

SERVICE LEARNING

Nutrition and Nurturing: A Service-Learning Nutrition Pharmacy Course

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Objectives. Pharmacy students must acquire skills and attributes including compassion, communication, empathy, health promotion, and respect for diversity. A service-learning course was developed to achieve these outcomes by targeting the nutrition education needs of low-income children who are at high risk for obesity and related health problems.

Design. Each first-year pharmacy student is partnered with a small group of elementary students to deliver an active, hands-on curriculum of healthy nutrition and physical activity.

Assessment. Each pharmacy student completes 3 reflection assignments, a survey designed to measure perceived changes in themselves as a result of the course, and a final nutrition examination.

Summary. The elementary school children gained health-related knowledge and interacted with positive role models. The pharmacy students conveyed health-related information, promoted healthy lifestyles in situations rich with socioeconomic and cultural diversity, and began to develop skills and attitudes necessary to become successful pharmacists.

Keywords: service-learning, early experiential education, nutrition

INTRODUCTION AND PURPOSE

The 2000–2001 Chair Report of the Professional Affairs Committee (PAC) of the American Association of Colleges of Pharmacy (AACP) describes service-learning as a structured learning experience with explicit learning objectives that combines performing service in the community with preparation, reflection, and discussion. The PAC presented a definition of service-learning that is appropriate for pharmacy education (Table 1).¹ The report outlines many benefits associated with service-learning experiences within pharmacy education. These experiences allow pharmacy students to contribute to communities while learning from them through interaction with individuals of different ages, cultural and ethnic backgrounds, or socioeconomic conditions. In contrast to traditional educational methods, this type of experiential education places pharmacy students into communities where students interact with individuals in their environment and experience the factors that influence their abilities to access health-related information and engage in

healthy behaviors and healthcare.

Participation in a service-learning course also contributes to the general abilities that are defined by the AACP Center for the Advancement of Pharmaceutical Education (CAPE) as curricular outcomes for the entry-level doctor of pharmacy degree program: social and contextual awareness, social responsibility, communication, valuing and ethical decision making, and social interaction. Overall, a well-designed service-learning program provides pharmacy students with experiences that prepare them to be competent health care practitioners in an era of increasing diversity, high numbers of uninsured patients, significant health disparities, high medication costs, and decreasing access to care.

The purpose of this paper is to provide an overview of the University of Colorado School of Pharmacy's first 2 years of experience with the design, implementation, and offering of a required service-learning course in the core curriculum of a new entry-level PharmD program.

Course Development

The faculty of the University of Colorado School of Pharmacy commenced its entry-level Doctor of Pharmacy (PharmD) program in 1999. The new curriculum was developed and implemented using an abilities-based educational philosophy and the AACP's CAPE outcomes.

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Table 1. Definition of Service-Learning for Pharmacy Education Presented by the 2000-2001 American Association of Colleges of Pharmacy Chair Report for the Professional Affairs Committee

Service-learning is a form of experiential education that:

- Meets the actual needs of the community;
 - Establishes a relationship between the community and the academic institution;
 - Helps foster civic responsibility or the development of a sense of caring for others;
 - Is integrated into the required academic curriculum;
 - Provides structured time to reflect on the service experience;
 - Enhances what is taught in school by extending student learning beyond the classroom and into the community;
 - Attempts to balance the service that is provided and the learning that takes place
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Table 2. Course Outcomes for a Service-Learning Nutrition Course

After completion of the Service-Learning Nutrition course, the student is expected to be able to:

- List general principles of a healthful diet and physical activity regimen
 - Identify foods that are part of a healthy diet
 - Identify diseases associated with poor dietary habits
 - Compare and contrast health promotion versus disease management
 - Interact with individuals of different race, socioeconomic status, culture and gender with appropriate skills, compassion and desire to understand and value their perspective
 - Employ different techniques to convey health related information and motivate individuals to change or adopt lifestyle habits
 - Promote the profession of pharmacy as a caring, ethical and responsible profession
 - Commit to a sense of service to the community through the profession of pharmacy
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These philosophies supported the inclusion of experiential education during every semester of the 4-year curriculum. Faculty members researched service-learning as an experiential-based educational methodology and determined that it should be a required component of early experiential education to meet the goal of integrating interpersonal attributes such as empathy, respect, and caring with high-level professional knowledge and competence in the early development of future pharmacists.

