiving the grant, with the encouragement of Professor Jane Krause and Food Finders Food Bank, the student authors created a project focused on food insecurity education in West Lafayette, Indiana. The main objective was to develop and teach a series of lessons on food insecurity and sustainability to middle school students using interactive activities. A team of Purdue students from various backgrounds was recruited to assist in planning and to act as student mentors. They partnered with Mrs. Caren Walker, a family and consumer science teacher at Klondike Middle School, on this project. The team of Purdue students taught the five lessons for her three classes of eighth grade students. The most competitive teams from these classes came to present their posters, made throughout the project, at the Purdue Engagement and Service-Learning Summit on March 1, 2017.

KEYWORDS

sustainability, service-learning, middle school, eighth grade

INTRODUCTION AND BACKGROUND

“If you can’t feed a hundred people, then feed just one.”

—Mother Teresa

The United States Department of Agriculture (USDA) defines food insecurity as a situation in which “consistent access to adequate food is limited by a lack of money and other resources at times during the year” (Feeding Texas, n.d.). Food insecurity is a yearlong measure that calculates the risk of hunger, including coping strategies utilized by a household to avoid hunger (Feeding America, n.d.; Feeding Texas, n.d.). It does not indicate hunger continuously within a household; rather, food insecurity describes a household that lacks access to healthy food periodically during the year as a trade-off for paying for rent, clothing, medical insurance,

and other necessities (Feeding America, n.d.). Other terms for food insecurity include “struggling to avoid hunger” and “faced by the threat of hunger” (Feeding Texas, n.d.). Food insecurity exists in every county and congressional district across the United States (Feeding America, n.d.).

Feeding America (n.d.), which started in the late 1960s, is the largest nonprofit hunger-relief organization in the United States. It is comprised of a coalition of 200 food banks and studies food insecurity and its impact in every county throughout the nation. On a yearly basis, Feeding America collaborates with food banks and meal programs to provide food to more than 46 million

Figure 1 (banner image, above). Posters at the Purdue Engagement and Service-Learning Summit (March 1, 2017). Courtesy of Jane Krause.

Figure 2. Purdue student team members (left to right): Nam-Anh Nguyen, Quynh Nguyen, Daniel Lin, Ellisa DeFur. Courtesy of Jane Krause.

people, including 12 million children, throughout the US who are at risk of hunger. One such food bank is in Lafayette, Indiana. Founded in 1981, Food Finders Food Bank (n.d.) serves 16 adjoining counties (including Tippecanoe) located in west and central Indiana. In addition to providing food, Food Finders advocates for the hungry and educates the public regarding issues related to food insecurity. In 2013, Food Finders Food Bank (n.d.) assisted over 85,000 residents in the 16 counties who were food insecure, of which nearly 30,000 were children. Also in 2013, the food insecurity rate in Tippecanoe County was 16.8% (of the entire population) and 21.2% (of the children population) (Feeding America, n.d.). Unfortunately, these numbers continue to increase, especially the number of food insecure children (Livingston, 2015). It is estimated that one in five children live in families that struggle to put food on the table (Coleman-Jensen, Gregory, & Singh, 2014).

Food insecurity is multifaceted and is impacted by many components, including but not limited to poverty, food access, stability of food supply, agricultural practices, and environmental factors such as climate and natural disasters (Grace Communications Foundation, n.d.). Certain groups can also be more susceptible to food insecurity, including low-income pregnant women, victims of conflict, those suffering from illness, migrant workers, low-income urban residents, the elderly, and children. In the US, the term “food desert” is often used to define a location that has limited access to healthy, nutritious food. It is important to note that there are no grocery stores within one mile of downtown Lafayette, which is an example of a food desert (TCHD, 2016).

In the United States, nutrition is taught in every grade from K–12 in the vast majority of public schools (NCES, 2000). However, lessons on the interconnection between nutrition, food insecurity, and sustainability are not

widespread in the classroom. Corresponding to this, nutrition educators research, teach, and conduct community outreach within the area of food insecurity, yet no clear consensus exists concerning what this multidimensional field encompasses (Hamm & Bellows, 2003). It is suggested that nutrition education and food insecurity be integrated because optimal health, well-being, and sustainability are at the core of both topics. Because of this, raising awareness regarding food insecurity seems to be one step toward discovering long-term solutions in reducing the threat of hunger.

PROJECT OBJECTIVES

With this background information in mind, the objectives for this service-learning project were to:

1. develop and deliver a series of lessons on food insecurity and sustainability to eighth graders utilizing interactive activities;
2. assess the impact of the series of lessons on the eighth graders’ knowledge; and
3. obtain and evaluate feedback about the series of lessons for future refinement.

