

Evidence-Informed Education and Practice in Collaborative Learning Units: A Mixed-Methods Study

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Evidence-Informed Education and Practice in Collaborative Learning Units: A Mixed-Methods Study

Cover Page Footnote

In keeping with calls for unified terminology (Marcellus et al., 2021), for this publication we use the term DEU for the one type of collaborative model, and when referring specifically to the units engaged in this research project, we use DEU/CLU. We acknowledge the support of Fanny Vermes, Linus Scott, and Jenna Haaf with data collection. We thank the Island Health Professional Practice Office for its assistance in compiling lists and contact information for the designated units included in this study. | Dans l'esprit des appels à utiliser une terminologie unifiée (Marcellus et al., 2021), nous utiliserons le terme UDE dans cet article pour ce type de modèle collaboratif, mais, lorsque nous ferons référence précisément aux unités touchées par ce projet de recherche, nous utiliserons UDE/UAC. Nous aimerions souligner l'aide de Fanny Vermes, Linus Scott et Jenna Haaf lors de la collecte de données. Nous tenons aussi à remercier le Bureau de pratique professionnelle Island Health pour son aide dans la compilation des listes et des coordonnées des unités comprises dans cette étude.

Developing competence in evidence-informed practice has become an essential component of bachelor of science in nursing (BSN) education over the past 2 decades (American Association of Colleges of Nursing, 2021; Canadian Association of Schools of Nursing [CASN], 2022). Throughout current Canadian BSN pre-licensure education, students are expected to develop competencies in the domains of knowledge, nursing practice, communication and collaboration, professionalism, leadership, and research and critical inquiry skills. A key guiding principle for the research skills and critical inquiry domain within the CASN (2022) National Nursing Education Framework is for BSN programs to prepare graduates to “provide evidence-informed nursing care using research skills, critical inquiry, clinical reasoning, and clinical judgement” (p. 11). The focus and outcomes are on the provision of evidence-informed nursing care, and therefore evaluation of educational program outcomes needs to, in part, involve assessment pertinent to this domain.

Teaching evidence-informed practice typically relies heavily on didactic classroom teaching, despite a call from Ryan (2016) that teaching evidence-informed practice in the clinical setting may be more effective (Aglen, 2016; Horntvedt et al., 2018). Nurse educators have discussed how to teach critical thinking, research literacy, research use, and discrete aspects of evidence-informed practice. Research literacy (Jakubec & Astle, 2022), also referred to as information literacy, is viewed as a core competency. Research literacy is often taught in theory-laden courses, competing for students’ attention with content focused on nursing care in acute care situations and clinical skills lab courses.

There has been growth in knowledge driven by initiatives such as Benner et al.’s (2010) call for radical transformation of nursing education, the Institute of Medicine reports on quality of health care, and the Quality and Safety Education in Nursing competencies (Kelly et al., 2018). However, there is still a modest understanding of how BSN students integrate this learning into their practice education experiences, whether certain practice education models are more conducive to the integration of evidence into clinical settings than others, or whether there is alignment between academic, practice, and student expected levels of knowledge related to evidence-informed practice (Aglen, 2016; Horntvedt et al., 2018; Patelarou et al., 2020). The primary aim of this mixed-methods study was to explore the levels of evidence-informed practice knowledge, skills, and attitudes of senior BSN students, point-of-care nurses, and academic faculty within the context of a collaborative learning model. The secondary aims were to explore each group’s experience with the collaborative learning model and the quality of the learning environment, and to obtain nurses’ suggestions on ways evidence-informed practice learning could be improved.

Background

BSN Practice Education

BSN practice education occurs through diverse modalities, including real, simulated, or virtual point-of-care practice experience to integrate the knowledge, skills, and attitudes required to practise effectively and safely in today’s complex health care contexts. The delivery and effectiveness of practice education varies across contexts, influenced by factors including the quality of the clinical learning environment, curricular approaches to teaching and learning, model of course delivery, academic–practice relationships, and diversity in roles and responsibilities for faculty, students, and nurses (Budgen & Gamroth, 2008; Edgecombe et al., 1999; Forber et al., 2016).