Nutrition and physical activity was chosen as the topic for a service-learning program, which partnered first-year pharmacy students with low-income elementary school students, and has proven to be a valuable and mutually beneficial experience for all involved in many respects. Basic principles of nutrition are important components of health professions curricula and basic nutrition is a health-related topic that first-year pharmacy students can learn and, in turn, teach to young children relatively easily. The choice of nutrition as a defined topic for the service-learning course gives developing pharmacy students a health-related context and structure with which to interact with the community.

Many children in the United States make poor eating choices or live in situations that lead to nutritional problems. The consequences of unhealthy eating include hungry children who have an increased risk for developing behavioral, emotional, and academic problems at school or conditions of overweight or obesity that can have last-

ing effects on self-esteem and contribute to health problems later in life.² Unhealthy eating habits and low levels of physical activity are contributing to epidemic rates of obesity in the United States, particularly among individuals of minority groups and children.³ Many basic behaviors regarding nutrition and physical activity are formed early in life and principles of healthy lifestyles are likely to become daily habits if they are introduced and reinforced beginning at a young age. Therefore, the choice of a service-learning program based on principles of healthy nutrition and physical activity meets the needs of the community and enhances what is taught in pharmacy school by extending student learning beyond the classroom and into the community, thereby conforming to 2 of the elements of the definition of service-learning set forth by the AACP's PAC.

School of Pharmacy faculty members with expertise in experiential learning and clinical nutrition worked closely with 2 registered dietitians to develop the course content. One dietitian, who worked with a nutrition curriculum in a school of medicine and a physician assistant program, assisted with the development of a curriculum for pharmacy students. The other dietitian, who had over 20 years of experience in elementary school-based nutrition programs, assisted with development of the curriculum for elementary students that focused on second and fourth grade levels. Pharmacy student learning outcomes for the course are presented in Table 2.

Table 3. Module 1 for Elementary Students: The Food Guide Pyramid

| Curriculum Level | Major Nutrition Concept and Activity | Physical Activity | Tasting Activity |
|-------------------------|---|---|---|
| Second Grade Curriculum | A picture of the food guide pyramid (FGP) is used for discussion. The "Mystery Sock" game is played in small groups. The pharmacy student places a small piece of food that is representative of one area of the FGP in a sock. The students pass the sock around, feel and smell the food and try to guess what it is and where it belongs in the FGP. This is repeated for small pieces of food that represent each part of the FGP. | FGP Relay: Using string, the shape of a large FGP is outlined on the floor. The entire class of elementary students divides into two teams and each team forms a line. A pharmacy student holds up a picture of a food and the first person in line from each team runs to the area in FGP representative of the food. The relay is repeated until each student has participated. | Pyramidwiches: Very small amounts of food representing each area of the FGP are provided and each elementary student "builds" an FGP using food: pieces of tortilla, bread or crackers, raisins, shredded carrots, thinly sliced deli meats, peanut butter, cottage cheese and chocolate chips. The students disassemble their FGP's and taste the different parts. |
| Fourth Grade Curriculum | FGP Chain: The students record everything they ate the previous day and, using a reference sheet, determine the number of serving sizes eaten of each item. Strips of colored paper are provided. Each color represents a different part of the FGP (brown = grains, green = vegetables, etc.) and each strip represents a serving size. Using this information, students create an FGP chain of types and number of serving sizes of each food item eaten. Students review the variety (colors) and proportion (length) in their chains. | FGP Relay: Similar to the second grade curriculum but, in addition, students must take a 3x5 card and write examples of other foods representative of the area of the FGP. The relay is repeated until each student has participated. | Pyramidwiches: Same activity as the second grade curriculum. |

