

Integration of Service-learning Activities into Three Food and Nutrition Courses: Benefits and Challenges.



Laurel G. Lambert¹
Food Service Management

Kathe A. Gabel²
Clinical Dietetics

Jeff Culbertson²
Food Science and Toxicology

College of Agricultural and Life Sciences
University of Idaho
Moscow, ID 83844-3183

Abstract

Academic service-learning (ASL) is known to increase students' self-efficacy and problem solving skills, plus stimulate higher order thinking due to direct experiences in learning activities. An ASL activity, incorporating multiple ADA learning outcomes, for Food and Nutrition (FN) majors was developed and integrated into Clinical Dietetics, Food Systems Management, and Food Research and Development courses. This ASL activity provided students with experience in weighed plate waste research in a community school setting; exposed them to research design, data analysis and research report writing; while providing teaching experience. FN majors perceived the ASL experience to be valuable and enjoyable. Coordination of the FN courses illustrated to FN majors the integrated nature of clinical dietetics, food systems management, and research. The ASL activity presented challenges in that: (1) involving FN majors in all aspects of planning and developing the activity was not possible, (2) the opportunity for FN majors to develop individual research projects was replaced by the ASL group activity, and (3) developing the ASL activity required a significantly greater amount of faculty time compared to traditional classroom preparation.

Introduction

Educators in accredited programs in majors such as dietetics are challenged to meet an increasing number of required learning outcomes in their curricula. These learning outcomes are derived from delineation studies conducted by The American Dietetic Association (ADA) (Kane et al., 1990) to

ensure students are prepared for current and future demands of dietetic practice. Incorporating learning outcome requirements into a dietetic curriculum does not necessarily require new courses (Balch, 1996). Educators can incorporate learning outcomes into demanding and intense curricula by integrating activities such as academic service-learning (ASL) into existing courses (Brehm et al., 1999; Fraser and Rock, 1996; Mattfeldt-Beman, 1997; Mitchell, 2002). This strategy can promote development of partnerships with community agencies and provide realistic job experiences to students while incorporating multiple learning outcomes.

Academic Service-Learning

As a pedagogical approach, ASL augments student experiences through participation in course-relevant community service (Petkus, 2000, Tai-Seal, 2001; Zlotkowski, 2001). In this approach, it is important that the service be directly linked to the learning outcomes of the course (Burns, 1998). Due to hands-on experiences in learning activities, ASL can increase students' problem-solving skills and self-efficacy, and stimulate higher order thinking. For this method to be beneficial, students must understand the value of the service before beginning the activity and be well prepared to accomplish the activity.

Students learn best when they are involved in work they believe to be genuine and purposeful (Zlotkowski, 2001). The ultimate reward of ASL is the shared benefit to all those involved; the organization served, students, course instructors, the educational institution, and community-at-large (Jacoby, 1996). Therefore, the objective of this ASL activity was to incorporate nine required ADA learning outcomes

¹ Contact author, Assistant Professor, P.O. Box 443183, School of Family & Consumer Sciences

² Professor

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into one ASL for three Food and Nutrition (FN) undergraduate courses involving FN majors.

Methods

Overall, the project involved nutrition education, weighed food waste data collection, data analysis and report writing. FN majors developed and presented nutrition lessons to first through third grade students in the test school. At the same time, weighed plate waste data were collected from test and control schools to determine lesson intervention effect on consumption of selected fruits and vegetables served in the school lunch program. FN majors collected, analyzed, and reported on plate waste data of first through third grade students.

Development of ASL activity

The following sequence of events was followed in planning the ASL activity:

September 2001: FN faculty members teaching the courses Clinical Dietetics, Food Systems Management, and Food Research and Development, along with the elementary school foodservice director (responsible for both schools) met to coordinate and incorporate the ASL activity into the Spring semester schedule. ADA learning outcomes were identified for the activity. FN faculty selected one test and one control elementary school to participate in the ASL activity based on principals' and teachers' willingness to participate, close location to the university, and demographic similarities between schools. The ASL activity was scheduled for 10 school day mornings March 4-10, 2002. The ASL activity was approved by the University Human Subjects Review Board.

November 2001: The ASL activity was presented to and approved by the elementary school principal and the nine elementary teachers who would be involved at the test school. A presentation about the ASL activity was also given to the elementary control school principal who also approved participation in the ASL activity.

December 2001: The Food Systems Management faculty met with the School District Foodservice Director to plan the menus for January, March, and April, ensuring that the same menus with the selected fruits and vegetables would be offered at both test and control schools.