While there are significant variations in curricular and regulatory requirements for practice education in nursing programs (Forber et al., 2016), the *basic* structures of practice education experiences have not changed substantially for decades. Budgen and Gamroth (2008) described 10 basic practice education models in the literature: faculty-supervised practicum, preceptorship, education unit, joint appointment, secondment, affiliate position, internship, cooperative education, work–study, and undergraduate nurse employment. Forber et al. (2016) offered a more unified terminology for practice education models, described as three main types: traditional, preceptorship, and collaborative models. They propose that the traditional model centres on rotational or block placements in which a primary instructor supports a group of students across several units who are teamed with RNs each day; the preceptorship model involves a 1:1 relationship between a student and a unit RN; and the collaborative model (also called partnership models or dedicated education units) involve all unit RN team members supporting student learning.

Despite the longevity of these models, there is still limited evidence demonstrating the superiority of specific models of clinical education. One exception is recent evidence that the dedicated education unit (DEU) enhances clinical learning when compared with traditional faculty-led models, primarily through creation of unit-based shared cultures of learning grounded in strong academic–practice partnerships (Jayasakara et al., 2018; Nguyen et al., 2020). Forber et al. (2016) suggested that traditional models are better suited for early clinical experiences and collaborative models for later (see also Nishioka et al., 2014; Roxburgh, 2014), and that opportunities for a variety of placements may be advantageous. Forber et al. also noted that across models, consistency and constancy best support student learning and development.

Local Development of the DEU/CLU Model

One collaborative education model variation, delivered in our local setting over the past 20 years, is the collaborative learning unit (CLU). The CLU model was adapted in 2003 following initial development of the DEU in Australia (Edgecombe et al., 1999; Marcellus et al., 2022). This adaptation ensured that the CLU model reflected the local health system context, pedagogical underpinnings of the curriculum, and evidence-informed practice principles (Marcellus et al., 2022). In line with the DEU, the adaptation was informed by the philosophies and principles of adult learning, transformative learning, and work-integrated learning communities of practice, rather than historical apprenticeship approaches (Edgecombe & Bowden, 2014, p. v). The goals were “to provide optimal learning for students, increase access to practice placements, ease transition to new graduate roles, and build capacity for implementing best practices and a culture of evidence and research” (Marcellus et al., 2021, p. 2994). For these goals to be realized, it is critical that everyone involved possess evidence-informed practice knowledge, skills, and competencies to benefit from the experience. Key features also include adequate resources, a unit culture centred on students, learning experiences that more closely resemble nursing practice, and a combined academic and practice responsibility to nurture students’ professional development and evidence-informed practice skills (Edgecombe & Bowden, 2014). The model was operationalized via a multi-organizational proposal and grant supported by the provincial Ministry of Health to conduct an initial pilot study. The specific mechanisms by which it would create change included development of a joint steering committee with academic and practice commitments to support the model, aligning student scheduling logistics with staff rotations, providing orientation workshops, designing evaluation processes, and building trust between staff, students, and faculty (Marcellus et al., 2021). Following positive pilot results, the model was

expanded to a total of eight units within 1 year. A positive and resourced practice environment, consistent with the DEU model focused on learning and teaching, is increasingly identified as necessary for developing a culture of inquiry that supports the integration of evidence-informed practice (Aglen, 2016; Horntvedt et al., 2018; Patelarou et al., 2020).

Assessing the Quality of Learning in Practice Contexts

Research related to practice education models primarily focuses on students' or others' perceptions of the learning experience, with few studies addressing outcomes related to the cognitive domain (Forber et al., 2016; Marcellus et al., 2021). A recent systematic review on the impact of the DEU model on student learning outcomes concluded that this model contributed "to self-reported increased confidence and critical thinking, decreased anxiety, enhanced leadership skills, implementation of evidence-informed practice and feeling more supported by nurses during both practice education experiences and transition to practice" (Dimino et al., 2022, p. 188). They also noted that these findings were based primarily on instruments measuring personal perceptions of student experiences, including implementation of evidence-based practice, and recommended that more objective measurable student learning outcomes should be developed.

