

# Evaluation of Clinical Practice Settings for Baccalaureate Nursing Students' Development of Clinical Judgment

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## Research article

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# Abstract

**Background:** Recipients of health care in the 21st century demand excellent patient-centered care and outcomes. Leaders of health care organizations, as well as political and national organizations, have focused their attention to the readiness of newly graduated baccalaureate of science in nursing prepared nurses to care for patients. Bridging the gap from nursing science theory to professional practice remains a challenge for nursing programs. The purpose of this study was to evaluate the impact of the clinical learning practice settings on the individual student's development of clinical judgment skills.

**Methods:** This quantitative comparative pilot study evaluated the unlicensed BSN student's ability to demonstrate safe and effective patient care before and after exposure to a clinical learning setting. This project involved applying a progressive simulation experience with a quantitative pretest (prior to clinical exposure) and posttest (after clinical exposure) to determine the impact of two nursing clinical learning models, a traditional clinical model and a dedicated education model, on individual students' development of clinical judgment. Data was analyzed using SPSS version 24.

**Results:** Students in the dedicated education clinical learning model demonstrated statistically significant change in the pre- and post-test scores improvement in their clinical judgment competency.

**Conclusions:** Although both clinical models provided evidence in support of student development of the professional competency of clinical judgment, there is a need to continue to evaluate the long-term impact of this model on student learning outcomes.

## Background

Safe and effective clinical judgment is a quality sought in new graduate bachelor of science in nursing (BSN) registered nurses (RN) because this skill improves patient safety and outcomes. Clinical judgment has long been identified as essential for the professional practice of the RN [1, 2, 3, 4]. In recent years, nursing education has been the focus of increasingly onerous legislation, as well as political and nursing organization initiatives, to ensure baccalaureate of science in nursing (BSN) students are afforded a learning experience that will prepare new graduates to enter the workforce as competent professionals (5, 6, 3). As a direct impact of the National Academy of Science, Engineering, and Medicine, formally the Institute of Medicine (IOM) [7], report and supported by the American Association of College of Nursing (AACN) [1] and the Accreditation Commission for Education in Nursing [ACEN], formerly the National League for Nursing Accrediting Commission [3], nursing programs are held responsible for preparing graduate BSNs with the competency to provide evidence-based practice that supports positive patient outcomes.

The AACN [1] outlined that nursing programs must support the development of graduate BSN nurses in the areas of critical thinking, communication, assessment, and technical skills. However newly license nurses lack competence in their judgment and ability to make sound clinical decisions [8, 9, 10). Evidence has shown the development of competency in clinical judgment is interrelated with the time allocation

and opportunities offered in the experiential clinical learning experience [11, 12]. In 2010, the Tri-Council of Nursing, an alliance among the American Association of Colleges of Nursing (AACN), National League for Nursing (NLN), American Organization of Nurse Executives, and American Nurses Association, in a joint collaboration with the Robert Wood Johnson Foundation, threw their collective support behind the *Future of Nursing: Campaign for Action* program. This program promotes established outcomes and academic progression plans to increase the preparedness of the BSN nursing workforce at state, school, and national levels [5, 3].

Nursing faculty are expected to find ways to innovate and adapt academic programs so that the programs maintain academic rigor and relevance to a rapidly changing health care industry [13, 14]. Academia is challenged with finding ways to develop critical judgment skills to support the nursing process, furthering the students' application, analysis, and synthesis of nursing science [12, 15]. Twenty-first-century leaders in nursing education are drawing their attention to the learning opportunities that support professional competency of nursing students, which in turn have nursing researchers investigating how we can further strengthen the foundation of the clinical learning experience and practice settings. The purpose of this study was to add to the body of knowledge related to an evolving model of BSN clinical practice setting:

## Transition to Professional Practice

Bridging the gap of nursing science theory to professional practice remains a challenge for nursing programs. For the graduate BSN, *practice readiness* is defined as having the knowledge foundation of a generic RN who can execute job-specific skills necessary to provide safe, effective, and quality nursing care [16]. Epstein and Hundert [17] described competency as the accustomed mannerisms of communication, psychomotor skills, professional composure, ethics, and reflections that steer the nurse's professional practice for the benefit of the individual and community. Newly licensed RNs must assume a role change to become independent practicing professionals [18, 19]. The graduate BSN must possess complex thinking skills, draw inferences on information gathered within the realm of patient care, and utilize knowledge and skills learned in academia to formulate a course of action [20].

