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ScienceDirect

Currents in Pharmacy Teaching and Learning 5 (2013) 342–350

Currents in Pharmacy Teaching & Learning

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Research

Teaching critical thinking and problem-solving in a pharmacy self-care lab: A skills-based approach

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Abstract

Introduction: Developing self-care curricula to engage millennial learners in critical thinking is challenging. A five-phase experiential-based learning cycle with a foundation based on millennial learners' preferences, human patient simulation, and critical thinking skills development was adapted for use in a self-care lab. Skills are reinforced with topics that increase in complexity as the semester progresses. The objective of this study is to describe the implementation process and to measure the success of these curricular changes.

Methods: The five-phase learning cycle is utilized to introduce SOAP note writing, evidenced-based medicine, drug information skills, new disease states, patient interviewing, and medication therapy management. Constructive feedback through development of rubrics and verbal as well as written communication reinforces skills development. Curricular changes were measured by analyzing student grades, as well as student's and Curriculum Committee's written and scored feedback. A two-sided *t*-test was used to determine statistical significance.

Results: Comparisons of student feedback from 2007 to 2008 showed a statistically significant improvement with the revised curricula ($p < 0.01$). Curriculum Committee feedback on course content ($p < 0.01$) and teaching techniques ($p = 0.03$) also improved significantly. While student grades initially fell in 2008 ($p < 0.01$), analysis of 2009–2011 grades showed improvement after implementation of a formative feedback process.

Conclusions: Teaching an "approach to self-care" rather than trying to cover every self-care topic has been successful in terms of promoting critical thinking as well as other patient-centered skills in a self-care lab. It was well received by students and faculty and has encouraged students to achieve high levels of cognition.

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Keywords: Pharmacy care labs; Critical thinking; Curriculum; SOAP notes; Skills development

Introduction

Developing self-care curricula to engage the millennial learner and to teach critical thinking and problem-solving (CT/PS) skills is challenging. In a traditional self-care therapeutics course, teaching CT/PS skills may be impossible unless the approach is changed or lecture hours are added. In 2002, University of New Mexico began to structure a new curriculum that incorporated more active learning using pharmaceutical care labs (PCLs). PCLs were incorporated into the first three years of the curriculum in part to help address patient care competencies from the Accreditation Council for Pharmacy Education (ACPE) and the Center for the Advancement of Pharmaceutical Education (CAPE) outcomes.[1] In the spring of 2007, when the PCLs first began, the mission was to give students hands-on patient care experiences to augment learning from concurrent didactic courses. It was felt that the opportunity for application of the information taught in the classroom setting would optimize learning and retention. While the first offering in 2007 was relatively successful in terms of offering hands-on experiences and addressing some of the patient care competencies, it uncovered limitations in both

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1877-1297/13/$ – see front matter © 2013 Published by Elsevier Inc.
http://dx.doi.org/10.1016/j.cptl.2013.03.002

student's abilities to think critically and instructor's abilities to address the wealth of topics given the time constraints. In Standard 11, the ACPE states that colleges of pharmacy must promote the "development and maturation of critical thinking and problem-solving skills."[1] More recently, the American Association of College of Pharmacy (AACP) stated that CT/PS skills were the most important skills for our students to have as they graduate and enter into pharmacy practice.[2] Initial discussion by the PCL faculty centered on pathways to address and implement the patient care competencies as well as Standard 11.

The new process focused on finding an approach to help students learn CT/PS skills that would apply to everyday pharmacy practice settings and encompass multiple self-care conditions. After searching the literature, it became evident that addressing CT/PS skills is relatively new to pharmacy education but has been addressed in other professions. In 1995, psychologists Oliver and Utermohlen wrote about their perception of students needing to "develop and effectively apply critical thinking skills to their academic studies, to the complex problems that they will face, and to the critical choices they will be forced to make as a result of the information explosion and other rapid technological changes."[3] This clearly illustrates the challenges our pharmacy students are encountering today.

Pharmacy organizations such as the American College of Clinical Pharmacists (ACCP) and AACP value critical thinking and problem-solving skills development in pharmacy education.[2,4] A white paper from ACCP in 2008 calls for colleges of pharmacy to pay more attention to integration of critical thinking into their curricula.[4] AACP held a Curricular Change Summit the same year calling into question mechanisms used to teach pharmacy students critical thinking, communication, and problem-solving skills in the United States.[2] The group rejected using the majority of classroom time for transmission of factual information, and in 2009–2010, these findings were reviewed and discussed by the Academic Affairs Committee of AACP. The discussion focused on how schools and colleges of pharmacy teach CT/PS skills to the current generation of students—the millennial generation.[5] It included recommendations for pharmacy educators on how to teach more effectively. The following is an excerpt from these recommendations.

(1) Lectures may not provide an optimal learning environment. This generation has different expectations of faculty and delivery of course content. The teacher needs to become a facilitator of learning and less of a provider of information.
(2) The relevance of assignments must be transparent to the learner. These students detest busy work.
(3) Interaction should be an important component of the educational process, as these students value group work and collaborative learning.
(4) The new generation of learner appreciates faculty who respond quickly, provide constructive feedback, and are familiar with and effectively use digital tools in the classroom.[5]

To effectively teach the millennial generation, instructors must first understand the strengths and weaknesses of these learners. Chuck Underwood, an expert on generational dynamics and author of *The Generational Imperative*,[6] described many of the same characteristics as the white paper article[4] and pointed out that the millennial generation has many great qualities including working well in teams, setting and adhering to deadlines, and being active in their communities. He stated that they have come of age in an era of "helicopter parents," highly structured days, and information technology changes.[6] As such, they feel intense pressure to perform well academically and adhere to a strict and overfull daily schedule. They also are accustomed to getting immediate answers to questions with the click of a mouse or smartphone; this impairs their ability to "think on their feet"[6] and synthesize decisions themselves. These attributes have led to a generation that does not have the CT/PS skills of the previous generations. Since CT/PS skills are imperative for modern healthcare practice, pharmacy school curricula should encourage students to process information and synthesize answer(s) to patient care problems.

Problem-based learning has been used in pharmacy institutions to teach CT/PS skills and has been shown to be effective. However, human patient simulation (HPS) has recently been shown to be more effective than problem-based learning in terms of developing critical thinking skills.[7] In an article published in the *American Journal of Pharmaceutical Education* (AJPE) in 2008, the authors concluded that "human patient simulation offers a unique immersive and engaging learning environment that fosters achievement of high levels of clinical performance."[8] As millennial generation students enjoy hands-on immersive activities, HPS fits well with their strengths and relative weaknesses.

AJPE published an article in 2011 that delineated how HPS can be used to teach clinical reasoning and problem-solving skills.[7] This article steps through the process of using HPS with an example scenario including pre-simulation, clinical encounter, and debriefing.[7] A particularly useful component of this article is the use of Bloom's Taxonomy to show cognitive, motor, and affective skills that are addressed using this approach to learning. This allows instructors to incorporate HPS skills into their lab or classroom in order to achieve higher level learning (synthesis and evaluation) in Bloom's Taxonomy. Since millennial learners prefer application-based learning opportunities,[5] pharmacy care labs offer a unique opportunity to combine active learning and HPS with CT/PS skills. Although there are many models for care labs and some published guidance on best approaches to teaching

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