Figure 3. Community partner: Klondike Middle School. Courtesy of Jane Krause.

METHODOLOGY

Klondike Middle School (specifically Mrs. Walker, family and consumer science teacher) served as the community partner for this service-learning project. The school is in the Tippecanoe School Corporation (n.d.) school district and is located in West Lafayette, Indiana. Total enrollment for Klondike Middle School is approximately 455 students and includes sixth through eighth grades (Public School Review, n.d.). The majority of the student body (64%) identify as white. Approximately 38% of the students at Klondike Middle School are eligible to participate in the National School Lunch Program (NSLP). This is a federally assisted meal program for public, nonprofit

Table 1. Food insecurity lesson date, topic, and learning objectives.

Lesson Date	Lesson Topic	Learning Objectives
Lesson 1 (01/19)	What is Food Insecurity?	<ul style="list-style-type: none"> Define food insecurity, hunger, and their connections. Identify pillars of food insecurity and their components.
Lesson 2 (01/26)	Causes and Consequences of Food Insecurity	<ul style="list-style-type: none"> Name major causes and effects of food insecurity. Explain how social issues (e.g., health, education) impact food insecurity.
Lesson 3 (02/02)	Sustainability and Climate Change	<ul style="list-style-type: none"> Define sustainability. Explain how food insecurity relates to the three dimensions of sustainability. Define climate change and its impact on food security.
Lesson 4 (02/09)	Eating on a Budget	<ul style="list-style-type: none"> Develop a healthy meal for a family within a specific budget.
Lesson 5 (02/16)	Community Resources for Food Insecurity	<ul style="list-style-type: none"> Name resources for nutrition assistance in the United States and in the Lafayette area. Describe the mission and purpose of Food Finders Food Bank.
Lesson 6 (02/23)	Poster Presentations by Eighth Graders	<ul style="list-style-type: none"> Provide feedback on posters created and presented by the eighth graders.

private schools and childcare institutions and provides nutritionally balanced, reduced-priced or free lunches to students who qualify based on family income (Food and Nutrition Service, 2016). At Klondike, 35% of students are eligible for free lunches and 3% are eligible for reduced-priced lunches (Public School Review, n.d.).

During January and February 2017, a team of four Purdue students delivered a series of lessons and discussions (40 minutes each; one lesson every Thursday morning for six weeks) to three classes of eighth graders. The team of Purdue students included: Ellisa DeFur (education), Daniel Lin (pre-pharmacy), Nam-Anh Nguyen (engineering), and Quynh Nguyen (pre-pharmacy). The team collaborated during the fall 2016 semester to develop the lessons, which are summarized (i.e., topics and learning objectives) in Table 1. References utilized for each lesson are presented in Table 2. The lessons were delivered to the eighth graders utilizing Power-Point, worksheets, YouTube videos, and interactive discussions and activities that engaged the students. An invited speaker from Food Finders Food Bank taught part of lesson five. At the end of the series of lessons, the eighth graders received a certificate for completion of the lessons and items (e.g., re-useable grocery bag, sports water bottle, lunch tote bag, and vegetable garden seeds), which reinforced the information shared.

Eighth graders completed an assessment prior to and immediately following the series of lessons, which was

developed by the authors based on the learning objectives for the lessons. The assessment included eleven items (multiple choice and short answer format) to assess the eighth graders' knowledge of food insecurity and two Likert scale (i.e., five-point, strongly agree to strongly disagree) perception items to assess confidence in their knowledge surrounding the topic. The post-assessment also included two additional Likert scale items (i.e., five-point, strongly agree to strongly disagree) that gathered feedback on the lessons and experience. Data analysis was conducted utilizing Statistical Package for the Social Sciences (SPSS) version 23. The paired t-test was used to compare changes in pre- and post-assessment knowledge items and scores. The Wilcoxon signed-rank test was used to compare changes in pre- and post-perception and confidence responses. Feedback on the series of lessons was summarized, and the level of statistical significance was set at 0.05 ($p < 0.05$). The Purdue University IRB granted this study exempt status.

Over the span of the lessons at Klondike Middle School, small groups of eighth grade students (3–6 members each) created posters based on their understanding of food insecurity and sustainability. During lesson six, each group of eighth graders presented their poster to the class and answered questions from the audience. One poster from each of the three classrooms was selected (based on anonymous feedback by eighth grade peers, the teacher, and Purdue students) for presentation at the Purdue Engagement and Service-Learning Summit

Table 2. Food insecurity references used for development of lessons.