A review of literature reveals an expectation of academia to educate nursing students to enter the workforce ready to work independently, within a short orientation period [21, 22, 23]. Underpinning the graduate BSN's successful transition into practice, Romyn et al. [21] reported the need for new nurses entering the practice setting to "hit the ground running" (p. 8). Kinghorn et al. [24] and Romyn et al. [21] observed that health care employers expect new graduates to transition to practice quickly, although new graduate BSNs' transitions are hindered by chronic understaffing, insufficient orientation time, increasingly complex patient care assignments, and negative nursing work culture. The 2013–2015 NLN strategic plan (as cited in [25]) underscored the importance of cultivating a future nursing workforce that supports an interdisciplinary team approach to provide patient-centered care to advance the nation health. Murray et al. [16] found that only 10% of hospital leaders, compared to 90% of nursing faculty,

had confidence in new graduate BSNs' ability to deliver safe and organized care. The discrepancy lies in how these two groups—hospital leaders and nursing faculty—define practice readiness [26].

Rush et al. [10] estimated the cost to recruit, hire, orient, precept, and train a new nurse was \$40,000 per new graduate BSN. While the turnover rate of newly licensed nurses in their first year of practice ranges from 35% to 60% [27]. The financial impact and retention challenges have brought academia and service leadership together to re-evaluate the theory-to-practice gap documented throughout the nursing research literature. Confounding this problem, 46% of experienced practice nurses in hospital settings are over the age of 50 [4]. In turn, health care organizations are justifiably worried about how to sustain the professional RN workforce needed to care for the acuity of patients.

In 2000, the National Council of State Board of Nursing (as cited in [28]) sought to develop a *transition to practice model* for newly licensed nurses. The aim for this model was for health care organizations to develop a structured preceptor orientation model that would support the transition to professional role of a newly licensed graduate nurse [28]. These programs have demonstrated reductions in the 12-month turnover rate of newly graduated BSNs from 7.1% to 4.3% over a span of 10 years [29]. Despite improvements in retaining newly graduated BSNs in practice, health care organizations remained challenged with the financial burden of both retaining and training newly licensed nurses [29].

Nursing education leaders are faced with the challenge of preparing BSN graduate nurses to have the foundation of professional practice necessary to enter into practice [1, 2]. New graduate BSNs enter the profession as novices on the novice-to-expert spectrum [30]. They draw upon formally learned nursing science and personal learning experiences as a basis for their professional practice, referred to as *situated learning*. A nursing program must support individual student development of problem-solving skills, critical thinking, prioritization, professional ethics, communication, and evidence-based nursing care [31, 32]. As new graduate BSNs gain experience, they are better able to abstract and pay finite attention to the priorities of care. The guidance, support, and feedback provided in the clinical learning environment (CLE) enhances the supportive environment, allowing students to develop their professional competency and clinical judgment [11]. Benner [33], in reporting on the Carnegie study, concluded that the traditional pedagogy in nursing education does not foster application or demonstration of knowledge to actual clinical bedside nursing. It is an expectation that nursing students, through their experiential clinical learning, will gain insight in clinical judgment skills; however, not all students have equal opportunities [12]. The Carnegie study, published in the *Educating Nurses: A Call for Radical Transformation*, supports student socialization into the professional role as the best learning practice [33]. Awareness of the positive impact of CLE compels the question of how do we—academia, nurse educators in the clinical learning setting, and leadership—facilitate the transition of the BSN student with safe clinical judgment into professional practice.

## Clinical Learning Environment

The clinical learning environment (CLE) is a critical component of nursing education [34, 35, 36]. Although student-centered learning has long been advocated in research, nursing curricula have been slow to embrace this philosophy and to address the needs of diverse learner styles [37]. Faculty have traditionally utilized the clinical setting to assess students' ability to demonstrate synthesis of didactic material through their individual clinical decision making [38]. The CLE allows students to develop individual critical thinking skills, clinical reasoning skills, enhanced communication skills, prioritization skills, and organization abilities [1]. The CLE provides the construct for students to conceptualize the social, behavioral, and psychomotor skills, as well as knowledge of nursing. The development of these competencies is interrelated with the time allocation and opportunities offered in the experiential clinical learning experience [11, 12].

