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ScienceDirect
Currents in Pharmacy Teaching and Learning 3 (2011) 30–35
Currents in Pharmacy Teaching & Learning
http://www.pharmacyteaching.com

Research

A measure of teamwork perceptions for team-based learning

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Abstract

Introduction: Teamwork is a developed skill that is essential within pharmacy practice and health care. Exposure to team-based learning (TBL) pedagogy may foster development of this skill. The purpose of this study was to evaluate a measure for perception of teamwork among PharmD students, and then examine a module using TBL pedagogy.
Methods: Faculty instructors for a 90-contact hour cardiovascular pharmacotherapy module used TBL pedagogy in teaching 18 hours of the therapeutics topics in that module. To determine a change in their perceptions of teamwork, second-year PharmD students took pre- and post-module surveys. The survey instrument used was previously published with use among medical students.
Results: Fifty-eight of 61 PharmD students participated. The Rasch Measurement Model was used to construct measures of student perceptions along a linear and unidimensional "perception of teamwork" continuum. To make the survey unidimensional, seven of the 20 items were removed. The resulting instrument had a reliability of 0.93 and separation of 3.56. Pre-module survey results were 1.1 ± 2.5 logits, whereas afterwards were 1.3 ± 2.4 logits. Change in students' perceptions were varied at 0.2 ± 2.6 logits (paired *t*-test $p = 0.6293$). Older students had a negative correlation ($r = -0.27$, $p = 0.04$), whereas pharmacy work experience had a positive correlation with change in teamwork perception ($r = 0.31$, $p = 0.02$).
Conclusion: This instrument appears psychometrically valid and reliable to measure changes in PharmD students' perceptions of teamwork with TBL. Study results led to reflection on attributing factors for module improvements by involved faculty.

Keywords: Team-based learning; Teamwork; Student perceptions; Rasch measurement

Introduction

Teamwork is essential for a safer, more effective health care system.[1] As health care team members, pharmacists need to be equipped to work in teams with other health care professionals regardless of practice setting. In fact, the Accreditation Council for Pharmacy Education suggests that students experience teamwork during their education.[2] Thus, teamwork should be fostered among students in both early and advanced stages of education. It seems reasonable to initially have students build teamwork skills with classmates before moving onward to other interprofessional teamwork. Although there are multiple educational strategies to expose students to teamwork, one successful strategy has been small-group learning.[3] A specialized type of small-group learning that focuses on team development is team-based learning (TBL).

Having originated in the 1970s from Michaelsen and colleagues, TBL has been successfully integrated into health professions education.[4] TBL uses behavioral objectives, transparently selected teams, tests (i.e., the Individual Readiness Assessment Test and the Group Readiness Assessment Test) on pre-lecture readings, and applied in-class learning activities (i.e., case studies). The tests incentivize student preparation for the classroom, student accountability to peers, and small-group team discussions about the topic learning objectives. The applied learning activities are designed with the 4 Ss (**S**ignificant to students, **S**ame problem, **S**pecific choice, **S**imultaneous report) and focus to stimulate

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1877-1297/11/$ – see front matter © 2011 Published by Elsevier Inc.
doi:10.1016/j.cptl.2010.10.004

class discussion, peer teaching, and debate. Through application of important informational content, these learning activities are intended to foster critical thinking skills along with teamwork and collaborative learning. Team-based learning activities in the classroom have demonstrated positive learning outcomes.[5-9]

Previously, Parmelee and colleagues evaluated changes in perception with TBL for 180 medical students during their core basic science sequence in the first and second year of medical school.[10] A survey instrument was developed to evaluate the students' perceptions. This survey was administered during the first and second years of medical school. Their results suggested changes in perceptions within "professional development," "satisfaction with team experience," and "peer evaluation" after a year of medical education using a TBL format.

Although teamwork seems useful and important in practice, skill with teamwork is not automatically successful just because participants are placed into groups.[11] Thus, a measure of teamwork is needed to evaluate implementation of this TBL instructional method and student perceptions of learning teams. Some literature is available with regard to TBL in disciplines, such as nursing, physician assistant, and medical education,[12-14] although training of teamwork skills has not been highlighted. There is not a lot of literature available in pharmacy education that evaluates student perception changes in teamwork using TBL.

A newer college of pharmacy has incorporated multiple teaching and learning strategies into the pharmacotherapy sequence. In the cardiovascular module, faculty used traditional lecturing, team-based learning, case-based activities, and educational games. The objectives of this study were to measure PharmD students' teamwork perceptions and thereafter examine teamwork with implementation of TBL coursework.

Methods

The cardiovascular pharmacotherapy module for second-year PharmD students totaled 90 contact hours in duration. Thirty-two hours were reserved for examinations and problem-based learning style case studies. The remaining 58 hours were available for didactic classroom time. This time was divided into nine major topics, with each topic subdivided into background, pharmacology, and therapeutics sections. The instructors for this module consisted of three basic sciences and three pharmacy practice faculty. Team-based learning pedagogy was used by pharmacy practice faculty in teaching the therapeutics sections for six module topics (18 contact hours), whereas the remaining three (of 9) module topics used a traditional lecture format secondary to time restrictions. The students received a formal one-hour lecture with instructions about TBL on the first day of class. In the class of 61 students, every student team consisted of seven or eight students and teams were chosen during class time on the first day of classroom instruction. This was done by organizing students into a line based on skill sets or personal student experience and counting off into eight teams so the skill sets were distributed as equally as possible among teams.[4] Student teams worked together on in-class tests and applied learning activities for which activities encompassed most class time.

To assess for a possible change in students' perceptions, a survey instrument was administered to all 61 second-year PharmD students on the first and last days of the cardiovascular module. Fifteen minutes of class time were allotted for each 20-item survey administration. Although student responses remained confidential, they were not anonymous, because individual student pre- and post-module surveys needed to be paired. The survey data were collected and paired by a separate institutional office, the Department of Health Professions Education. Therefore, student data were de-identified before evaluation by study investigators. This study was approved by the Institutional Review Board of Northeastern Ohio University Colleges of Medicine and Pharmacy (NEOUCOM) and student participation was voluntary.

Instrument

The survey instrument used in this investigation was originally developed and used among medical students.[10] Permission to use the survey instrument for this investigation was granted by those authors. Their instrument was composed of 20 questions/items in which a five-point Likert-type scale was used to appraise student perceptions of: (1) overall satisfaction with team experience, (2) team impact on quality of learning, (3) satisfaction with peer evaluation, (4) team impact on clinical reasoning, and (5) professional development. In an effort to improve reliability in this present study of PharmD students, the evaluation instrument was modified from a five-point rating scale to a four-point rating scale as suggested by Weems and Onwuegbuzie.[15] Otherwise, no further changes were made before obtaining student responses (Table 1).

The Rasch Measurement Model

The principle of fundamental measurement served as a guide for this investigation. Measurement *precedes* use of inferential statistics and is an important step that often times has been neglected. That is, historic "measurement" in the social sciences (including education) has often not met the rigorous standards of "measurement" in the physical sciences.[16] Rigorous physical sciences "measurement" in the social sciences is termed *fundamental measurement* and data fitting the Rasch Measurement Model (RMM) attains this required rigor.[15] The RMM has frequently been used in educational research[17] by professional licensing examination bodies, such as the National Board of Medical Examiners[18] and also by various US state-level departments of education for high-stakes standardized examinations within secondary education.[19]

The RMM assumes that a single latent trait (or underlying characteristic/quality) is being measured with the sur-