February 2002: FN faculty met with the nine participating elementary teachers in the test school to develop the teaching schedule for the FN majors. Each teacher agreed to schedule the lesson in the morning before lunch. Prior to teaching, each FN major met with his/her assigned teacher and was introduced to the classroom setting in which they would be teaching.

Course Incorporation of ASL activity

Clinical Dietetics Course (FCS362)

All eighteen FN majors (13 Coordinated Dietetic Program [CPD] students and 5 Nutrition students) enrolled in FCS362 provided nutrition education to children in three first grade classes, two second grade classes, two third grade classes, and two second-third split grade classes. One set of nine FN majors taught the first week and a second set of nine FN majors taught the second week. The Clinical Dietetics course continued to be taught to the FN majors not involved in teaching during their assigned week.

Prior to starting their teaching rotation in the elementary school FN majors were instructed on basic nutrition education principles and exposed to a variety of teaching activities. Nutrition education resources were made available to them through the School of Family and Consumer Sciences, the University library, and the Internet. The State Board of Education's Academic Achievement Health Standards (State Board of Education Achievement Standards, 2002) also were reviewed. FN majors developed lesson plans that were critiqued and approved by their Clinical Dietetics course instructor. Each lesson plan consisted of learning objectives, time allotment, an assessment activity, lesson content and sequence, learning activities and required lesson materials (Holli and Calabrese, 1998). Because of low consumption of fruits and vegetables in the elementary age group (Sandeno et al., 2000) faculty chose to focus on these food groups for educational and research purposes. Lessons were based on the USDA Food Guide Pyramid (USDA, 2002), the 5-A-Day program (Produce for Better Health Foundation, 2002) and other related nutrition materials. In the test school, FN majors presented lessons to elementary students in daily 30-minute sessions for ten consecutive school days. FN majors revised lessons, with their instructor's approval, as they assessed the effectiveness of each lesson on student learning, participation, and elementary teacher's acceptance. A portfolio of all revised lessons and related materials was developed by FN majors and presented to participating elementary teachers at the end of the activity.

With specific criteria provided by the Clinical Dietetic course faculty, each FN major also developed an evaluation sheet that was used by the elementary school teacher to critique his or her lessons and classroom teaching. In addition, FN faculty solicited written comments from the elementary school teachers as to their perceived value of the nutrition lessons presented to their students. During the two weeks that nutrition lessons were taught by the FN majors they also decorated the cafeteria with fruit and vegetable images and prepared a bulletin board

for display in the cafeteria highlighting the 5-A-Day program.

Challenges:

- FN majors were allotted 30 minutes per day for 10 days to teach nutrition lessons. Contento et al. (1995) have suggested it may take as many as 50 hours of nutrition education to see a change in behavior. Within the one semester, attempting to teach 50 hours of nutrition education was not practical or realistic in today's education environment.

- The short duration of teaching nutrition lessons limited FN majors' experience and reduced the possible impact the nutrition lessons would have had on fruit and vegetable consumption of the elementary students.

- Due to limited time on the part of students, faculty, and school personnel, and the scheduling of the activity during one school semester, FN majors could not be involved in all aspects of developing the ASL activity.

Food Systems Management Course (FCS387)

As part of the Food Systems Management course, all thirteen FN majors enrolled in FCS387 (all 13 CPD students) participated in weighed plate waste data collection at both schools to assess the effects of nutrition education on fruit and vegetable consumption by first through third grade students. FN majors who taught nutrition in the test school (as part of the Clinical Dietetics course) during Week One participated in the plate waste data collection during Week Two and FN majors who taught nutrition during Week Two participated in the plate waste data collection during Week One. During the two-week ASL activity, class meetings for the Food Systems Management course were canceled and replaced with a self-study activity on food safety. For participating in the plate waste data collection, CPD students received four to six supervised management practice hours as part of their ADA experience requirement.

Prior to beginning the ASL activity, FN majors were instructed, during two 50-minute class periods, on different methodologies for plate waste data collection. During these two class periods FN majors reviewed research articles that included use of weighed plate waste methods as evaluation tools to measure students' intake (Comstock et al., 1981; Jansen and Harper, 1978; Ryan et al., 1999). Protocol established by the FN faculty for plate waste data collection in the test and control schools was also discussed. Each FN major practiced weighing fruits on the same digital scale used in the study to enhance intra-rater and inter-rater reliability. Additionally, during the three data collections (pre, intervention, post) one of the three FN faculty were present to contribute to greater inter-rater reliability.