In an active clinical learning environment, students need to have access to and interaction with a spectrum of patients [18]. In a traditional CLE faculty assign a student to one or two patients per clinical experience. Faculty must organize, plan, and ensure that each student is given equal opportunity to achieve learning objectives. In this traditional clinical model, students have limited opportunities to demonstrate, synthesize, or apply theory to their bedside nursing because the 8:1 faculty-to-student ratio precludes such luxuries [8]. The faculty must decide between a faculty-centered versus a learner-centered teaching approach [39]. Faculty allocation of time in clinical might not be sufficient to repeat psychomotor skills, deliver direct patient care, and meet all student learning needs. However, because the acuity of patients is steadily increasing, so is the need for closer supervision of students delivering direct nursing care [12, 2]. Facilitating skills and patient learning experiences has proven to be challenging [40]. Experiences gained by individuals or groups of students are varied and go unplanned. Even with careful strategic planning, the CLE is subject to variability.

The Dedicated Education Unit [DEU] nursing clinical model is an academic service collaboration in which one hospital reserves one or more inpatient care units exclusively for the use by one nursing program. The DEU CLE creates a triad in which the student, expert staff RN (preceptor RN), and nursing faculty partnership enhance a progressive collaboration and education effectiveness in building the future competent graduate BSN workforce [41, 42, 43]. The DEU clinical model offers the student an experiential 1:1 learning environment, in which the RN preceptor shapes the professional practice of the BSN student by role-modeling professional skills, attitudes, and behavior, hence providing contexts for professional roles and clinical judgment in a clinical setting [18, 39]. The one-on-one instruction of the DEU model allows students to assume increased accountability for patient care [44, 20, 45]. Under the DEU model, RN preceptors can point out errors, how to anticipate errors, and initiate risk mitigation practices [46]. Providing opportunity for nursing students to be immersed in the interdisciplinary health care team, which encourages bi-directional communication, mutual respect, and shared decision making to achieve quality patient care [47, 46]. This model for CLE appeals to millennial students' learning preference of experiential learning, motivation for reinforcement, collaborative attitude, and work style [48, 49, 46, 50].

## Academic Service Partnership

For school of nursing to remain sustainable, their leaders must have the vision to ensure the graduates of their programs have a sufficiently broad experience and skill set to meet the needs of health care employers. Academic programs and health care organizations have formed strategic alliances and academic service collaborations to utilize and create an innovative clinical learning setting: the DEU. Strategic alliances and academic service collaborations are innovative ways to address the predicted nursing shortage [51]. Academic service collaborative agreements allow schools nursing programs and health care organizations to share resources, talented professionals, and financial resources in arrangements that can be mutually beneficial [52]. Literature on these alliances has demonstrated (a) successful student transition into professional practice, as well as retention of students as future staff nurses; (b) changes in the role of staff RNs (clinical ladder, integration into the education area, and mentoring future staff); (c) expansion of educational learning capacities for schools of nursing; (d) commitment of healthcare organizations to retain future nursing staff, reduce orientation time, and offer opportunities for research; and (e) improved patient and staff satisfaction [41, 16, 53, 54].

The literature includes research on new BSN nurses' transition into practice, perception of preparedness for their new professional role, and clinical learning experience [44, 18, 46, 10]. By sharing a vision and mutual respect, the service academic collaboration of a DEU clinical model in literature has enhanced student professional competency, led to the recruitment of new graduate nurses, facilitated transition into practice, and shortened the orientation period for new hires. Within the health care organization, the DEU has increased patient satisfaction, fostered career ladder advancement of staff RNs into administration and educational roles, fostered a positive changes in teamwork, and offered incentives for quality improvements and research [55, 41, 56, 57, 34, 58, 47].

In response to the IOM [2] report, the AACN [52] commissioned a comprehensive investigation to identify areas in which these academic service collaborations could strengthen the influence and sustainability of schools of nursing. Highlights of the AACN report revealed (a) academic nursing is not aligned to be an equal partner in the administration of health care, (b) academic service alliances are not cultivated to the fullest capacity, and (c) funding of initiatives for program expansion is not readily available.

