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Title: The Relationships Among Standardized Exam Results, Remediation Time, and Licensure Success

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Purpose: The purpose of this study was to explore the relationships among standardized exam scores, time spent on exam specific remediation, and licensure exam results using data from three years of senior classes.

Background: Preparing pre-licensure nursing students for a rapidly changing health care environment requires that students are able to think critically and synthesize data from multiple sources. A curricular revision in one program prompted the foundation of a constructivist approach to helping students synthesize knowledge from previous and concurrent courses. The four knowledge synthesis courses incorporate an inquiry based approach that includes students working in small groups to actively participate in problem solving. Case studies and assignments in these courses reflect theoretical and clinical concepts that correlate with what is being taught during the semester and utilize previous learning. Faculty members teaching in this program have structured medical surgical, pathophysiological, and specialty concepts to tie together in the knowledge synthesis courses. A secondary objective of the knowledge synthesis courses is to help students begin to utilize standardized tests to identify areas of weakness and gaps in knowledge. With the help of faculty members students formulate a plan for remediation as a means of preparing for licensure examination.

In the first semester of their junior year, students review the licensure exam categories alongside concepts of care and case studies that reflect what they are studying in their other nursing courses. Test taking skills and methods to reduce test anxiety are discussed and practiced. The second semester of the junior year continues the focus on testing that incorporates weekly medication calculation questions designed to strengthen the student's calculation knowledge. The students also self-identify their learning needs with exercises that have them reflecting on their emotional intelligence, testing decision making and integration of material learned in concurrent courses. Their second standardized test in the curriculum has a focus on the care of the older adult and draws on information that was presented during both semesters of their junior year.

In the senior year the objective of the utilization of standardized examinations is to support students in identifying areas of weakness. Students are encouraged to use test specific remediation to improve grades. This is done by using two versions of a custom built comprehensive exam that is given at the beginning and end of the first semester. Based on the score of the first exam students are motivated to complete test specific remediation on areas of weakness as part of their course grade. In the second semester of the senior year students begin and end the semester with a standardized comprehensive exit examination. The students are

encouraged to remediate but test specific remediation is not part of their course grade. The emphasis in the second semester continues to be the identification of areas of weakness and filling in concept and content gaps through the use of active learning strategies including several simulation scenarios, small group case studies, and presentations.

Methods: This retrospective, descriptive, correlational research study utilized descriptive and correlational statistics to identify relationships among three years (2014-2016) of senior nursing students' data ($N = 364$) including: two custom comprehensive exam scores, two exit exam scores, time spent in test specific remediation, and licensure exam results. Descriptive statistics provided means for standardized test scores, time spent on test specific remediation, score improvement, and licensure success on first attempt. Analysis of Variance (ANOVA) and correlation analysis were used to explore relationships among graduation year, and student success on licensure exam with standardized test scores and time spent in test remediation that accompanied the standardized exam.

Results: The results of the study demonstrated several important relationships for consideration in planning curricula and student preparation for licensure examination. When comparing mean test scores from students who passed (86.6%) versus those who failed (13.4%) the licensure exam on the first attempt, statistically significant differences in means scores were found for custom comprehensive exam scores ($F = 26.44$, $df = 1, 362$, $p < .001$) and exit exam scores ($F = 31.61$, $df = 1, 365$, $p < .001$). The exam most strongly correlated with licensure exam passing was the first administration of the exit exam in the spring of the senior year ($r_{pb} = .282$, $p < .001$), followed closely by the first custom comprehensive exam administered at the beginning of the senior year ($r_{pb} = .261$, $p < .001$). Time spent in test-specific remediation was positively, weakly correlated with test score improvement ($r = .173$, $p = .001$) in the fall semester, but remediation time in the spring semester (between the first and repeat administrations of the exit exam) was not associated with exit exam score improvements. Interestingly, over the three year period, we saw a significant increase in student time spent on test-specific remediation (1 hr 44 minutes in 2014 to 3 hrs 48 minutes in 2016) while mean test score improvements remained relatively stable as did licensure pass rates on the first attempt.

Conclusion: The results of our study are significant to educators interested in preparing pre-licensure students for licensing examinations. Identifying at risk students early on, developing a plan for addressing knowledge gaps and building confidence in their test taking skills may help them be more successful on their first attempt at the licensing exam. We incorporated curricular changes aimed at helping students to synthesize both current and previous knowledge in the hope that we would improve critical thinking skills. Originally, courses like this were only included in our senior year curriculum. Expanding the course concept to the junior year was an attempt to help students be more successful in testing throughout the nursing program.

The use of standardized exams has allowed us to help build student's comfort level and confidence with test taking. Students in the first semester of their senior year take an exam that is very similar at the beginning and end of the semester. This is a purposeful curricular design to help students identify gaps in knowledge, remediate on test specific concepts, and retest. Students who use this opportunity wisely are successful. The statistical correlation in this study demonstrates that a significant majority of our students were able to increase their score.

Time spent in test specific remediation is a small part of what we do to help prepare students for test success. It is a measurable variable that allows us a glimpse of how much time students spend preparing for testing. There are limitations to measuring time spent on remediation: although we can quantify time spent remediating through computerized tracking, we have no clear idea of the quality of the remediation. Additionally, students have the option to download study materials and study them at a later time. Therefore it is possible that we are not capturing all of the time spent on test-specific remediation. Another limitation is that we only looked at time spent on the custom comprehensive and exit exam remediation. Students were encouraged to spend some time remediating in other exams depending on their weak areas.

The fact that we had a limited number of students who were unsuccessful on licensure pass on their first attempt is good. However, this small number makes it much more difficult to identify what makes the difference for student success on licensure pass rates. This leaves us to speculate on what we, and nursing faculty in other programs, can do to truly ensure licensure exam success. We implemented a curricular change that incorporates a constellation of strategies to synthesize knowledge, build test taking comfort and confidence, identify areas of weakness, and develop a plan for remediation. This study allowed us to discover the impact of a few of those changes and to begin to ascertain the areas in which the time is well spent. Going forward, we will continue to motivate students to spend time in course specific remediation throughout the senior year as opposed to only in the fall semester. We will also keep the custom examination in the fall semester, as it has a strong correlation with student success. Identifying this correlation also allows us to implement additional efforts aimed at students who perform poorly on this exam to help them continue to prepare for licensure exam success.

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