

The Impact of SNLE Enrichment Program in Critical Care Nursing Module

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Abstract

Background: The Baccalaureate Nursing program in the Nursing College at XXX experienced a decrease in Saudi Nursing Licensing Exam (SNLE) scores on the first attempt for students graduating between June 2017 and January 2018 without a clear explanation for the decline. Thus, the college developed an SNLE enhancement program to prepare intern students to pass the SNLE. **Methods:** This study aimed to examine how effective the SNLE enrichment program is in preparing students to pass the Licensure Examination, to explore the unique predictors of the exam scores among interns in nursing who attended the SNLE Enrichment Program, and to inform the nursing colleges about the optimal ways to conduct the SNLE enrichment program to improve the licensure exam passing rate. Participants were drawn from a convenient sample of intern students who attended the critical care nursing module in the SNLE enrichment program in March 2018. The study used 50 multiple choice questions (MCQs) that were written in similar fashion to the SNLE format to measure students' knowledge in critical care concepts. **Results:** This study showed that the SNLE enrichment program increased exam scores; this was determined by comparing pretest exam scores to the posttest exam scores. There was a statistically significant difference in the exam scores, over three points. However, there was a drop in the students' scores comparing the pretest mean score to one-week post-intervention. Student GPA and age were not predictors of student achievement in the three exams points. **Conclusion:** Another study that examines how to help students retain knowledge for a longer period is recommended.

Keywords: SNLE; Intern students, Undergraduate nursing students; Nursing education program types; Saudi Arabia

Introduction

The Saudi Nursing Licensing Exam (SNLE) passing rate is a source of great anxiety for educators and students.^[1,2] Thus, successful completion of the nursing programs and passing the licensure examination is important for the students, faculty, and nursing programs.^[3,4]

In the United States, the National Council of State Boards of Nursing (NCSBN) introduced the Nurse Licensure Compact (NLC) commission in 2000.^[5] However, more than 20,000 nursing school graduates fail the licensure examination each year in the United States.^[6] Many studies examined factors that predict first attempt passing of the licensure examination. For instance, many studies suggested pre-nursing factors that predict the first attempt licensure examination passing rate such as pre-nursing and nursing GPA,^[7] preadmission scores in math, science, and reading comprehension,^[8,9] and performance in pre-nursing anatomy and physiology.^[3,10]

In addition, students who displayed poor performance on examinations long before graduation and licensure testing are at risk for NCLEX-RN failure.^[11] Thus, individualized tutoring, examination feedback that identifies students' specific weaknesses, and constructing a study plan that includes answering licensure examination questions and case studies improved the Licensure Examination passing rate.^[6,12] In this line, students' performance in the first nursing course, such as

adult health nursing would be a good indication for the needs of this remediation intervention.^[13]

Student characteristics also may play a role in succeeding on the licensure exam. For instance, Kaddoura, Van Dyke, and Yang^[14] found a statistically significant relationship between critical thinking scores and passing the licensure exam. In addition, test-taking skills had a positive impact on licensure examination performance.^[4] Also, the teaching approach played a role in improving the first-attempt licensure exam score. For example, combining high-fidelity simulations and traditional clinical experiences showed significantly higher scores on the pre-graduation exit exam than traditional clinical experiences alone.^[15,16]

The Saudi Commission for Health Specialties (SCFHS) regulates health care specialist certification in the Kingdom of Saudi Arabia. SCFHS aims to raise the efficiency and safety of the health sector for the Saudi nation. Hence, the SCFHS Board of Trustees has approved the requirement of the Saudi Nursing Licensure Examination (SNLE) as mandatory for all nurses to practice the profession in the country.^[17]

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The SNLE is a three-hour exam provided by the Saudi Commission for Health Specialties (SCFHS) which aims to assesses nurses/graduate nursing students' readiness to practice the profession in the Kingdom of Saudi Arabia. [17] It consists of 150 MCQs which may include up to 10 pilot questions. It is a three-hour MCQ examination with scheduled breaks. It is divided into two parts of 75 questions each with a time allocation of 90 minutes for each part. There is a scheduled 15-minute break between the two parts. These questions have four options from which the candidate will choose the best answer. The examination shall contain recall questions that test knowledge and questions with scenarios that test other skills (interpretation, analysis, decision making, reasoning, and problem solving). The purpose of the blueprint is to ensure questions not related to what students were taught are excluded and to include only what students were expected to learn. [17] The blueprint was developed by a committee which included Nursing College Deans. Critical care nursing questions are worth 10% of the whole exam score.