The elementary school modules were designed to be incorporated into the activities of a regular school day to take advantage of the structure of a classroom learning environment and to optimize student attendance and participation. Pharmacy students were scheduled to visit the elementary school 7 times. The first module was designed as an introductory experience in which the pharmacy and elementary students formed groups and got to know each other. Six nutrition modules were developed to follow the first visit, each focusing on a distinct nutrition-related topic: (1) the food guide pyramid (FGP), (2) breakfast and grains (3) fruits, vegetables, and snacks, (4) meat and dairy products, (5) fats, oils, and sweets, (6) portion sizes. Each of the 6 elementary school modules was designed to incorporate 3 elements: (1) a major nutrition concept with an activity such as worksheets or a hands-on demonstration, (2) a physical activity that reinforced the nutrition concept, and (3) tasting of foods. The elementary student curriculum for Module 1 is described in detail in Table 3 to illustrate an example of a module. The pharmacy stu-

dent curriculum associated with Module 1 focuses on the public health messages associated with the FGP, how the FGP was developed, sample FGPs from different ethnic and cultural perspectives, how the typical American diet compares to the recommendations of the FGP, and FGP changes that have been proposed by critics. To promote academic achievement in key areas needed by the elementary students, the modules were designed to integrate basic concepts of math, spelling, reading, science, and writing with the nutrition and physical activity concepts wherever possible.

After the modules were developed, a sample of elementary school principals from schools in low-income Denver neighborhoods were contacted and the program was described to them. After 2 elementary school principals expressed interest, School of Pharmacy faculty arranged a meeting with the teachers at each school and presented the program to them. Teachers made individual decisions about whether to allow their elementary school class to participate and devote 1 hour of class time per

week for 7 weeks to the service-learning course. The teachers who agreed to participate were asked to choose 1 hour during the afternoon the course was scheduled to host the pharmacy students in their classroom. They also were asked to place the elementary students into effective working groups of 3 students each. The teachers reviewed the modules and offered suggestions for improvement in an effort to optimize student learning and program success. Although the pharmacy students would be fully trained to execute each module, the teachers were reminded that they were required by the Denver public school system to stay in the classroom with the students during each module. This allowed the elementary school teacher to assist with any classroom management situations that arose during the hour.

The food service personnel at each school were consulted regarding food preparation for the tasting activities associated with each module. With advance notice and for a nominal fee paid by the School of Pharmacy, the food service staff agreed to order the food needed for each module and a food service technician agreed to work ~2 extra hours per week to prepare the food.

COURSE DESCRIPTION

The course is a required 1-credit course that is offered in the spring semester of the first year of the pharmacy curriculum. The class meets 2 afternoons per week for 7 weeks and is highly integrated into the core academic pharmacy curriculum. In 2000 and 2001, ~85 pharmacy students were enrolled in each class. During the first class meeting of the semester, held at the School of Pharmacy, the pharmacy students received their elementary school classroom assignments and then assigned themselves to 1 of the predetermined groups of elementary students. This small working group, consisting of 1 pharmacy student and 3 to 4 elementary students, remained together for the entire 7-week course. Given that the average elementary school classroom size is ~25 students, ~8 pharmacy students were assigned to each classroom. The pharmacy students assigned to each classroom became a team and were charged with the responsibility for conducting the 7 subsequent elementary school classroom sessions. The team was required to designate a team leader for each session and the leadership were required to rotate between team members throughout the duration of the course.

The schedule was as follows for the remainder of the course. During the first class meeting of each week, the pharmacy students met in a lecture hall at the School of Pharmacy where they learned about the designated nutrition topic for the week at a level appropriate for beginning

pharmacy students. This content was designed to give the pharmacy students the appropriate nutrition background to work with the elementary students later in the week and to understand higher-level nutrition topics and disease states when those were presented later in the pharmacy curriculum. The course director facilitated an open discussion with the class about experiences in the elementary school classrooms during the previous week's activities. The current week's elementary school module was presented and reviewed with the pharmacy students during this time. During the second class meeting of each week, students collected a box of supplies from the School of Pharmacy for use in each elementary school classroom, then traveled to the elementary school. After meeting briefly as a group outside the classroom, they spent 1 hour in the classroom with the children and presented the week's nutrition and physical activity module.

The curriculum and all of the materials and resources necessary for conducting each week's module were provided to the pharmacy students, either in the box that each pharmacy student group transported from the School of Pharmacy or from the food service personnel at the elementary school. The pharmacy students who were designated as leaders each week were responsible for managing the supplies and the time for activities in the elementary school classroom. Each team of pharmacy students was encouraged to modify the supplies and activities associated with the curriculum to best meet the needs and interests of their group of elementary school children.