Collaboration of academia with hospital organizations has mutual benefits [47, 16, 53]. This alliance has been found to enhance clinical learning cultures, promote the generation of research, improve evidence-based patient care delivery, and allow for career development of the preceptor RN [47, 16]. Under the DEU model, students and patients become the beneficiaries of heightened professional, educational, and clinical practices [59]. The nursing unit benefits from enhanced teamwork, satisfaction, professionalism, productivity, evidence-based practice changes, and emerging patient care improvements [46].

Sound clinical judgment is a competency expected of newly graduated BSN RNs entering professional practice [12]. Schools of nursing are under pressure to respond to the nationwide call from professional nursing organizations and the health care industry for newly graduated BSN RNs who are professionally competent to care for multiple complex patients [12, 7]. There is a need to re-evaluate the clinical learning experience offered to students in a generic BSN program [60, 3]. The experiential CLE offers students opportunities to develop their clinical judgment, role socialization, and professional practice [12]. The

purpose of this study was to evaluate the CLE of the DEU as compared to the traditional faculty-led CLE in terms of the influence of these methods on individual student development of clinical judgment psychometric skills. The intent of this project was to evaluate individual students' ability to demonstrate safe and effective patient care in pre- and post-observation (simulation scenario). In this study, the hypothesis—Does the clinical learning setting influence the ability of the individual student demonstration of safe and effective nursing care (clinical judgement competency)—was tested using a pre- and post-simulation experience.

## Method

### Research Design and Setting

This quantitative comparative pilot project evaluated two cohorts of students, in a pre- and post-design, to determine the influence of the impact of the clinical learning setting on the individual nursing student's clinical judgment. The dependent variable was the clinical learning setting. There were two options of the dependent variable: (a) the DEU clinical learning setting and (b) the traditional clinical learning setting.

The clinical learning setting was in a community hospital on a medical-surgical 20- to 30-bed inpatient unit. The traditional clinical learning setting was defined as a faculty-led learning environment. Eight unlicensed nursing students engaged in direct patient care under the direct supervision of one university academic faculty member. In the DEU clinical learning setting, one to two unlicensed nursing students engaged in direct patient care under the direct supervision of the one hospital-hired RN (clinical preceptor). In the DEU model, the SON faculty undergo a role change. Faculty members engaged each student and clinical preceptor to ensure the student learning outcomes are achieved.

## Procedures

### Sampling Procedures

A convenience sample selected was from one school of nursing baccalaureate program in the northeast region of the United States. The research institution enrolls 8 students per clinical learning setting. The study sample for this pilot study was composed of 16 nursing students. The pre- and post-testing was designed to yield a sample size of 32. An a priori power analysis recommended a total sample of  $n = 76$  (pre-  $n = 38$ ; post-  $n = 38$ ) for a statistical power of 0.8. Cohen's  $d$  for an effect size and  $Z$  test were performed to determine the effect size for this project ( $d = 0.25$ ). This pilot comparative study had a small effect and low power with limited transferability. Despite the limited transferability of the study, the results can be used as justification by the research institution to reevaluate the clinical learning model in use.

Institutional review board expedited approval before implementation of this study. Informed consent was obtained from all eligible students enrolled in one medical-surgical course. The principal investigator had no previous association with, taught, or participated in any of the prerequisite courses, current course components, or future courses. Confidentiality of participants and the information they provided was maintained by using aggregate data and coding.

## Instrument

Within the SON, there is a dedicated nursing lab with a Laerdal 3G SimMan® simulator. The 3G SimMan is a full-sized adult human high-fidelity mannequin that allows students to perform basic and advanced skills.

The researcher evaluated each individual participant using the Seattle Nursing Simulation Evaluation tool. This 5-point Likert scale tool includes five categorical variables to evaluate clinical judgment competency. The tool selected allows the researcher to evaluate the unlicensed BSN student psychometric competencies in all the domains of learning, psychomotor, cognitive and affective learning during a simulation. The pre and posttest was used to determine changes in the individual student clinical judgment by demonstrating their application of course learning, mastery of skills, clinical decision making, communication, values, beliefs, moral reasoning, and professional rapport. The categorical variables assessed by the tool are as follows:

- assessment/intervention/evaluation,
- critical thinking/clinical decision making,
- direct patient care,
- communication/collaboration, and
- professional behaviors.