To establish baseline data, fruit and vegetable plate waste data were collected at the test and control schools throughout the month of January 2002 by FN faculty and graduate assistants. Five different fruits and five different vegetables were selected for evaluation. They were fresh Red Delicious sliced apples; canned fruits in light syrup, which included pineapple bits, fruit cocktail, peach slices, and pear slices; frozen potato tator tots; fresh baby carrots; canned kernel corn, green beans, and green peas. These fruits and vegetables were selected because of

Table 1. Questions on preferred classroom instructional styles and value place on experiential learning.

1. Choose your preferred teaching strategy(ies) for learning nutrition education methods.	a. Classroom instruction	b. Classroom instruction and development of teaching activities	c. Classroom instruction, development of teaching activities and classroom teaching	d. Classroom instruction, development of teaching activities, classroom teaching, and evaluation of teaching						
2. Choose your preferred teaching strategy(ies) for learning plate waste methodology.	a. Classroom instruction	b. Classroom instruction and development of teaching activities	c. Classroom instruction, development of teaching activities and classroom teaching	d. Classroom instruction, development of teaching activities, classroom teaching, and evaluation of teaching						
3. Choose your preferred teaching strategy(ies) for synthesis interpretation, and reporting of research.	a. Classroom instruction	b. Classroom instruction and development of teaching activities	c. Classroom instruction, development of teaching activities and classroom teaching	d. Classroom instruction, development of teaching activities, classroom teaching, and evaluation of teaching						
4. Consider how your learned nutrition education concepts. What value do you place on using the experiential approach to learning these concepts?	Highest Value			Medium Value				No Value		
	10	9	8	7	6	5	4	3	2	1
5. Consider how your learned plate waste methodologies. What value do you place on using the experiential approach to learning these concepts?	Highest Value				Medium Value			No Value		
	10	9	8	7	6	5	4	3	2	1
6. Consider how your learned research methodology, e.g. data synthesis, interpretation, reporting. What value do you place on using the experiential approach to learning these concepts?	Highest Value				Medium Value			No Value		
	10	9	8	7	6	5	4	3	2	1

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availability, ease of measurement, and elementary students' familiarity with them due to their routine offering on the school lunch menu.

During March 2002, when nutrition lessons were presented at the test school, fruit and vegetable plate waste was collected by FN majors at both schools for 10 consecutive school days. Plate waste data were collected again by the FN faculty and graduate assistants at both schools when lessons were not presented during the month of April 2002. Menu items accompanying the fruits and vegetables served during January, March, and April were essentially identical at both schools. One week after completing plate waste data collection, FN majors wrote and submitted short papers on their "perceptions" regarding their data collection experience. This allowed students time to reflect on their experience with the ASL activity and provide feedback to FN faculty. These papers were the focus of discussion during one class period.

Challenges:

- In September 2002, planning began to incorporate the ASL activity into the elementary schools' schedules and planned curriculum for implementation in March 2003. In order to comply with school policies and procedures, and work within their organizational system, much of the planning for the plate waste data collection had to be organized prior to FN majors beginning classes in January 2003. This prevented the inclusion of FN majors in planning this portion of the ASL activity.

- The ASL activity was appropriate for teaching students data collection techniques and reviewing results. However it did not allow them to develop a research question, develop their own research methodology to test a hypothesis, or replicate their project.

Food Research and Development Course (FCS 474)

Upon completing plate waste data collection phase, all data were analyzed by the college statistician, and results were provided on a spreadsheet to all 16 FN majors enrolled in FCS474 (13 CPD students and three nutrition students) enrolled in this course. Faculty for the Food Research and Development course facilitated discussions about research variables and data analysis. Working in small groups, FN

majors collaboratively wrote a research report based on analyses of data collected during the ASL activity. Reports were formatted in the style of a scientific publication that included a review of literature, methodology, results, discussion, and a reference section on research related to nutrition education and measurement of food consumption using weighed plate waste methods.

After the ASL activity was completed, FN majors who were CPD students were asked to answer six questions (Table 1). CPD students were selected for the survey because all were enrolled in the three FN courses used for the ASL activity. Some nutrition students did not take all three FN courses. The six questions were designed to solicit information on their preferred teaching strategies to learn nutrition education methods, collect plate waste data, and interpret and report research results. They were also asked to rate the value of using an experiential approach to learn these concepts. A Likert-type scale of 1 = no value to 10 = highest value was used.