Methods

Given that evidence suggests an effective DEU/CLU practice education model requires that (a) all participants (faculty, nurses, students) hold a minimum level of evidence-informed practice competencies, (b) sufficient clinical resource capacity exists, and (c) collaboration exists between multiple groups and institutions including BSN students, BSN academic faculty and practising clinical nurses/leaders/educators, we undertook an evaluation of BSN Year 4 (BSN4) DEU/CLUs. The primary purpose of this study was to determine the level and consistency of evidence-informed practice knowledge, capacity, and skill application within and between senior BSN students, nurses/leaders/educators, and academic faculty groups within an undergraduate DEU/CLU practice education model. The secondary purpose was to explore nursing students', nurses', and faculty's perceptions of their DEU/CLU experience and the perceived quality of the DEU/CLU learning environment, and nurses' perceptions on ways it could be improved to facilitate evidence-informed practice learning.

Design

This was a mixed-methods, observational, cross-sectional study to explore our multiple concepts of interest. We used a convergent parallel mixed-methods design with a nested case study in which qualitative and quantitative data collection occurred simultaneously (Table 1). Quantitative and qualitative data collection was conducted using REDCap, with data obtained from three key groups for both individual group analysis and between-group comparisons. The nested case study involved the conduct of target nurse focus groups to acquire their experience with DEU/CLUs and views of how this model could be improved to enable evidence-informed learning and student practice from the front-line nurse perspective, given the multiple challenges facing front-line nurses (e.g., high patient acuity, high patient census, nursing shortages) (Table 1). This study was conducted in 23 medical-surgical DEU/CLUs across three acute care facilities in a metropolitan area in British Columbia, just before the COVID-19 pandemic.

Table 1*Convergent Parallel Mixed-Methods Design Procedure*

	Quantitative	Qualitative
Data collection	REDCap online survey across 23 collaborative learning units including <ul style="list-style-type: none"> • Demographics • Research Competencies Assessment Instrument for Nurses (RCAIN) • Quality of Clinical Learning Environment Instrument (QCLEI) 	Research Electronic Data Capture (REDCap) online survey across 23 collaborative learning units using open-ended questions Focus groups
Data analysis	Descriptive statistics, percentage of positive responses, confidence intervals for each question with counts >4	Inductive thematic analysis
Merging of findings	Identifying content areas represented in both data sets Comparing and contrasting data for similarities and differences Synthesizing and interpreting compared findings	
Products	Discussion and recommendations	

Tools

A growing number of instruments are available to measure the quality of nursing practice environments (i.e., Mansutti et al., 2017) and nursing research capacity (i.e., Xia et al., 2023). For this study, we reviewed and selected instruments that had strong psychometric stability for our study population and aligned with our local practice context. The two instruments employed in this study were developed by nurse researchers in British Columbia.

The Research Competencies Assessment Instrument for Nurses (RCAIN) (19 items, 5-point Likert scale) measures three domains related to translating evidence into practice: (a) knowledge, (b) capacity (competence), and (c) application of knowledge and skills in evidence-based practice domains (Mallidou et al., 2018). Cronbach's α coefficients measured 0.871, 0.813, and 0.946 for each domain, respectively. In 2023, RCAIN was evaluated using 520 nurse respondents across 33 health organizations (Mallidou et al., 2023). The RCAIN tool demonstrated internal consistency reliability for all 19 items (Cronbach's α coefficient 0.944), and for all subscale domains: knowledge (α coefficient 0.926), skills (α coefficient 0.911), and application of knowledge and skills (α coefficient 0.914). Construct validity was assessed using confirmatory factor analysis, which demonstrated a three-factor solution after meeting all statistical data requirements for normality, multicollinearity, residual values, and multivariate outliers. The authors conclude the RCAIN tool validated their earlier 2018 psychometric findings and support its use by clinical nurses who fall between "know somewhat" and being "expert," nurse educators, and nurse administrators (Mallidou et al., 2023). We determined the tool to be appropriate for BSN students in their final clinical rotation as they would be at least similar to novice nurses who "know somewhat."