## Research Design

After IRB approval was obtained, recruitment, and informed consent were performed at the start of the academic semester. Participants were randomized to simulation experience and de-identified through the process of assigning a number and color-coding scheme.

The pre and post-test were conducted at the start and end of the academic semester. The simulation framework and structure were reflective of the International Council Nursing Simulation standards and NLN/Jeffries Simulation framework [61, 62]. The pre- and post-test simulation used two established simple-to-complex simulation scenarios reflective of course learning objectives. All students actively participated in all phases of the simulation, and data collection included observation during the pre-brief, simulation, and post-debrief. This observational study used the Wilcoxon rank sum test to determine if there was statistically significance difference between in the pre and post test scores.



## Results

The purpose of this study was to add to the body of knowledge related to a new model of BSN clinical practice setting. The results of this study relate to psychometric evaluation of individual student clinical judgment and add to the dialogue supporting the academic service collaboration. This pilot study used the Seattle Nursing Simulation Evaluation tool [63], administered as a pretest (prior to clinical exposure) and posttest (after clinical exposure) of a progressive simulation experience. The study compared the impact of a new model of BSN clinical experience of a DEU, as compared to the traditional clinical practice setting, on individual students' development of clinical judgment. Refer to Figure 1.

## Recruitment

Recruitment yielded a total eligible sample of 13, (DEU model,  $n = 6$ ; traditional clinical learning model,  $n = 7$ ) who were eligible to enroll in the course as a result of external factors. Findings reflect the total participant group and each individual clinical learning model. On visual inspection, participant demographics in the two distinct clinical groups were comparable to national program norms, as described in Table 1.

The mean age of the participants was 27.4 years, with a range from 21 to 48 ( $SD 1.4$ , median 26). On visual inspection of data, the two groups were comparable for age. In the DEU model, the mean age was 27.6 years with a range of 21–48 ( $SD 10.4$ ). In the traditional group, the mean age was 27.1 years with a range of 21–36 ( $SD 5.3$ ). The sample was composed of nine (69.2%) female students and four (30.8%) male students. The two clinical groups were comparable; the DEU clinical group consisted of four (66%) female students and two (33%) male students, and the traditional clinical model consisted of four (57%) female students and three (43%) male students. The composition of the sample was similar to the findings reported by the NLN (2016) for the gender composition of schools of nursing, which identified 85% of enrollment in the BSN program as female students and 15% of enrollment as male students.

The sample self-reported as Caucasian (seven students, 53.8%), African American/Black (two students, 15.4%), Hispanic (two students, 15.4%), and Asian (two students, 15.4%). The groups were similar for ethnicity, as reflected in Table 2. The composition of the sample had a similar distribution to the findings reported by the NLN (2016), which identified BSN students' self-reported ethnicity as African American (10.8%), Hispanic (8.1%), Asian (5.5%), and Indian/Native American (0.7%).

## DEU Clinical Model

The Wilcoxon signed rank test revealed there was statistically significant change in the pre- and posttest scores ( $Z -2.041$ ,  $p < .041$ ). As described in table 2 scores for the posttest ( $M 17.67$ ,  $SD 3.01$ ) had increased when compared to the pretest scores ( $M 14$ ,  $SD 3.406$ ).

The post-test showed after exposure to the DEU clinical learning model students demonstrated statistical significant improvement in all five areas of clinical judgement. Refer to table 3. Post-test scores revealed significant improvement in critical thinking/clinical decision-making, communication/collaboration, and professional behaviors

## Traditional Clinical Model

Results of the Wilcoxon rank test indicated there was no statistically significant change between pre- and posttests ( $Z -1.58, p < .114$ ). As described in table 2 scores for the posttest ( $M 13.71, SD 4.889$ ) had slightly increased when compared to the pretest ( $M 12.14, SD 3.716$ ), but not at a level of significance. Post test scores after exposure to the traditional clinical learning model setting did show improvement in assessment/evaluation and communication collaboration. Refer to table 4.