Challenges:

- By incorporating the ASL activity into the Food Research and Development course, FN majors were limited to writing their research paper on the

Table 2. Sample of elementary teachers' written responses regarding the perceived value of having FN majors teach nutrition to their students and recommendations for improvement

Perceived value:

- The children being engaged for 30 minutes. The activities were well thought out and presented in an enthusiastic manner.
- Good teaching techniques, quality, well-prepared lessons, visuals, activities were appropriate.
- The students gave the children a lot of hands-on activities to do. They got them interested and excited about eating fruits and vegetables. If they would have just spoken to the kids about the healthy benefits, I don't believe there would have been as much of an interest.
- The instruction was excellent. The University students were well prepared and professional.
- I think having them come daily for two weeks was important.
- Half hour was a good amount of time.

Recommendations for improvements:

- Maybe a short lesson on classroom management before they enter the classroom.
- Have a kick off assembly.
- Possibly an outline of the lesson for that day for just my information. Maybe I could assist better.
- More parent involvement.

fruit and vegetable consumption of elementary students. Typically in this course, each FN major would select an individual research topic to explore the scientific literature and complete a research project.

Results and Discussion

The ADA viewpoint that, "dietetics education is a dynamic and complex process that translates the theoretical and ideal into application and practice (Commission on Accreditation for Dietetics Education, 2002) lends support for the use of experiential learning in a dietetic curriculum. FN majors who practice "real-life experiences" in teaching

elementary students have a unique opportunity to acquire necessary knowledge, skills and learning outcomes for entry-level practice in community nutrition.

Clinical Dietetics Course (FCS362)

When FN majors (CPD students) were asked to choose their preferred teaching strategies for learning nutrition education methods, 85% (n=11/13) selected a combination of classroom instruction and experiential learning. When asked about the value of using the experiential approach to learning nutrition education concepts, 92% of the FN majors (n=12/13) ranked the experience as being very valuable (7 or higher on a scale of 1 to 10). In addition, elementary teachers provided written comments to the FN faculty stating that FN majors' lessons, preparation, presentations and enthusiasm for the activity were excellent and of great value (Table 2). A FN major's comment of "The hands-on approach, I feel, is when

you learn the most" illustrates the majority view of the perceived value of the ASL experience.

Food Systems Management Course (FCS387)

A comparison of fruit and vegetable consumption pre-, during, and post- nutrition education intervention showed no significant difference among any elementary grade at the test or control school. Upon completion of the study, school officials were provided with a table depicting consumption data of their students. Data presented to the test and control schools included standard weights of each measured fruit and vegetable served, mean amounts consumed per school, and mean percentages consumed per student and per grade.

In perception papers, FN majors provided written feedback regarding their experience in collecting plate waste data and suggestions for improvement of ASL activity (Table 3). The feedback provided FN faculty with valuable information on

how to improve instruction and procedures for future ASL activities. One FN major reported that more practice using the electronic scales prior to actual data collection would be beneficial. Several FN majors suggested that having all three faculty members jointly explain the activity during one class period instead of during separate class periods would provide more clarity. FN majors requested that measured data of fruit and vegetable consumption by elementary students be posted daily so they could immediately see the results of their nutrition lesson instruction.

All FN majors were able to participate in the process of weighed plate waste data collection while working with teachers and school food service personnel in a commu-

Table 3. Sample of Food and Nutrition majors' responses to questions included in a report submitted for class credit

QUESTION 1: What did you learn about the research process in conducting plate waste studies?

Example of qualitative responses

- I learned more about applied research. I knew the textbook definition of research, but I had no idea what actual hands-on research was like.
- I learned about the details in how weighed plate waste studies are conducted, and I also learned that research in the field is not perfect and there are many variables to consider. I also learned about the school lunch program and the school lunch environment.
- I learned that it is important to be accurate in the procedures. Paying attention to detail is also important.

QUESTION 2: What are some of the procedures that you think are important for the integrity of the studies?

Example of qualitative responses

- Collecting data for pre-intervention, intervention, and post-intervention stages was important in order to prove if there was a significant difference as a result of the nutrition education at each stage of the study.
- I think it is important to have two or three people present when weighing or counting a product. This should be done just to insure that calculations and procedures were done correctly.
- I think that it is very important to have good communication between all of the people involved in the study.

QUESTION 3: What are some areas/issues/procedures that you think need to be addressed/changed to strengthen the integrity of the studies?

