Available online at www.sciencedirect.com

ScienceDirect

Currents in Pharmacy Teaching and Learning 6 (2014) 543–549

Currents in Pharmacy Teaching & Learning

http://www.pharmacyteaching.com

Research

Evaluation of student perceptions of concept mapping activity in a didactic pharmaceutics course

Rajesh Vadlapatla, PhD[a,*], Sukhvir Kaur, PharmD[b], Yingnan Zhao, PhD[c]

[a] *Department of Pharmaceutical Sciences, University of Saint Joseph School of Pharmacy, Hartford, CT*
[b] *Department of Pharmacy Practice and Administration, University of Saint Joseph School of Pharmacy,Hartford, CT*
[c] *Xavier University of Louisiana College of Pharmacy, New Orleans, LA*

Abstract

Objective: To incorporate a concept mapping assignment as an active learning strategy in a pharmaceutics course and evaluate student perceptions about this new activity.
Design: A total of 67 students were given an individual and group concept mapping assignments to analyze the interrelationships of physicochemical properties, formulation factors, and excipient requirements of a specific dosage form. A student satisfaction survey was administered to collect student perceptions about the activity anonymously.
Assessment: All students and student groups successfully completed concept maps based on the rubric provided by the faculty. A total of 46 students (69%) completed the satisfaction survey. Overall, students reported that the use of concept mapping improved their understanding of the course material.
Conclusions: The concept map assignment allowed students to visualize how different properties of individual dosage forms are interrelated. It is a useful tool for integrating instructional concepts in a pharmaceutics course and beyond. Concept maps enhance learning experiences and lead to a better understanding of the fundamental concepts.

Keywords: Pharmaceutics; Concept map; Dosage forms; Active learning

Introduction

The profession of pharmacy requires students to be able to make meaningful connections, recall information, and apply it to patient care in a meaningful way. It has been reported that there is fragmentation in pharmacy education where "knowledge appeared to be presented in independent units, potentially resulting in a fragmented way of knowing."[1] Creating active learning strategies to enhance student learning includes having students make connections between prescription medications, and the product development process is crucial. Furthermore, the Accreditation Council for Pharmacy Education (ACPE) Standards 2007 promotes the enhancement of students' critical thinking skills through active learning strategies (Standards 10.2 and 11.2), where students apply basic science concepts as learned in pharmaceutics to the provision of patient care.[2] It has been shown extensively in the literature that using active learning techniques such as problem sets and case studies has a significant effect on student learning.[3,4] This learning-focused (or centered) andragogy has shown some evidence of improved retention of knowledge compared to more didactic approaches.[4–8]

Using concept maps as an active learning strategy allows students to organize information in a meaningful fashion and to comprehend the interrelationship between concepts they learn. Concept mapping represents interrelationships

* Corresponding author: Rajesh Vadlapatla, PhD, Department of Pharmaceutical Sciences, University of Saint Joseph School of Pharmacy, 229 Trumbull St, Hartford, CT 06103.
E-mail: rvadlapatla@usj.edu

http://dx.doi.org/10.1016/j.cptl.2014.04.014
1877-1297/

between concepts (usually a word) in a graphical fashion, is constructed to answer a particular question, and is organized in a hierarchical fashion. Two or more concepts are connected using linking words that specify the interrelationship between the concepts. This serves as an active tool to engage students in meaningful learning.[5] Requirements of concept mapping include having relevant knowledge, organization of that knowledge, and an intellectual commitment to integrate new with existing knowledge. Concept mapping is a tool that can be used not only as a learning tool but also as an evaluation tool where the instructor may identify both valid and invalid ideas held by students. Very few articles have been published based on concept (knowledge) mapping in pharmacy education. Previously, it was reported that some of the observed challenges using concept mapping as a learning strategy in the classroom included the amount of material to be covered in the learning experience, physical facilities to carry out small group activities, anxiety among students to try new approaches, possible increase in instructor time, and large class size.[1]

In a didactic pharmaceutics course it is difficult for students to put together the concepts that they have learned during the course and get an overall big picture. This is largely due to the fact that there are so many different concepts taught with little or no connection to one another. For example, physiochemical properties such as solubility, particle size, pH, temperature, and surface area are taught during the introductory part of the course, followed by instruction related to different dosage forms. There is a limited emphasis on how these physicochemical properties are related to dosage forms and/or how these physicochemical properties affect different properties of dosage forms. We believe that there is a need for connecting physicochemical properties, formulation properties, and use of excipients in a particular dosage form.

Concept mapping was used as an active learning technique in our pharmaceutics course. The objectives of this assignment were achieved by creating an active learning environment and challenging the students to critically think and apply the concepts learned in class. All of the students and their cooperative groups successfully completed the concept maps. Students constructively criticized and graded their group members for their contribution toward the group project and the quality of their individual concept map.

Concept mapping was implemented in the pharmaceutics course as an active learning strategy. During this activity, students built connections between the theories and properties of selected dosage forms. The University of Saint Joseph School of Pharmacy (USJ SOP) curriculum utilizes ability-based outcomes (ABOs) that are derived from the American Association of Colleges of Pharmacy (AACP), Center for the Advancement of Pharmaceutical Education (CAPE) Educational Outcomes (revised 2004), and the ACPE Standards 2007 and the university core values. Individual course objectives are derived, delivered, and assessed to the stated ABOs. The pharmacy curriculum at USJ SOP uses a modified team-based learning model where students are usually given instructions and an interactive lecture followed by being assigned a group activity in their pre-designated teams of 6–7 students to re-enforce learning. The teams occupy small breakout rooms surrounding the large classroom and the course instructor(s), usually one to two faculty, walks around the breakout rooms to answer any questions or redirect groups if necessary. Constructing a group concept map, as well as an individual concept map, was one of the longitudinal activities that were conducted in the pharmaceutics class. Creating a group concept map allows students to learn from each other and fill in any knowledge gaps, whereas development of a concept map as an individual helps to assess an individual's learning of key concepts.

In this study, the use of concept mapping assignment as a new learning activity in a pharmaceutics course was explored. Students' perception about the usefulness of this new strategy was evaluated utilizing a standardized learning satisfaction survey.

Materials and methods

Pharmaceutics is a four-credit-hour course offered in the first semester in our program. Traditionally, it is a content-heavy foundational (basic) science course generally taught in a lecture format with or without the use of active learning techniques. Students learn one course intensively, from the beginning to the end, spending six hours a day in the classroom. The students are formed into a semester-long cooperative learning groups that consist of six to seven members per group.

A concept mapping assignment was introduced as one of the active learning techniques. Students were encouraged to make connections between different properties of the assigned dosage form. The following were the objectives of designing this assignment:

(1) Create an active learning environment that emphasizes student-lead learning
(2) Retain as much information as possible without rote memorization
(3) Integrate key concepts learned during the pharmaceutics course
(4) Foster critical thinking and lifelong learning skills

On the first day of the course, 67 students were assigned a summative assignment to be completed by the last week of the course. The students were given three weeks to complete this assignment. Each student was asked to design two concept maps; one individual concept map and one group concept map. Students worked in cooperative groups to create the group concept map. The group concept map was assigned randomly to each group. One student from each group was asked to select a dosage form from a list of