Course Assignments

There were 5 assignments and 1 examination associated with the course. Three of the assignments were reflection assignments designed to meet the PAC definition of providing structured time to reflect on the service experience. A grading rubric was provided with each reflection assignment so students understood the length and content expectations. The first reflection assignment was a prereflection that students received ~1 month before the course started and were required to complete prior to the first day of class. The assignment requested that they think about their lives when they were the same age as the students with whom they would be working. They were asked to compare their life experiences with their perceptions of what life was like for the elementary school students. The pharmacy students were asked to describe what they thought the neighborhood, school, classroom, and teacher would be like and what role nutrition and physical activity currently played in the lives of the children. They were asked to describe how they expected the children to impact them and how they anticipated they would impact

Table 4. Demographics of Pharmacy Student Enrolled in a Service-Learning Nutrition Course

| | 2000 | 2001 |
|----------------------------|-------|-------|
| Average age (yr) | 27.0 | 27.4 |
| Age range (yr) | 19-43 | 21-42 |
| White (%) | 51 | 52 |
| Asian/Pacific Islander (%) | 21 | 25 |
| Black (%) | 12 | 7 |
| Hispanic (%) | 11 | 12 |
| Foreign (%) | 3 | 2 |
| Native American (%) | 2 | 2 |

the children. To complete the pre-reflection, pharmacy students were asked to think of themselves as future health care professionals and describe some factors that motivate individuals to participate in healthy behaviors. Then they envisioned a pharmacist as a primary healthcare professional who motivates individuals to adopt lifestyle changes and be active participants in their health.

The second reflection assignment provided pharmacy students with a quote regarding rote learning, a method that does not result in learners truly understanding what they have learned or how to apply the knowledge to new situations. The pharmacy students were asked to compare this type of rote learning to the learning the elementary students were expected to experience in this course. Pharmacy students also were asked, as part of this reflection exercise, to make judgments about whether the elementary students should be able to apply what they would learn about nutrition and physical activity to other aspects of their lives outside of the structured class time with the pharmacy students. The pharmacy students were then asked to describe the ways in which they learned from the service-learning experience and how they might apply it to their future roles as health care professionals.

The final reflection asked pharmacy students to think and write about the nutrition knowledge that they gained in the context of broad and competing societal issues by presenting them with the dilemma of placing soda vending machines in public schools in exchange for large sums of money.

A computerized diet analysis assignment that required pharmacy students to record their food intake for 3 days and analyze the nutritional content of their diet was included as another assignment in the course. Concepts of physical activity were reinforced through an assignment that required the pharmacy students to wear a pedometer for 2 weeks and write a short paragraph about the level of physical activity in their daily lives. A final examination served as a summative evaluation of the nutrition knowl-

edge that the pharmacy students gained from the course. The students received a grade of pass or fail for the entire course.

COURSE EXPERIENCE AND OUTCOMES

During the first 2 years of the course, 173 first-year pharmacy students went to 2 inner-city elementary schools and worked with 504 children 1 hour per week for 7 weeks. The ethnic distribution of the population in the elementary schools was 75% Hispanic and 25% African American. Even though the School of Pharmacy has an ethnically diverse student body, the ethnic distribution in the elementary school student body differed significantly from that in the pharmacy student body (Table 4). Twenty-five percent of the elementary students spoke Spanish and English, having learned English as a second language, and 9% spoke Spanish only. The student population in both schools was socioeconomically disadvantaged, and greater than 97% of the students qualified for reduced or free lunch programs. These characteristics of the elementary school student body illustrate that most pharmacy students were participating in interactions with individuals of different ages, cultural and ethnic backgrounds, and socioeconomic conditions than themselves.