The Quality of Clinical Learning Environment Instrument (QCLEI) (27 items, 5-point Likert scale) measures four domains: (a) the role of staff in student learning, (b) the role of the academic educator in student learning, (c) the manager contribution to student learning, and (d) readiness to support student learning (Currie et al., 2015). Higher scores on the QCLEI instrument reflect greater quality of the learning environment. To limit the overall survey length and focus on the area of CLU interest (evidence-informed practice education in the face of resource challenges), we used the 14 questions in the domain of the role of staff in student learning. The reliability index for this domain demonstrated an α coefficient of 0.95. While the validity measures were not clearly defined, the authors concluded the QCLEI is a valid and reliable tool for assessing the clinical learning environment from multiple perspectives. We concluded that the Domain of Role of Staff in Student Learning had face validity for our purposes of assessing the clinical learning environment considering challenges of staff shortages, high patient acuity, heavy nurse-to-patient workloads and the potential consideration of these factors on the quality of the clinical learning environment for undergraduate nursing students.

Ethical Considerations

Ethical approval was obtained from the Island Health and the University of Victoria Health Research Ethics Board (BC2019-001).

Recruitment and Study Participants

The sample for this study included academic and health care system participants involved with a 12-week practice course between January and April 2019. During this time, Year 4 students completed their final practice experience in placements across three acute care hospitals and multiple community settings, including home care and public health. Participants in this study came from three groups: (a) BSN4 students who had their final 12-week practice experience in any of the 23 DEU/CLUs ($n = 18$), (b) nurses/nurse leaders/educators working in any of the 23 DEU/CLUs ($n = 97$), and (c) academic faculty with DEU/CLU experience ($n = 7$) (see Table 2). For the nested case study, nurse focus group participants were recruited from six DEU/CLUs; sites selected had hosted long-standing DEU/CLUs (greater than 10 years), cared for a range of clinical populations, and employed a variety of care delivery models.

Student and academic faculty participants were recruited using electronic distribution of study information from the undergraduate program assistant. Nurses were recruited using posters displayed within DEU/CLUs and on general health authority and hospital electronic and paper bulletin boards. One research team member, a health authority point-of-care RN, visited each of the six units, provided the survey link to the nurse leaders, provided information about the focus groups, and invited nurses and students to participate. The researchers were not directly responsible for teaching students or supervising nurses or faculty.

Table 2*Demographic Characteristics by Group*

Characteristic	BSN students		Nurses		Academic faculty		Full sample 122	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Age								
<25	11	61	10	10	0	0	21	17.2
25–29	4	22	28	29	0	0	32	26.2
30–34	1	6	7	7	1	14	9	7.4
35–39	2	11	12	12	1	14	15	12.3
40–44	0	0	7	7	1	14	8	6.6
45–49	0	0	6	6	0	0	6	4.9
50+	0	0	26	27	4	57	30	24.6
Missing	0	0	1	1	0	0	1	0.8
Gender								
Female	17	94	92	95	5	71	114	93.4
Male	0	0	5	5	2	29	7	5.8
Missing	1	6	0	0	0	0	1	0.8
Highest education								
BSN	0	0	80	78	0	0	80	65.6
Doctorate	0	0	0	0	2	29	2	1.6
Licensed practical nurse diploma	0	0	6	6	0	0	6	4.9
Master of nursing	0	0	7	7	3	43	10	8.2
None	16	89	0	0	0	0	16	13.1
Other	2	11	3	3	2	29	7	5.8
Registered psychiatric nurse diploma	0	0	1	1	0	0	1	0.8
Nurse and faculty years in practice								
≤less than 10 years	–	–	55	57	0	0	55	53.1
>greater than 10 years	–	–	42	43	6	86	48	46.1
Missing	0	0	0	0	1	14	1	0.8

Years RN in current CLU								
≤less than 5 years	–	–	55	57	–	–	55	56.7
>greater than 5 years	–	–	42	43	–	–	42	43.3

Note. En dash indicates that the given demographic was not asked the given question.