## Conclusions

Findings from the Wilcoxon signed rank test for the total sample did demonstrate an increased posttest scores with statistical significance ( $Z -2.69, p < .007$ ) as described in Table 2. The DEU clinical model had a greater change between the pre- and posttest. The traditional clinical model pre- and posttest scores did show improvement, but the difference was not statistically significant.

The literature reviewed for the present project indicated that academic service collaborations are positively associated with assisting students to apply nursing science concepts to their evidence-based nursing praxis [64]. The nature of this pilot project provided evidence in support of ongoing academic service collaborations in the form of a DEU model. The findings of this study suggest that the clinical learning model of a DEU yielded positive student learning outcomes of clinical judgment. The student-centered clinical model of the DEU creates a triad with one-on-one instruction of the RN preceptor and faculty, offering the student an increased opportunity to develop the professional competency needed for practice. Although both clinical models provided evidence in support of student development of the professional competency of clinical judgment in one isolated nursing course, there is a need to continue to evaluate the long-term impact of this model on student learning outcomes. The study may lead to further exploration of concepts of socialization, skill acquisition, and role conception of the new graduate nurse. Because clinical judgment and competence are valued in nursing, the present study was a logical beginning.

A limitation of this project was the small sample size ( $n = 13$ ). External constraints of this project necessitated evaluating a new clinical learning model within one research institution and two clinical groups of students from one medical-surgical course. Another barrier that must be acknowledged was the limitation of course enrollment in the new clinical learning model of the DEU by the research institution. The medical-surgical course is offered once in an academic calendar year. This pilot study evaluated students in a pre- and posttest after exposure to the clinical learning experience in a single medical-

surgical course. Due to time constraints and course planning, students were evaluated after 8 consecutive weeks of clinical. Testing students as they progress through the program would generate a more comprehensive evaluation of their achievement of student learning outcomes.

## Discussion

Benner et al. [12] and Tanner et al. [65] affirmed that sound clinical judgment requires the nurse to consciously make informed decisions based on a holistic view of a patient's situation. The newly licensed nurse struggles with transition to practice [23]. Health care in the 21st century demands nursing education to re-evaluate best practices in preparing prelicensure nurses for entry into practice [12]. The clinical learning setting is where BSN students learn how to assimilate into the professional role of practicing nurse. Hands-on learning experiences are the hallmark of traditional clinical teaching and learning pedagogy; they provide context for professional practice [12]. Turning our attention to how BSNs are prepared for professional practice, we encounter the traditional faculty-led clinical model, which has been proven to not support authentic and progressive learning experiences [57, 35, 27]. As faculty, we need to listen to stakeholders' input and critically examine what and how we teach with the goal of always looking for ways to improve.

In 2000, the NCSBN (as cited in [28]) sought to develop a *transition to practice model* for newly licensed nurses. The aim for this model was for health care organizations to develop a structured preceptor orientation model that would support the transition to professional role of a newly licensed graduate nurse [28]. These programs have demonstrated reductions in the 12-month turnover rate of newly graduated BSNs from 7.1% to 4.3% over a span of 10 years [29]. Despite improvements in retaining newly graduated BSNs in practice, health care organizations remained challenged with the financial burden of both retaining and training newly licensed nurses [29].

Strategies to enhance nursing curriculum and student learning outcomes should be multipronged and targeted. For nursing programs to be sustainable and produce a newly licensed graduate with the professional competencies sought after by health care organizations, schools of nursing need to (a) enhance individual students' situated knowledge and skills by offering increased interactive learning opportunities, which allow application of evidence-based nursing practice into their bedside nursing care; (b) ensure authentic learning settings that provide a context and socialization into the culture of professional nursing; and (c) provide increased opportunities for experiential learning that supports the development of individual students' development of skills, including the availability of resources, and expert staff RN mentors [66].

Nursing programs are struggling with the challenges of an aging faculty, the demands for increasing enrollment, and meeting student learning outcomes [67]. Health care organizations are facing what has been referred to as an expertise gap: the anticipated rate of retirement of expert experienced nurses is confounded by an increased number of novices, newly licensed nurses [68]. Scholars and experts have proposed the need to build the alliance among academia service partnerships with the goal

of strengthening the quality of nursing education, increasing faculty capacity, and ensuring safe evidence base nursing care [2, 47, 69, 70]. By sharing a vision, mission, and mutual strategic goals, the academic service collaboration can support and sustain the future professional workforce needed to meet the demands of 21st-century health care [52].

