RESEARCH
Original Research

Case-Based Learning Facilitates Critical Thinking in Undergraduate Nutrition Education: Students Describe the Big Picture

Tara Harman, MS, RD; Brenda Bertrand, PhD, RD; Annette Greer, PhD, MSN, RN; Arianna Pettus; Jill Jennings, RD, LDN; Elizabeth Wall-Bassett, PhD, RD; Oyinlola Toyin Babatunde, PhD, MPH, RD

ARTICLE INFORMATION

Article history:
Accepted 4 September 2014
Available online 11 November 2014

Keywords:
Dietetics
Teaching strategy
Case studies
Case method
Problem-based learning

http://dx.doi.org/10.1016/j.jand.2014.09.003

ABSTRACT

Background The vision of dietetics professions is based on interdependent education, credentialing, and practice. Case-based learning is a method of problem-based learning that is designed to heighten higher-order thinking. Case-based learning can assist students to connect education and specialized practice while developing professional skills for entry-level practice in nutrition and dietetics.

Objective This study examined student perspectives of their learning after immersion into case-based learning in nutrition courses.

Design The theoretical frameworks of phenomenology and Bloom's Taxonomy of Educational Objectives triangulated the design of this qualitative study.

Participants/setting Data were drawn from 426 written responses and three focus group discussions among 85 students from three upper-level undergraduate nutrition courses.

Main outcome measures Coding served to deconstruct the essence of respondent meaning given to case-based learning as a learning method. The analysis of the coding was the constructive stage that led to configuration of themes and theoretical practice pathways about student learning.

Results Four leading themes emerged. Story or Scenario represents the ways that students described case-based learning, changes in student thought processes to accommodate case-based learning are illustrated in Method of Learning, higher cognitive learning that was achieved from case-based learning is represented in Problem Solving, and Future Practice details how students explained perceived professional competency gains from case-based learning.

Conclusions The skills that students acquired are consistent with those identified as essential to professional practice. In addition, the common concept of Big Picture was iterated throughout the themes and demonstrated that case-based learning prepares students for multifaceted problems that they are likely to encounter in professional practice.
J Acad Nutr Diet. 2015;115:378-388.

PRE-PROFESSIONAL PROGRAM EDUCATION REQUIRES an environment that facilitates critical thinking so that students can apply their knowledge to future practice. Educators should plan their teaching strategies recognizing that student knowledge progresses hierarchically throughout their academic experiences. Bloom's Taxonomy of Educational Objectives illustrates this cognitive learning hierarchy as a pyramid.[1,2] The base is represented by the ability to remember—the basic level of learning. Progressive cognitive development occurs as one ascends the pyramid. The three highest levels—Analyze, Evaluate, and Create—directly relate to critical thinking.[2] Effectively solving problems and asking questions indicates aptitude for critical thinking.[3] The educator's role is to provide students with the tools necessary to ascend higher levels of learning, to the point at which critical thinking is achieved.[3]

Case-based learning is a method of problem-based learning.[3] Simply defined, a case study is a story with an educational message.[4] On a spectrum with structured learning at one end, guided learning in the middle, and an unstructured, freelance form to the opposite end, case-based learning is positioned between structured and guided learning.[5] Case-based learning provides students with a venue to relate content learned in the classroom to performance in professional practice. This process can be initiated as students solve problems that are posed in simulated real-life situations.[5,6]

In a typical case-based learning class, the educator teaches course content, presents a case, and then the class engages in open case discussion.[3] Although case-based learning has been widely executed in law, business, medicine, and science education, it has only recently gained popularity in health

sciences education.[7] Application of case-based learning in related health sciences allows students to develop higher-order cognitive learning by resolving patient-centered clinical scenarios.[8]

In this context, two upper-level undergraduate courses in an undergraduate nutrition curriculum (NUTR [prefix code for the Nutrition Science Department course listing] 3104 Vitamins and Minerals and NUTR 4312 Medical Nutrition Therapy) were changed from a structured method of instruction to case-based learning.[3] A directed case-based learning method was used daily throughout the entire semester by the course instructor. Traditional short lectures preceded case studies that were pertinent to lecture topics.[9] Students initially reviewed a case independently as a homework assignment, or in small, instructor-assigned permanent groups as an in-class activity.[10] Responses to case questions were then discussed by the class. During discussions, the instructor reinforced key concepts, provided additional pertinent information that students missed, and clarified misunderstandings.[3] Daily clicker quizzes, four to six narrative quizzes on case homework assignments, and five to seven examinations were used to assess and direct student learning.[10] Clicker quizzes accounted for about 25% of the final grade, 15% from homework assignments, and 60% from examinations.