Data Collection and Analysis

Quantitative

We developed an online survey for this study that included participant demographic data and two instruments: one to assess research competencies (RCAIN), and the other to assess nursing staff contributions to the quality of the learning environment (QCLEI). Survey data were collected using the REDCap (Research Electronic Data Capture) secure web application. Data were analyzed using R version 3.6.1 (R Core Team, 2019) and Epidemiological Tools R version 0.5-10.1 package for calculation of confidence intervals. Variables were analyzed by user group (students, nurses, and faculty) and reported by calculating the percentage of positive responses. Counts and percentages were presented for demographic variables. Confidence intervals (CIs) assuming a binomial distribution were calculated for each question and domain where counts > 4 to assess potential differences between groups. Counts for responses where $n < 5$ were suppressed to protect the identity of respondents and decrease the risk of re-identification. Domain means and CIs were also calculated.

Qualitative

Qualitative data were captured in two ways. First, a narrative question was included in the survey addressing the perceptions of students, nurses, and faculty of their DEU/CLU experience. Second, four hospital-based focus groups were held over typical meal break times with members of six DEU/CLUs selected to represent nurses with a range of patient populations and experience with the model, to obtain their opinions on how the DEU/CLU practice model could be improved. A semi-structured interview guide was used to guide conversations, and the questions were posted on flip charts with sticky notes made available so that participants who could not stay had the opportunity to provide input on all questions. Examples of questions included (a) please share with us your experience with a DEU/CLU, and (b) what are your recommendations for improving the DEU/CLU practice education model? Refreshments were provided during focus groups. The focus groups were not recorded because of the reality of nurses having to come and go at different times. Detailed notes were taken by two BSN student researchers.

Data from the survey narrative question and focus groups were transcribed, stratified into three groups (students, nurses, and faculty) and entered into NVivo10. Coding was conducted by two BSN student researchers and one researcher (LM), and further validated with a second researcher (DS). The transcriptions were read and reread to gain familiarity with the data, and line-by-line analysis was employed to generate preliminary basic codes. The data were analyzed using Braun and Clarke's (2022) six-phase thematic analysis approach. Inductive analysis was used to categorize, compare, and contrast data between groups. Sub-categories and higher-level categories were then identified and organized within themes.

Merging Procedure for Quantitative and Qualitative Data

Consistent with a convergent mixed methods design, we analyzed quantitative and qualitative data independently (Cresswell & Plano Clark, 2018). Both quantitative and qualitative data were attributed equal value. Comparing and contrasting of the data took place in the discussion phase to achieve further insights and develop a visual comprehensive understanding of how development of evidence-informed practice competencies is supported within the context of learning in a DEU/CLU.

Results

Quantitative Findings

Evidence to Practice Knowledge, Capacity, and Skills (RCAIN)

Knowledge Domain. Table 3 presents the distribution of responses from the three groups. Academic faculty consistently demonstrated the highest knowledge in all the areas explored. Nurses reported similar knowledge to students except for question Q4, knowledge of research reports relevant to their practice, for which nurses reported about 15% higher positive response rate than students (80, 95% CI, 69–89 vs. 65, 95% CI, 38–86). The lowest scores for students were reported for Q3, knowing how publications contribute to KT activities, and Q5, the appraisal activities used to evaluate the quality of the literature, with 59% [95% CI, 33–82], whereas for nurses, the lowest score was for Q6, activities performed for literature analysis, with a response rate of 62% [95% CI, 49–73]. However, CIs overlap for all questions, which suggests no true difference between groups.

Overall group scores were calculated for the Knowledge Domain. Positive responses were similar between groups with 71% [95% CI, 44–90] of students, 74% [95% CI, 62–84] of nurses and 100% [95% CI, 48–100] of academic faculty agreeing with the questions.

