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Research

Predictors of performance on the pharmacy curriculum outcomes assessment (PCOA) ☆

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Abstract

Objective: Our aim was to evaluate factors that predicted student performance on the pharmacy curriculum outcomes assessment (PCOA) examination.
Methods: PCOA was administered to two P2 pharmacy classes in 2013 and 2014. Predictor data was collected during a learning style workshop using the Unified Learning Style Model (ULSM) and through institutional databases. Possible predictors of performance were included in a multiple linear regression. Variables included in the regression were chosen as predictors based upon previous studies in the health sciences literature.
Results: A total of 142 second professional year (P2) students completed the PCOA. Average PCOA scores were 363.5 ± 42.2. Significant predictors in the multiple linear regression included P1 grade point average (GPA) institution, Pharmacy College Admissions Test (PCAT) reading, accommodators (compared to assimilators), and students that did not prefer reading. Increases in P1 GPA, and PCAT reading improved PCOA scores. Students that did not prefer reading as a learning preference, accommodators, and institution on average led to a reduction in PCOA scores.
Conclusions: Our pilot study found that P1 GPA, PCAT reading, institution, accommodators, and students that do not prefer reading may predict PCOA performance, which mirrors findings related to summative examinations in health sciences literature.

Keywords: Pharmacy curriculum outcome assessment (PCOA); Summative evaluation; Learning style

Introduction

The accrediting body of colleges of pharmacy, Accreditation Council for Pharmacy Education (ACPE), states in the 2007 standards that all colleges should incorporate summative assessments throughout the pharmacy curriculum.[1] The 2016 ACPE Standards further emphasize the importance of incorporation of "systematic, valid, and reliable knowledge-based assessments," and they specifically list the PCOA as one of the required knowledge documentation elements for the assessment of foundational knowledge. Finally, the ACPE Guidance document suggests utilization of PCOA for assessment of student competence at the end of the didactic curriculum, benchmarking, and longitudinal assessment in a curriculum.[2]

The PCOA is a validated evaluation tool developed by the National Association of Boards of Pharmacy, which was piloted in 2008 and made available for administration in

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2009.[3] The PCOA incorporates four major content areas including the basic biomedical sciences, pharmaceutical sciences, social/behavioral/administrative pharmacy services, and clinical sciences. The current PCOA exam blueprint that specifies this content is derived from responses to the Curriculum Survey from US Colleges of Pharmacy (developed by stakeholders and National Association of Pharmacy) and the content of Appendix B in the 2007 ACPE standards that specifies content, which must be taught in pharmacy schools. Through April 2014, there have been more than 24,000 administrations of the PCOA to U.S. pharmacy students across 59 colleges of pharmacy.[4] Since the PCOA administration only started in 2009, there is no literature that shows prediction of performance on it; only a significant correlation of exam score to GPA and in incentivized students, the SAT verbal score.[5,6]

Currently, there is a lack of data surrounding what may predict student performance on the PCOA. To date, only one private college of pharmacy evaluated potential correlation of the PCOA and GPA.[5] However, literature does exist surrounding predictors of performance on the North American Pharmacist Licensure Examination (NAPLEX). In a meta-analysis, Pharmacy College Admission Test (PCAT) and pre-pharmacy GPA were both significant predictors of performance on the NAPLEX.[7]

There is also a lack of data in the pharmacy literature surrounding learning preferences effect on student performance on summative evaluations; however, there is data available in other health sciences literature. Our institution uses the Unified Learning Style Model (ULSM) to classify learning preferences.[8] The ULSM combines a variety of learning preference models from various authors including Kolb, Felder and Silverman, Riding and Rayner, and Gregorc.[9–12] Important learning preferences relative to this article include Kolb learning styles and students who prefer visual, aural, reading, and kinesthetic perception of information. Use of the ULSM and learning preference workshop methodology has been previously been evaluated in pharmacy students.[13]

In a study evaluating the United States Medical Licensing Exam (USMLE), authors found the Kolb learning styles assimilator and converger predicted improved scores on the USMLE.[14] The Kolb categories assimilator, accommodator, diverger, and converger are derived from an interplay between concrete experience, abstract conceptualization, active experimentation, and reflective observation.[10] Concrete learners tend to learn best through interacting with a situation and prefer "feeling" through situations. They prefer being instructed by an expert. Abstract learners prefer to understand the theory of a situation and like to think through situations. Active experimenters prefer being hands on with a situation and taking risk. Conversely, reflective learners like to observe and consider their options before acting. Assimilators prefer the abstract and reflective approach to learning whereas the opposite is observed with accommodators, who prefer the active and concrete approaches. Convergers prefer an active and abstract approach whereas divergers prefer the concrete and reflective approach.

Preferences for how information is perceived in the ULSM can be through reading, visual, aural, and kinesthetic (hands-on learning). Students can prefer any combination of the previous categories. A previous study in pharmacy students showed that students preferred visual and reading categories more often than aural and kinesthetic categories.[13] A study evaluating medical students showed the Nelson–Denny reading test scores to be a significant predictor of both MCAT and USMLE scores.[15]

As the PCOA becomes more widely incorporated into pharmacy colleges and schools with the changing standards, it is important to assess potential predictors of performance given both the potential student impact (stakes) and institutional impact if the exam scores are used for benchmarking students and institutions comparatively. As correlations have been demonstrated between standardized pharmacy examinations (PCAT and NAPLEX), PCOA and GPA, and learning preferences and exam performance of other health professions students, we want to determine if these and other student specific factors could predict student success on the PCOA. Therefore, the purpose of this study was to identify predictors of performance on the PCOA.

Methods

This study employed a non-experimental correlational research design. Two classes of second professional year (P2) pharmacy students took the PCOA exam during January of 2013 and 2014 at Eugene Applebaum College of Pharmacy and Health Sciences, which is a traditional four-year state pharmacy school with about 90–100 students enrolled in each class. The curricular structure consists of three years of didactic coursework followed by one year of APPE. Required pre-pharmacy coursework includes basic sciences (anatomy and physiology, basic and organic chemistry, microbiology and physics), calculus, and general education electives. When P2 students take the PCOA, they have completed all of their PharmD coursework in the basic sciences and pharmaceutical sciences, 75% of patient care labs (three of four), 25% of therapeutics course modules (two of eight), and 50% of social and administrative coursework (four of eight courses).The project was approved through the Wayne State University, Institutional Review Board (IRB).

The PCOA examination for students was mandatory as part of our Professionalism Curriculum; however, students had the option of not including their data in this analysis. Students who opted to participate in survey data signed an informed consent. An independent proctor administered the PCOA exams. Students that performed well received one of several incentives based on score including recognition at a college event, personal letter from the Dean, or bonus points in a specific course. Students that performed less than two standard deviations below our college mean in any of the four main PCOA content areas participated in a remediation