However, SCFHS provides item-writing workshops for the faculty in the nursing colleges to prepare them to participate in writing the questions for SNLE to build the question bank for this exam. It also serves to familiarize nursing faculty with the structure of the exam to arrange their courses and exams accordingly, in the hopes the passing rate for the SNLE will rise. Furthermore, Saudi university/college students can sit for the SNLE during the final year of their undergraduate study. Nevertheless, the SNLE pass rate for undergraduate students in the nursing colleges in the country for the period of June 2017-January 2018 was 76%.

The Baccalaureate Nursing Program in the Nursing College at King Saud University (KSU) experienced a decrease in SNLE scores on the first attempt for students graduating between June 2017 and January 2018 without a clear explanation for the decline. The passing rate for the college was only 80% and the college was ranked fourteenth on the national registry for the SNLE on the first attempt for students graduating between these periods. This is despite the fact that the Nursing College at KSU was the first college in the nation to start BSN, MSN, and Ph.D. programs in the country. In addition, KSU was the first established (1967) public university in Saudi Arabia. [18] Nonetheless, to improve the SNLE pass rate on the first attempt, the Nursing College at King Saud University developed an enhancement program to prepare intern students to pass the SNLE and improve the passing rate for this exam. However, no study has thus far examined how effective the enrichment program is in preparing students to pass the licensure examination. Thus, this study examined the impact of SNLE enrichment program in the critical care nursing module.

This research was designed to: 1) Study the differences in the exam scores among interns nursing who attended the SNLE Enrichment Program in critical care nursing module in three time points (pretest, posttest, 1 week posttest); 2) Examine the unique predictors of the exam scores among interns nursing who attended the SNLE Enrichment Program in three time; and 3) Inform the nursing colleges about the optimal ways to conduct the SNLE Enrichment Program to improve the licensure exam passing rate.

Methods

This was a longitudinal quasi-experimental study to examine the effectiveness of the licensure examination preparation program in the critical care nursing course. All undergraduate students who attended the enrichment program to prepare intern students for the licensure examination in the critical care nursing concept were included in this study.

Research questions

RQ1: Are there significant differences in the exam scores among intern nurses who attended the SNLE Enrichment Program in three time points (pretest, posttest, one-week posttest)?

RQ2: What are the unique predictors of the exam scores among intern nurses who attended the SNLE Enrichment Program in three time points (pretest, posttest, one-week posttest)?

Study population and sampling

The Nursing College of XXX has both a traditional and bridging track for undergraduate students. Bridging students start at level four, whereas traditional students start at level one. This enrichment program was developed to prepare interns to pass the licensure exam. Despite the fact that both traditional and bridging students were invited to attend this program in March 2018, only traditional students attended. For this study, all interns who attended the critical care concept were included in this study. Thus, this is a convenience sample of interns who attended the critical care concept in the enrichment program and agreed to participate in this study.

Intervention

The Nursing College of XXX developed an enrichment program to prepare the nursing interns students to pass the Saudi Nursing Licensing Exam (SNLE). The program is an intensive two-week program from Sunday to Thursday from 08:00 a.m. to 04:00 p.m. Each day, students will have one nursing concept such as anatomy, physiology, critical care nursing, pediatric nursing, etc. For the evaluation of the program and the quality assurance purposes, students will have an exam at the beginning of the session (pretest) and the same exam at the end of the session (post-test). However, for this study, students have the same exam one week later (one-week posttest). This washout period (period between the posttest and the one-week posttest) aimed to control for the carryout effect and to assess the effectiveness of the enrichment program to retain the knowledge.

Procedures for data collection

Following the same procedure for all sessions in the enrichment program, students answered the multiple-choice exam before the start of the session; then, students had the session which is a blend of lecturing and interactive learning that includes but is not limited to the exam questions. The session lasted two hours and included a discussion of the important concepts in critical care nursing. Then students had a fifteen minutes break. After the break, students had the same exam they had at the beginning of the session. One week later, students answered the same questions for the critical care concept. Students were surprised that they supposed to answer questions for the fluid and electrolyte imbalance concept and not the critical care concept.

The author asked them to answer these questions just to know how much they can remember from the last week. After students answered the exam, the author informed them that this is part of a research study to assess the effectiveness of this enrichment program and asked students who agreed to be part of the study to sign the consent form. Fortunately, all students agreed to participate in this study after they knew that their identification information will be removed and each student will be assigned a code that only the researcher will be aware of.

Research tools

The exam was composed of 50 multiple-choice questions similar to the SNLE format. As mentioned above, the SNLE consists of 150 MCQs and students have three hours to finish the exam. However, due to the strict use of time, students were given only 50 MCQs and had only one hour to finish. Each question was worth one mark; thus, each student's score will range from zero to 50. To ensure the content validity of the MCQs, questions for the enrichment program were written by faculty members who attended SNLE items writing workshops conducted by SCFHS and who are content experts in each concept.