Lesson	References
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held on Purdue's campus on March 1, 2017. The eighth graders whose posters were selected visited campus that afternoon for three hours. During that time period, the eighth grade students presented their posters to a small group of interested faculty and staff, toured the Honors College, attended a portion of the summit, toured the ACE Campus Food Pantry, and participated in an interactive discussion on the profession of pharmacy.

IMPACT

Three eighth grade family and consumer science classes (68 students total) at Klondike Middle School participated in the project. A total of 62 eighth graders completed both the pre- and post-assessment and were analyzed (response rate = 91.18%). Results from the pre- and post-assessments (knowledge items) indicate a statistically significant increase in seven of the eleven items and a mean total score of 18.64% ($p \leq 0.000$) (Table 3). In addition, there was a statistically significant ($p \leq 0.000$) increase in reported confidence in both perception and confidence items (Table 4). The eighth graders provided positive feedback (Table 5) and reflections on the program (Table 6).

Table 7 provides reflective quotes from Purdue student team members. Fifteen posters were created by the eighth graders, of which three posters were selected for presentation at the Purdue Engagement and Service-Learning Summit, which resulted in 14 eighth graders visiting campus for the afternoon. The Klondike Middle School teacher, Mrs. Walker, rated the project as "excellent" and invited the Purdue team back to her classroom to repeat the program during both semesters of the 2017–2018 academic year.

CONCLUSIONS AND SUGGESTIONS FOR FUTURE OPPORTUNITIES

Service-learning is a collaborative effort and offers mutual benefits for all involved. This service-learning

Table 3. Results for knowledge items on pre- and post-assessment ($n = 62$).

Time Period	Mean Percent Correct $\pm$ SD ^a
Pre-Assessment	34.73% $\pm$ 18.45%
Post-Assessment	53.36% $\pm$ 18.65%*

Note: 11 knowledge items on pre- and post-assessment

^a SD = Standard deviation

* Statistically significant increase in tested knowledge ($p \leq 0.000$)

Table 4. Feedback from eighth graders: Perception and confidence ($n = 62$).

Items on Pre- and Post-Assessment	Pre-Mean ^a $\pm$ SD ^b	Post-Mean ^a $\pm$ SD ^b
I am confident in my ability to develop a healthy menu within a given budget for my family.	3.62 $\pm$ 1.27	4.27 $\pm$ 0.61*
I am knowledgeable about food insecurity in the United States.	3.05 $\pm$ 1.34	4.12 $\pm$ 0.72*

^a 5 = Strongly Agree; 4 = Agree; 3 = Undecided; 2 = Disagree; 1 = Strongly Disagree

^b SD = Standard deviation

* Statistically significant increase in reported confidence ($p \leq 0.000$)

project was successful largely due to the effective give-and-take relationship between the Purdue students, the community partner, and the faculty mentor, as they all worked together to identify and accomplish the objectives of the project. Sharing the details of this project with others through this article allows those who are concerned and focused on the social issue of food insecurity the opportunity to replicate this project and provide ideas for similar projects. This article can serve as a reference for similar project development, including teaching resources and suggestions for future improvement.

The collaboration of the Purdue students from different majors was a strength of this project. Although the project did not align directly with the students' majors, it was a rewarding and educational experience for the entire team, including the faculty mentor. It illustrates how service-learning can be employed using an interdisciplinary approach involving students across both academic disciplines and cultural backgrounds.

The Purdue students jointly shared the responsibilities of the project. For example, Nam-Anh and Quynh focused

Table 5. Feedback from eighth graders following the series of lessons ($n=62$).

Items on Post-Assessment	Strongly Agree or Agree No. (%)
I found the lessons to be informative and helpful.	51 (82.26%)
I enjoyed preparing the poster with my classmates.	47 (75.81%)

Table 6. Example reflections from eighth graders.

What is one favorite thing you learned?
“What food insecurity is, pillars of food insecurity, and what impacts food insecurity.”
“What a food desert is, and there is a food desert in downtown Lafayette.”
“How to prepare healthy meals on a budget.”
“Creating the poster and learning more about food insecurity issues.”
“There are lots of programs to help with food insecurity.”
“There are people who care.”
“About climate changes and how it impacts crops/food.”
“That more people go without food in your community than you may realize.”
“That kids like us can volunteer to help.”

Table 7. Reflections from Purdue student team members.