As recommended in the AACP PAC guidelines for service-learning, the course established a positive relationship between the community and the academic institution. Anecdotal reports from the elementary school teachers indicated that the children enjoyed the individual attention they received from the pharmacy students and quickly developed relationships with them as their small groups interacted over the 7-week period. The small ratio of pharmacy students to elementary students allowed for more active, hands-on learning than individual teachers reported they could manage with a classroom of 25 students. The teachers felt this contributed to valuable learning experiences and possibly greater long-term retention of concepts. Many teachers indicated that they had included nutrition concepts in other classroom activities at other times during the week when the pharmacy students were not present. One teacher and her elementary students designed their class Valentine's Day party snacks using the food guide pyramid after being inspired by the pharmacy students' nutrition lessons. Finally, many teachers felt that the pharmacy students served as positive role models for health and higher education for the elementary students.

Pharmacy student participation in the reflection assignments and weekly School of Pharmacy classroom discussions provided opportunities to address the AACP's CAPE curricular outcomes for the entry-level doctor of

Table 5. 2000 and 2001 Service-learning Course Pharmacy Student Survey*

| | Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|--------------------------|-----------------|--------------|-----------------------|
| I learned to work with others more effectively | 2% | 12% | 35% | 51% |
| This experience contributed to my communication skills | 2% | 13% | 36% | 49% |
| This experience contributed to my leadership skills | 2% | 12% | 42% | 45% |
| I learned a new appreciation of different cultures and socioeconomic groups | 8% | 12% | 40% | 40% |

*n = 173 students

Table 6. 2000 and 2001 Service-learning Course Pharmacy Student Survey *

| | Never | Once in a While | Some-times | Fairly Often | Very Often |
|---|--------------|------------------------|-------------------|---------------------|-------------------|
| I felt I made a valuable contribution | 1% | 8% | 17% | 46% | 31% |
| I was actively involved | 1% | 0% | 9% | 34% | 57% |
| I worked with people from diverse ethnic and social backgrounds | 1% | 2% | 10% | 27% | 60% |

*n = 173 students

pharmacy degree program: social and contextual awareness, social responsibility, communication, valuing and ethical decision making, and social interaction. Pharmacy students used these opportunities to relate a variety of observations and experiences from their interactions in the elementary school classrooms and the course director wove the concepts of the CAPE outcomes into the discussion and assignment feedback when appropriate.

Pharmacy students participated in a survey at the completion of the course. The majority of pharmacy students reported that through the service-learning course, they learned to work with others more effectively, improved their communication and leadership skills, increased their appreciation of different cultures and socioeconomic groups, and made a valuable contribution to their community (Tables 5 and 6). These results suggest, per the AACP's PAC definition of service-learning, that the service-learning course helped to foster a sense of civic responsibility in the pharmacy students and a sense of caring for others. In accompanying comments, many students reported their struggle with conveying information to someone who did not speak English well or did not speak English at all. Most felt that the experience helped to prepare them for the challenges they would face as pharmacists. Students offered the following comments:

- "This experience offers me training to become a health care professional that I cannot obtain in a classroom, from a textbook or from role-playing activity with my classmates"
- "In my training as a health care provider this experience has really benefited me. This experience has taught me about communicating with people who have only a limited amount of knowl-

edge about nutrition. In the 'real world,' my patients will have only a limited amount of knowledge about pharmacy and I will have to speak in terms they can understand."

- "This is not a role that I am playing for my instructor with my other classmates, these are not just words I am repeating from a book. I am being responsible for someone obtaining knowledge from me as if I were in a pharmacy setting."
- "This experience has been really good for me because I have had to step back and think about how to approach some topics in order to ensure that I come across in a manner that the kids will understand. In the healthcare world, I want to be very conscious of the fact that people may not understand, so I can have the patience and knowledge to explain anything to them until they feel the concept is 100% clear."

The pharmacy students performed well on the reflection assignments. Because each reflection assignment was accompanied by a clear performance rubric that described the necessary components and attributes required to achieve a passing grade, each reflection assignment was satisfactory and no reflection assignments had to be rewritten. These results, taken in combination with the high scores achieved by pharmacy students on the final nutrition examination, indicate that the service-learning course has an appropriate balance between the service that is provided and the learning that takes place, per the AACP's PAC definition of service-learning.