Data analysis

Data was managed using IBM's SPSS version 23. Double data entry, testing of the frequencies, and the ranges in the descriptive statistics were used to assess outliers and missing data. Descriptive statistics such as the mean, the standard deviation, the frequencies, and the minimum and maximum scores were calculated.

For the first research question, the independent variable is teaching method and is measured at the categorical level; the dependent variable, exam score, was measured at the ratio level. In addition, the dependent variables are measured at three time points, hence, Repeated Measures Analysis of Variance (RM-ANOVA) was used to examine the difference in exam scores at the different time points. [19,20]

For the second research question, we checked if students' GPA and age can predict exam scores over the three time points. The assumptions of RM-ANOVA for the within-subject factor includes that the dependent variables are normally distributed, the Independent Variable (IV) is categorical, and the Dependent Variables (DV) are continuous level. [21] The assumptions for multiple regressions includes that IVs are at any level, DVs are continuous level, representative sample, normal distribution of variables, homoscedasticity of the variables, and linear relationship between X and Y. [21]

Ethical consideration

Approval of the study was obtained from the XXX Institutional

Review Board. In addition, an explanation of the study and informed consent were obtained from the participants before starting the study. [22] In addition, freedom of participation was ensured for all students. The three principles of ethics in this study were:

- Respect for persons (consent be obtained, the right to withdraw from the study at any time without penalty, freedom for participation, and privacy were being ensured);
- Beneficence (the study was safe for participants with minimal harm, it was a descriptive study); and
- Justice (benefits of research and burden were equal for participants).

Results

Demographic status of participants

All intern students (N=40) who attended the critical care concept session in the SNLE enrichment program agreed to participate in this study. The participants ranged from 23 to 26 years (M=23.5, SD=.68). The study sample was composed only of male students. Among the participants, 60% (N=24) had a Grade Point Average (GPA) from 2.97 to 3.88 out of 5; 15% (N=6) had a GPA from 3.89 to 4.00, and 20% (N=10) had a GPA above 4.

Scores of the exams

Table 1 shows the exam scores in the three time points. It reveals that the mean score of the pretest exam was 16.9 ± 5.9 out of 50, the posttest exam score was 40.8 ± 9.6 out of 50, and the one-week posttest exam score was 31.8 ± 13.0 out of 50.

Table 2 shows that there is a statistically significant difference ($p=0.00$ for Wilks' Lambda) in the exam scores over the three time points (pretest, posttest, and one-week posttest).

Table 3 showed the differences in the exam scores over the three time points. For instance, there was a 23-mark increase in the mean of the exam in the posttest compared to the pretest. However, when comparing the mean of the exam scores in the one-week posttest to the mean score of the pretest, the difference in the exam scores mean was only 14.9 marks. This means the teaching did increase students' knowledge about the critical care

Table 1: Exam scores.

	N	Minimum	Maximum	Mean	SD
Pretest	40	7.00	30.00	16.9	5.9
Posttest	40	10.00	48.00	40.8	9.6
1week Posttest	40	7.00	49.00	31.8	13.0
Valid N (listwise)	40				

Table 2: Multivariate testsa.

Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	
Exams Scores	Pillai's Trace	.866	123.022 ^b	2.000	38.000	.000	.866
	Wilks' Lambda	.134	123.022 ^b	2.000	38.000	.000	.866
	Hotelling's Trace	6.475	123.022 ^b	2.000	38.000	.000	.866
	Roy's Largest Root	6.475	123.022 ^b	2.000	38.000	.000	.866

a. Design: Intercept

Within Subjects Design: Exams Scores

b. Exact statistic

Table 3: Pairwise comparisons.

(I) Exams Scores	(J) Exams Scores	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
					Lower Bound	Upper Bound
1	2	-23.900*	1.505	.000	-27.664	-20.136
	3	-14.900*	2.429	.000	-20.977	-8.823
2	1	23.900*	1.505	.000	20.136	27.664
	3	9.000*	2.353	.001	3.115	14.885
3	1	14.900*	2.429	.000	8.823	20.977
	2	-9.000*	2.353	.001	-14.885	-3.115

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Table 4: Predictors of exam scores.

Dependent Variable	Model	Sum of Squares	df	Mean Square	F	Sig.
Pretest	Regression	244.630	2	122.315	4.056	.026 ^b
	Residual	1115.745	37	30.155		
	Total	1360.375	39			
Posttest	Regression	321.471	2	160.735	1.805	.179 ^b
	Residual	3295.504	37	89.068		
	Total	3616.975	39			
1 Wk Posttest	Regression	139.446	2	69.723	.396	.676 ^b
	Residual	6511.529	37	175.987		
	Total	6650.975	39			

b. Predictors: (Constant), GPA, Age

concept, but there was a drop of the knowledge retention over one week only.