Table 3*Research Competencies Assessment Instrument for Nurses*

Domain 1: Knowledge						
By rank order of positive responses with BSN students as reference group						
Questions	BSN students		Nurses		Academic Faculty	
	% of positive response [95% CI]	# positive respondents/# question respondents	% of positive response [95% CI]	# positive respondents/# question respondents	% of positive response [95% CI]	# positive respondents/# question respondents
Domain 1 Knowledge: I know...						
Q7. How diverse sources of data are used to better inform practice	88 [62–98]	14/16	83 [72–91]	55/66	100 [48–100]	5/5
Q2. At least one method of doing knowledge synthesis	82 [57–96]	14/17	83 [72–91]	55/66	100 [48–100]	5/5
Q1. How theoretical frameworks work	77 [50–93]	13/17	67 [54–78]	44/66	100 [48–100]	5/5
Q4. Of research reports relevant to my practice	65 [38–86]	11/17	80 [69–89]	53/66	100 [48–100]	5/5
Q5. Appraisal activities used to evaluate the quality of the literature	63 [35–85]	10/16	73 [60–83]	48/66	100 [48–100]	5/5
Q6. Activities performed for literature analysis	63 [35–85]	10/16	62 [49–73]	40/65	100 [48–100]	5/5
Q8. Rigorous methods used in knowledge synthesis	63 [35–85]	10/16	74 [62–84]	49/66	100 [48–100]	5/5
Q3. How publications contribute to KT activities	59 [33–82]	10/17	70 [57–80]	46/66	100 [48–100]	5/5
Average score Domain 1	71 [44–90]	12/17	74 [62–84]	49/66	100 [48–100]	5/5

Note. Positive responses = excellent or moderate knowledge. All values rounded to the nearest integer.

Capacity Domain. Over 65% of respondents in all groups demonstrated moderate to excellent capacity, or competency, in the areas assessed (see Table 4). Students, nurses, and academic faculty had scores over 80% for four of six questions (Q9, Q10, Q12, and Q14) related

to using agency protocols, applying evidence-based practice, using research-based evidence to address a clinical problem, and using evidence to improve practice. The lowest score for students was for Q13, using research findings in practice for quality improvement, 63% [95% CI, 35–85] reporting excellent or good capacity, and Q11, engaging in activities related to quality improvement, 63% [95% CI, 35–85]. Overall scores for this domain were similar for students, nurses, and academic faculty with 81% [95% CI, 54–96], 92% [95% CI, 83–97], and 100% [95% CI, 48–100], respectively, suggesting no true differences between groups.

Table 4*Research Competencies Assessment Instrument for Nurses*

Domain 2: Capacity and Skills						
By rank order of positive responses with BSN students as reference group						
Questions	BSN students		Nurses		Academic Faculty	
	% of positive response [95% CI]	# positive respondents/# question respondents	% of positive response [95% CI]	# positive respondents/# question respondents	% of positive response [95% CI]	# positive respondents/# question respondents
Domain 2: Capacity and Skills—I am competent . . .						
Q9. Using agency protocols for routine practice	100 [79–100]	16/16	97 [89–100]	62/64	<5	<5
Q10. Applying evidence-based practice (EBP)	100 [79–100]	16/16	95 [87–99]	60/63	100 [48–100]	5/5
Q12. Using research-based evidence to address a clinical problem	81 [54–96]	13/16	94 [85–98]	60/64	100 [48–100]	5/5
Q14. Using evidence to improve practice	81 [54–96]	13/16	95 [87–99]	61/64	100 [48–100]	5/5
Q11. Engaging in activities related to quality improvement	63 [35–85]	10/16	88 [77–94]	56/64	<5	<5
Q13. Using research findings in practice for quality improvement	63 [35–85]	10/16	89 [79–95]	57/64	100 [48–100]	5/5
Average score Domain 2	81 [54–96]	13/16	92 [83–97]	59/64	100 [48–100]	5/5

Application of Skills Domain. Over 50% of respondents in all groups demonstrated moderate to excellent skills in the areas assessed, with the highest scores displayed by academic faculty (see Table 5). All groups consistently identified having stronger skills in applying basic

research activities in quantitative and qualitative research (Q15, Q17) than in designing a quantitative study and analyzing data in qualitative research (Q16 and Q18, respectively). Overall scores for this domain were similar for students and nurses, of 69% [95% CI, 41–89] and 69% [95% CI, 56–80], respectively. Faculty had a higher score, 100% [95% CI, 48–100]. However, all CI overlap suggesting similar findings between groups, but one must consider the small sample sizes.