How did this service-learning experience impact you?
“FIREFLY has given me many opportunities to develop my interpersonal skills such as communication and leadership skills. Throughout this experience, I became more comfortable in speaking with the eighth graders and engaging them in the lessons. I also observed how the eighth graders used the information to create their posters. I hope they continue to share this information with others. I believe that the program should continue and grow since it shares new information with children.” —Daniel Lin (Pre-Pharmacy Student)
“Throughout the FIREFLY program, I improved my teaching skills. It was nice to expand my grade-level spectrum, because in the past I only taught kindergarten, first, second, and fifth grades. The eighth graders were fun to work with and I learned methods that help with teaching that age. FIREFLY was a great source of professional development for me. It was fun to teach the other Purdue students how to teach/engage the eighth graders because they have had no previous experience with this and had little knowledge about the United States educational system. The eighth graders were engaged in each session that we taught. As they worked on their posters, I could see that they had learned a lot and had become passionate about food security. This program turned out to be a success for everyone involved!” —Ellisa DeFur (Education Student)
“The information gathered for the project helped me to understand the issue from a community standpoint. This topic can be difficult to understand and challenging to deliver to eighth graders. As one of the two project managers, I tried to be proactive and cover as many details as possible. Not surprisingly, we had some situations along the way that Quynh and I did not anticipate. The project planning definitely enhanced my ability to handle ambiguity and be open to change. Our project adapted a lot since we first drafted it one year ago, but the end result was excellent. I am proud that we could take the information learned in the classroom and reach out to the local community.” —Nam-Anh Nguyen (Engineering Student)
“When I started FIREFLY with Nam-Anh, I only expected the excitement without seeing possible challenges. Looking back, I learned to remain calm and move on even when things did not go as planned. Flexibility and communication were the key throughout, and all of the teammates played an important role in the outcome of the project. I am grateful to have worked with Prof. Krause, Nam-Anh, Ellisa, and Daniel. I am an international student, and I learned so much from the eighth graders and Mrs. Walker in regards to the United States education model. This project has inspired me to investigate academia since, who knows, I may want to be an educator someday in the field of pharmacy.” —Quynh Nguyen (Pre-Pharmacy Student)

Figure 4. Certificate that eighth grade students received. Courtesy of Jane Krause.

on gathering information surrounding the topic of food insecurity obtained through research and volunteer experiences. Elisa assisted the team in understanding the public school system in the US and demonstrated effective teaching strategies for eighth grade students. Daniel offered general support with all aspects of the project and assisted in the classroom by reinforcing the instruction one-on-one with the eighth graders and organizing needed supplies. This teamwork illustrates “partnership synergy,” which is described as a “collaborative process that enables the individuals to combine their knowledge, skills and resources so they can accomplish more together than they could on their own” (CACSH, 2002).

Behind-the-scenes planning for this project was time consuming, but the time and effort spent resulted in an impactful and successful project. Managing a service-learning project, in addition to taking classes and participating in extracurricular activities, can be challenging. Sharpening time management and communication skills such as listening are essential to keeping a quality project on track. Even though the team had plenty of time to prepare for the lessons at Klondike Middle School, there were multiple adjustments needed during the process, which is to be expected and requires flexibility.

Sustainability of the project is being explored. Similar presentations are planned for the future with Mrs. Walker’s family and consumer science eighth grade students. It is anticipated that future lessons will be as successful, if not more so, in educating eighth graders on food insecurity. The possibility of offering this service-learning project in conjunction with a food security course on

campus is being discussed. Since the Service-Learning Sustainability Projects Grant was a one-time offering, the Purdue University Office of Engagement Community Service/Service-Learning Grant Program will be investigated for future funding opportunities. Continuing the research piece of this project is recommended. For the future, it would be interesting to consider incorporating retrospective confidence assessment with the eighth graders regarding food insecurity.

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- Ms. Katie Powell (Associate Director, Programs, Food Finders Food Bank)
- Dr. Elizabeth Brite (Director of Engaged Learning & Clinical Assistant Professor, Honors College, Purdue University)
- Mr. Gary Burniske (Managing Director, Center for Global Food Security, Purdue University)

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STUDENT AUTHOR BIO SKETCHES

Nam-Anh Nguyen is a 2017 Bachelor of Science graduate from Purdue University in Environmental and Ecological Engineering and has been accepted to graduate school at the University of California–Berkeley starting in August 2017. **Quynh P. Nguyen** recently completed her pre-pharmacy coursework at Purdue University and she will be a first-year professional PharmD student at Purdue College of Pharmacy starting in August 2017. Both authors are originally from Hanoi, Vietnam. **Jane E. Krause** (Clinical Associate Professor of Pharmacy Practice, Purdue College of Pharmacy) served as faculty mentor for this project.

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