Table 4 showed that both GPA and students' age are not predictors of the exam scores.

Discussion

In this study, the mean score of the pretest exam was 16.9 ± 5.9 out of 50, for the posttest exam scores was 40.8 ± 9.6 out of 50, and the one-week posttest exam score was 31.8 ± 13.0 out of 50. Unfortunately, to the knowledge of the author, there was no other study to compare our findings with either nationally or internationally. However, the findings of this study indicated a statistically significant difference in the exam scores over the three time points (pretest, posttest, and one-week posttest). There was a 23-mark increase in the mean of the exam in the posttest compared to the pretest which indicated the module was beneficial to students to gain more knowledge about critical care concept. However, there was a drop in the mean score one week post the intervention where the difference in the mean exam scores was only 14.9 in the one-week posttest compared to the pretest. This indicates poor knowledge retention over a one-week period only.

In the effort to explain the decline in the mean score over one week, the researcher examined students' characteristics (GPA and age) to find the factors that predict students' achievement in the three exams (pretest, posttest, and one-week posttest). However, neither of these two factors predicts exam scores. Hence, another study that examines how to help students retain knowledge for a longer period is recommended.

However, this study is in contrast to Whitehead,^[7] who found that student GPA predicts first-attempt licensing exam passing rate. The author also indicated that preadmission scores in math and science predict students' achievement in the licensure examination. Hence, it is recommended that our nursing college would consider the students' achievement in General Physics and General Zoology in the Preparatory Year as a requirement for the admission to the nursing college.

Furthermore, research findings suggested that students who have poor performance on nursing courses are at high risk for failing the licensure exam,^[11] thus individualized tutoring and prompt feedback on the examination results that address students' specific weaknesses is highly recommended.^[6,12] It is beneficial if those students practice answering the Licensure Examination questions to prepare them for the Licensure Examination upon graduation. This remediation intervention is highly recommended for students who performed poorly in nursing core courses, such as adult health nursing,^[13] and anatomy and physiology courses.^[3,10] Nonetheless, it is worth mentioning that the adult health nursing course only had a portion of 28% in the SNLE blueprint.^[17]

It is also recommended that the nursing college provide workshops training to improve students' skills in test taking^[4] and critical thinking^[14] to students entering the college and emphasize these skills in intern students. In addition, varying the teaching approach showed positive outcomes in licensure exam passing rate. For instance, introducing high-fidelity simulations to the clinical learning experience showed positive outcomes in students' learning performance and increase the licensure exam pass rate.^[15,16] This is very important for our college since the

college just moved to a new building that has better equipment and facilities, especially in the laboratories and simulation capabilities. Thus, the college needs to invest more in these resources to improve learning outcomes and increase the SNLE first-attempt pass rate.

Finally, regarding the effort of the SCFHS to provide a free SNLE item-writing workshop to prepare selected faculty members to participate in building the question bank for the SNLE, it is recommended that college administrators include all faculty members to attend these workshops. Consequently, this will improve faculty awareness about the SNLE requirements and increase the chance the students would have a practice course exam that is similar to the SNLE.

Limitations of the Study

The study is limited to the Critical Care Nursing Module on the SNLE Enrichment Program and did not include female students in the same concept due to the different campus location.

Conclusion

In conclusion, this study showed that the SNLE enrichment program increased exam scores by comparing the pretest exam scores to the posttest exam scores. There was a statistically significant difference in the exam scores over the three time points. However, there was a drop in the students' scores comparing the pretest mean score to one-week post the intervention. Student GPA and age were not predictors of student achievement in the three exams points.

Many studies suggested other factors that predict first attempt Licensing Exam passing rate. For instance, students' achievement in the pre-nursing courses such as math and science predict students' achievement in the licensure examination. Also, students' achievement in the core course such as adult health nursing and anatomy and physiology courses has a role passing the licensing exam; hence, a remediation intervention is highly recommended for students who displayed poor academic achievement in these courses.

This intervention may include individualized tutoring and constructive prompt feedback on the examination results that include practicing answering the licensure examination questions. Moreover, improving students' critical thinking and exam-taking skills would help students succeed in the licensing exam in the first attempt. Finally, faculties in the college are encouraged to attend the SNLE item-writing workshops provided by SCFHS to improve their awareness about the SNLE requirements.

Competing Interests

The authors report no competing (commercial/academic) interests.

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