## **Declarations**

## **Ethics Approval and Consent to Participate**

This research involving human participants was conducted in accordance with the Declaration of Helsinki and was approved by the Institutional Review Board of American Sentinel University, IRB. All participants provided their informed consent to participate in the study.

## **Consent for Publication**

The author, CG, hereby provides formal written Consent to Publish the work.

## **Availability of Data and Material**

The datasets used and/or analysed during the current study available from the corresponding author, CG, on reasonable request.

## **Competing Interests**

The author declares no competing interests.

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## **Authors' Contributions**

CE-G is the sole author of this manuscript and has read and approved the manuscript.

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## Tables

Table 1

## Sample Demographics

	Total Sample ( $n = 13$ )	DEU ( $n = 6$ )	Traditional ( $n = 7$ )
Gender			
Female	9 (69.2%)	4 (66%)	4 (57%)
Male	4 (30.8%)	2 (33%)	3 (43%)
Race/Ethnicity			
Caucasian	7 (53.8%)	3 (50%)	4 (57.1%)
African American/ Black	2 (15.4%)	1 (16.7%)	1 (14.3%)
Hispanic/Latino	2 (15.4%)	1 (16.7%)	1 (14.3%)
Asian	2 (15.4%)	1 (16.7%)	1 (14.3%)
Indian/Native American	0	0	0
Age Range			
18–24	4 (30.8%)	3 (50%)	1 (14.3%)
25–30	7 (53.8%)	2 (33.3%)	5 (71.4%)
31–35	0	0	0
36–40	1 (7.7%)	0	1 (14.3%)
41–45	0	0	0
46+	1 (7.7%)	1 (16.7%)	0

Table 2

## Comparison of Two Clinical Learning Model Pre- and Post-Test Scores

Factor	Total Scores	Minimum/ Maximum Scores	Mean Rank	Z scores
Total Sample				
Pretest	$M = 13$ ( $SD\ 3.59$ )	min. = 5 max. = 22	negative = 7 positive = 7	$Z = -2.687$ , $P < .007$
Post-test	$M = 15.54$ ( $SD\ 4.47$ )	min. = 6 max. = 18		
DEU				
Pretest	$M = 12.14$ ( $SD\ 3.572$ )	min. = 10 max. = 18	negative = 3 positive = 0	$Z = -2.041$ , $P < .041$
Post-test	$M = 13.71$ ( $SD\ 4.89$ )	min. = 15 max. = 22		
Traditional				
Pretest	$M = 14$ ( $SD\ 3.41$ )	min. = 6 max. = 17	negative = 4.5 positive = 1.5	$Z = -1.581$ , $P < .114$
Post-test	$M = 17.67$ ( $SD\ 3.01$ )	min. = 5 max. = 20		

Table 3

Participant Categorical Variables Pre- and Post-Test Scores for the DEU Clinical Learning Model

Categorical Variable on Tool		Mean	Median	Mode	SD
Assessment/intervention/evaluation	Pre	2.5	2.5	2	.55
	Post	2.83	2.5	2.2	1.09
Critical thinking/clinical decision making	Pre	2.66	3	3	.45
	Post	3.66	3.5	3	.89
Direct patient care	Pre	3	3.5	4	1.30
	Post	3.16	3	3	.45
Communication/collaboration	Pre	2.83	3	3	.707
	Post	4	4	4	.84
Professional behaviors	Pre	3	3	3	.84
	Post	4	4	4	.44
Total Pre		14	14	14	3.40
Total Post		17.66	16	16	3.01

Table 4

Participant Categorical Variables Pre- and Post-Test Scores for the Traditional Clinical Learning Model

Categorical Variable on Tool		Mean	Median	Mode	SD
Assessment/intervention/evaluation	Pre	2.14	2	1	1.12
	Post	2.85	3	3	.99
Critical thinking/clinical decision making	Pre	2.42	2	2	1.06
	Post	2.85	3	3	1.07
Direct patient care	Pre	2.71	3	3	.92
	Post	2.71	3	3	.89
Communication/collaboration	Pre	2.14	2	3	.84
	Post	2.85	3	3	.84
Professional behaviors	Pre	2.71	3	3	.74
	Post	2.71	3	3	.88
Total Pre		12.14	12	12	3.71
Total Post		13.71	15	15	4.88