Example of qualitative responses

- The order of presentation of food on the line could also affect the child's choice of a fruit or a vegetable.
- I feel that the people teaching should be different than those collecting. I felt that some of the students I taught didn't eat their fruits or vegetables because that would give them something to hand to me for the attention.

QUESTION 4: How could this experience be improved for next year's students?

Example of qualitative responses

- I realize the major researchers of this study want the students to take responsibility for their actions. However, details of the study should be gone over better. Plus the major researchers should explain the study together.
- I would have liked to hear how much is consumed each day so that I could be seeing the amounts that we were collected.
- I would like to have more time practicing weighing on the scales.
- I would have the dietetic students come in different intervals to start the plate waste study.
- I had a great time and learned a lot. I would definitely recommend this for future dietetics students.

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nity setting. Upon reflection, they were disappointed that the nutrition education provided to students showed no effect on fruit and vegetable consumption. However, FN majors did recognize that students ate similar amounts of canned fruits and vegetables as had been reported in related research literature (Buzby and Guthrie, 2002; Reger et al., 1996; Ryan et al., 1999).

Food Research and Development Course (FCS474)

Four groups of FN majors submitted four research papers that all scored 90% or greater. Papers averaged from six to nine double-spaced pages in length and contained an average of 15 scientific citations. Power Point® presentation software was used by FN majors for presentation of data in the form of charts and graphs. The main conclusions of all papers were similar and reported that nutrition lessons did not increase fruit and vegetable consumption during the study. Again FN majors were disappointed with the null effect of the nutrition education intervention, their findings paralleled results found in other nutrition education research literature (Buzby and Guthrie, 2002; Reger et al., 1996; Ryan et al., 1999).

The FN faculty believes the multi-course design of this activity contributed to the high quality of student papers. FN majors worked jointly on initial ideas and drafts of several sections of their paper before beginning plate waste data collection. Methodology sections contained information provided in the Clinical Dietetics and Food Systems Management courses. FN majors discussed statistical analysis and evaluation of the activity in their Food Research and Development course.

Based on discussions held at the end of the activity and student input, it was concluded by the FN faculty that the collaborative ASL activity was a successful endeavor. Multiple ADA learning outcomes were incorporated into one ASL activity involving three undergraduate FN courses. The ASL activity provided FN majors with real-life experiences in developing and presenting nutrition education to elementary students. Additionally, hands-on experience was obtained during weighed plate waste collection. Above all, FN majors acknowledged that this type of activity was beneficial to their education.

Summary

FN faculty can successfully incorporate ASL activities into their undergraduate curricula to meet multiple ADA learning outcome requirements while at the same time providing FN majors a unique and valued learning experience. In this activity, ASL was found to provide a number of benefits:

1. Establishing a positive relationship between the faculty and local elementary school personnel.
2. Providing a valued supplement to classroom course work and one that university majors appreciate and believe to be beneficial to their learning.
3. Showing FN majors the important connection among the three emphasis areas of Clinical Dietetics, Food Systems Management, and Food Research and Development in their overall education.
4. Providing FN majors a sense of accomplishment and ownership from developing and presenting their own lessons to elementary school age children.
5. Introducing FN majors to community organizations exposes them to possible career choices in school foodservice that they might not otherwise have considered.
6. Incorporating research into several classes to meet ADA learning outcomes while assisting in illustrating to FN majors that they can do research.
7. Showing that experiential learning incorporated into the curriculum to meet ADA required learning outcomes is an efficient, effective, and according to students, “a fun way” to learn.

To meet the challenges of incorporating service learning into curriculum as previously discussed, three considerations include:

1. Planning of the ASL activity could begin in the Foodservice course (FCS384) during the Fall semester with implementation of the ASL project occurring in all three courses (FCS362, FCS387, FCS474) during the Spring semester.
2. Within a time frame of two semesters, the potential exists for FN majors to develop their own ASL activity that would allow for more individual ownership of the activity.
3. Overtime as the ASL activity is replicated the amount of faculty time dedicated to the planning and implementing the activity is anticipated to decrease.

Based on favorable ratings by the FN majors, FN faculty will continue to use a combination of classroom instruction and experiential learning provided by ASL activities. Building positive relationships and gaining mutual respect between an educational institution and the community has been identified as one of the many benefits of ASL activities (Jacoby, 1996; Petkus, 2000; Tai-Seal, 2001). FN majors have also gained a new respect for the challenges that teachers face in developing and presenting nutrition information.

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