Lessons Learned

The course for pharmacy students has a structure that is more rigid than that of most service-learning courses in health professions curricula. Students were required to participate in the course and did not have a choice of community settings or activities. This format was chosen because it was the School of Pharmacy's first experience with service-learning as an educational methodology. Overall, the faculty members agreed that the course should be required so that each pharmacy student participates in the service-learning experience and that the nutrition curriculum was appropriate. The standardized curriculum was adopted in an effort to ensure a uniform nutrition curriculum for all students, decrease faculty-member time associated with managing multiple community partnerships, standardize the context in which the students interacted with the community, and better predict and measure outcomes from community, student, and faculty perspectives. In another departure from usual practice, the course development was driven almost entirely by the School of Pharmacy. If the recommended method for service-learning course design had been employed, the community partner and the academic institution would have worked together to outline the community and institutional assets and needs and to develop a course that best takes all perspectives into account. Fortunately, the elementary school teachers and principals viewed nutrition education as a valuable addition to their second and fourth grade curricula and welcomed the pharmacy students into their schools and classrooms.

FUTURE PLANS

The large number of details and complicated logistics of coordinating a service-learning course that involves multiple entities, many people, different organizational and individual cultures and calendars, and disparate goals and missions can be overwhelming. Management of these basic elements and activities required to run the course expend the vast majority of resources during the first few years of implementation. Once a pattern of managing basic course requirements and logistics has been established, resources become available to further address assessment, evaluation, and achievement of outcomes. Because there are numerous areas of possible evaluation in every service-learning course, it is important to choose major areas that will best assess the value of the course in the eyes of key stakeholders.

Based on pharmacy student feedback and performance in the course, the faculty members have agreed to continue to require the course as a core element of the entry-level PharmD curriculum. Future plans for the serv-

ice-learning course include assessments of elementary student learning and changes in self-confidence as a result of the experience, assessments of elementary school teachers and their perceived value of the course, and the addition of other health professions students, which would add an interdisciplinary component to the experience.

Application to Other Settings

Service-learning is an educational methodology that can be used to achieve many of the CAPE outcomes. Nutrition is a basic health-related topic that is important to the practice of all health professions and is currently associated with serious public health issues in the United States. Therefore, both service-learning and nutrition have broad applicability to all School of Pharmacy curricula. General nutrition concepts that are taught throughout the pharmacy curriculum (nutrition issues associated with hyperlipidemia, diabetes, hypertension, osteoporosis, etc) can be compiled and taught to the pharmacy students at a basic level during this course. The community component of the course can be implemented relatively easily in any community environment using daytime elementary school classrooms or after-school programs. There are many text and web-based nutrition activities designed for children that can be incorporated into the elementary school nutrition curriculum; however, initially, it is very helpful to have the assistance of a dietitian who has worked with pediatric, nutrition-related issues in a public health setting and with an elementary school teacher to establish the curriculum. It is critical that elementary school lessons incorporate and reinforce basic concepts such as writing, reading, math, spelling, and science so the nutrition lessons augment the elementary school curriculum instead of detracting from it. Elementary school teachers are under tremendous pressure to meet standardized testing requirements and will likely not be open to a curriculum unless it reinforces basic skills. The tasting component of each module is the most difficult to prepare, but is believed to be very important in reinforcing concepts with the elementary school children. Collaboration with school food service staff, the deli department of a grocery store, a catering company, or culinary school (possibly as a donation from these businesses) is essential to conducting successful tasting activities.

Typically, most pharmacy students are not familiar with service-learning as an educational methodology. It is important to clearly explain exactly what the students will be doing as part of the service-learning course, what these activities have been designed to achieve, and why they are required components of the core curriculum. Students should not be placed blindly in these situations and

expected to unconsciously realize the outcomes as a result of the experience. The rationale, goals, and outcomes of the experience should be explained at the beginning of the course so the students understand why it is important to their development as a health care professional. This allows students to be conscious of achieving these outcomes while they are participating in the experience.

CONCLUSIONS

An early experiential course designed to meet the definition for service-learning as outlined by AACP's PAC has been implemented. Overall, the course successfully integrated competencies in basic nutrition and physical

activity with experiences designed to enhance general abilities, including social and contextual awareness, social responsibility, valuing, communication, and social interaction, all of which are necessary for competence as a pharmacy professional.

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