## Figures

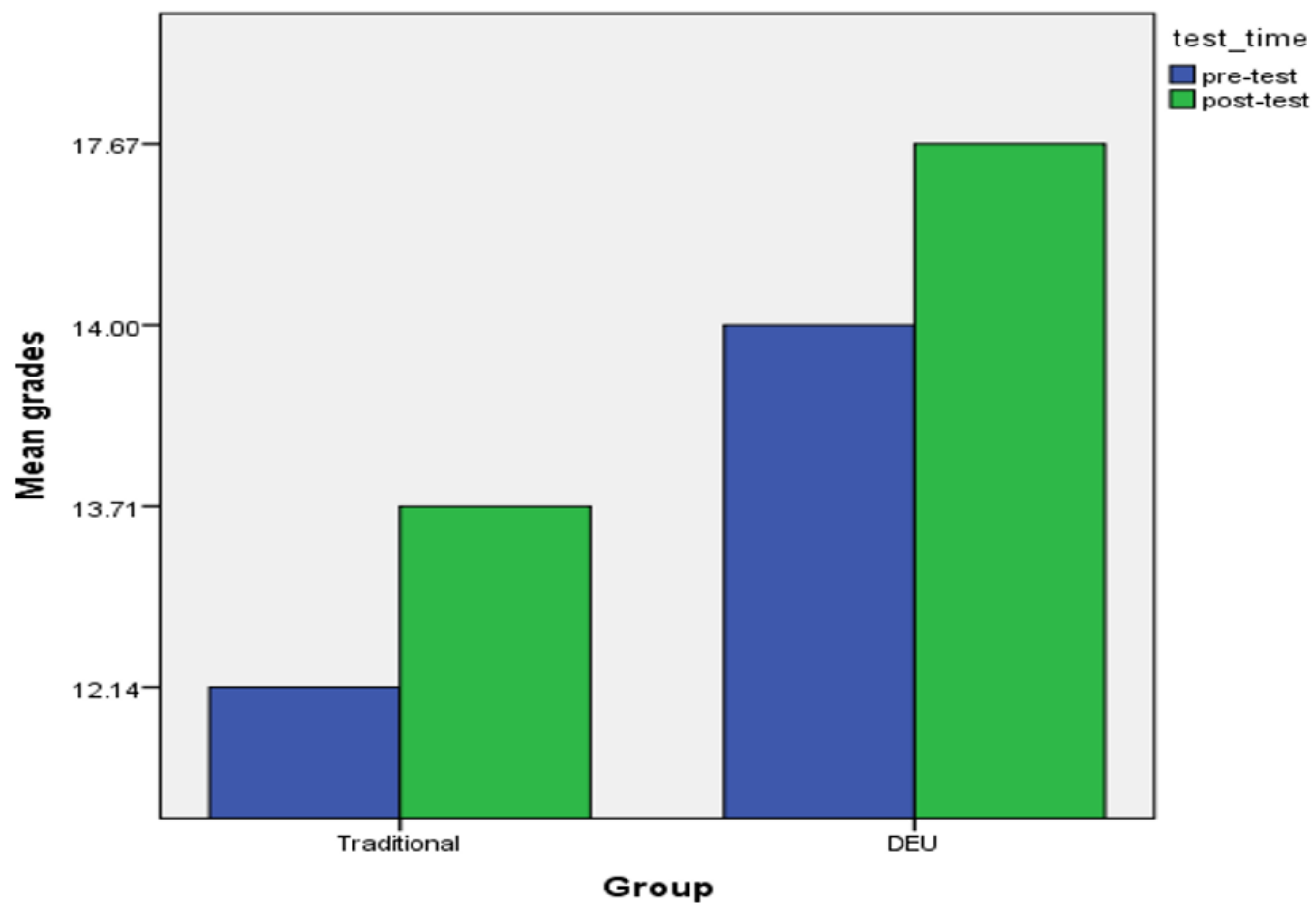


Figure 1

Pre- and post-test performance test scores by groups.