The Academy of Nutrition and Dietetics (Academy) reports that the vision of nutrition and dietetics professions is based on interdependent education, credentialing, and practice.[8] Considering the changing landscape of the health care industry and increased complexity of the field of nutrition and dietetics, the Academy has elevated the educational preparation requirements of future registered dietitian nutritionists.[8] As such, case-based learning can assist students to connect education and specialized practice while developing professional skills for entry-level practice in nutrition and dietetics. There is a gap in the literature about professional skills development and performance outcomes associated with case-based learning in undergraduate nutrition education. The purpose of this study was to understand the perspectives of learning among upper-level undergraduate nutrition students after their first exposure to case-based learning in the nutrition curriculum.

METHODS

Research Site

This study was conducted at a single public university that is located in the eastern region of the United States. The Department of Nutrition Science at this university offers a Bachelor of Science in Nutrition and Dietetics and Nutrition Minor. The Bachelor of Science is a Didactic Program in Dietetics (DPD) accredited by the Accreditation Council for Education in Nutrition and Dietetics of the Academy. The DPD is comprised of 126 semester credit hours, including 60 nutrition science semester hours in the principles of dietetics, the nutrition care process (NCP), management of food and nutrition programs, and services and foodservice systems. Nutrition science courses must be completed with a minimum grade of C (2.0) for DPD majors to remain program eligible. Nutrition science coursework is distributed throughout the DPD 4-year program of study. Freshmen complete 7 nutrition science semester hours, sophomores 10, juniors 21, and 22 in the senior year. Prerequisite requirements in lower level (1000- and 2000-level) nutrition science, basic sciences, and biological sciences are required before upper-level (3000- and 4000-level) nutrition science course enrollment. A nutrition minor requires 29 semester hours comprised of 16 nutrition science semester hours that are part of the DPD curriculum. Approximate annual DPD enrollment is 200 students and for the nutrition minor is 16 students.

Sampling

Participants were recruited using a purposeful criterion sampling strategy.[11] Those eligible were students enrolled in NUTR 3104 Vitamins and Minerals or NUTR 4312 Medical Nutrition Therapy during fall 2010 or spring 2011. These courses were the first upper-level nutrition science courses in which case-based learning was used. After completing a case study the first day of class in each respective class, which was then followed by a discussion about case-based learning as a method of instruction, the students confirmed that this was their first exposure to case-based learning in the nutrition science curriculum. The Principal Investigator (PI; B.B.), who was the sole instructor for these courses, had received formal training in case-based learning and used case-based learning to teach freshmen-level undergraduate nutrition courses the previous year. By reviewing the course rosters, the PI confirmed that students were not enrolled in multiple courses that were under study and had not been in introductory nutrition courses that were taught by the PI using case-based learning the preceding year. The course descriptions for the courses from this study are reported in Table 1. The University Institutional Review Board approved this study.

Qualitative Methodology

Three semi-structured audiotaped focus-group interviews were conducted among students enrolled in the respective courses, which included two sections of NUTR 3104 and one of NUTR 4312.

Recruitment

Without the instructor present, students from each respective course were informed of the study objectives by a research assistant during a regular class period 2 to 3 weeks before the data-collection session. Using a script, the students were informed that the study objective was to assess perspectives of student learning from case-based learning in the respective course, that data would be collected as an audiotaped discussion during a regular class period, and that students who agreed to participate would provide verbal or anonymous written responses to questions posed by the moderator. The data collection occurred the last week of the 16-week semester for each course.

Data Collection

The PI, who served as the moderator, used standard methods of qualitative interviewing[11] to originate a discussion guide that included open-ended questions, followed by a number of topical probes for directing the data-collection discussions. Two others reviewed the guide for content validity; one a nutrition graduate student who completed case-based learning courses the previous academic year (J.J.), and the