Table 5*Research Competencies Assessment Instrument for Nurses*

Domain 3: Application of Knowledge and Skills						
By rank order of positive responses with BSN students as reference group						
Questions	BSN students		Nurses		Academic Faculty	
	% of positive response [95% CI]	# positive respondents/# question respondents	% of positive response [95% CI]	# positive respondents/# question respondents	% of positive response [95% CI]	# positive respondents/# question respondents
Domain 3: Application of Knowledge and Skill—I am knowledgeable and skillful to . . .						
Q15. Apply basic research activities in quantitative research	81 [54–96]	13/16	77 [65–87]	47/61	100 [48–100]	5/5
Q17. Apply basic research activities in qualitative research	75 [48–93]	12/16	72 [59–83]	44/61	100 [48–100]	5/5
Q18. Enact basic research activities in qualitative research	63 [35–85]	10/16	64 [51–76]	39/61	<5	<5
Q19. Use organizational resources	63 [35–85]	10/16	69 [56–80]	42/61	100 [48–100]	5/5
Q16. Design a quantitative study	50 [25–75]	8/16	61 [47–73]	37/61	<5	<5
Average score Domain 3	69 [41–89]	11/16	69 [56–80]	42/61	100 [48–100]	5/5

Note. Positive responses = excellent or moderate knowledge. All values rounded to the nearest integer.

Quality of the Clinical Learning Environment (QCLEI)***BSN Students***

Overall, students demonstrated positive response rates between 50% and 94% for 21/27 (78%) questions related to the role of staff in student learning domain (see Table 6).

Questions with the most frequent positive responses related to how nurses supported student learning, including being easy to approach (Q1) (94%, 95% CI, 73–100), encouraging students to take part in discussions (Q2: (94%, 95% CI, 73–100), nurses being positive role models (Q3: 94%, 95% CI, 73–100), being able to access people and resources to enhance their learning

(Q4: 94%, 95% CI, 73–100), and perceiving they practised in a good learning environment (Q5: 94%, 95% CI, 73–100). Questions with the least frequent positive responses related to whether there was a clearly defined nursing philosophy (Q14: 28%, 95% CI, 10–53), and whether staff make an effort to get to know the students (Q13: 56%, 95% CI, 31–79).

Nurses

Overall, nurses demonstrated positive response rates between 53% and 97% for 81% of questions related to the role of staff in student learning domain (see Table 6).

The three questions with the most frequent positive responses related to (a) perceiving that there was a good learning environment (Q5: 97%, 95% CI, 91–100), (b) encouraging student independence as their skills increased (Q8: 97%, 95% CI, 91–100), and (c) modelling positive nursing roles (Q3: 95%, 95% CI, 87–99). The three questions with the least frequent positive responses include Q14, the nursing philosophy is clearly defined (54%, 95% CI, 33–57), Q9, students are satisfied with the supervision they receive (72%, 95% CI, 60–82), and Q10, there is a good spirit of solidarity among the clinical team (76%, 95% CI, 64–85).

Academic Faculty

Questions with response counts less than five are suppressed to prevent possible re-identification. Overall, faculty demonstrated positive response rates between 60% and 100% for (70%) of questions in the role of staff in student learning domain (see Table 6).

Questions with the most frequent positive responses related to the approachability of nurses (Q1: 100%), mutual learning interactions between nurses and students (Q7: 100%), encouraging independence as student skill increases (Q8: 100%), and informing students of learning opportunities (Q11: 100%). Questions with the least frequent positive responses related to having a clearly defined nursing philosophy (Q14: count < 5).

Only one question (Q12, staff are supportive of those in a role of preceptors) demonstrated a statistically significant difference between the proportions of positive responses in the groups. For this question, positive responses for students were significantly lower than for nurses ($p = .008$).

Overall scores for the role of staff in student learning domain of the assessment tool were similar for students 83% [95% CI, 59–96], nurses of 85% [95% CI, 75–92], and academic faculty 80% [95% CI, 28–99].

Table 6

Quality of Clinical Learning Environment by Rank Order of Positive Responses With Students as Reference Group (QCLEI)

Questions	Domain 1: Role of staff in student learning					
	BSN students		Nurses		Academic Faculty	
	% of positive response [95% CI]	# positive respondents/# question respondents	% of positive response [95% CI]	# positive respondents/# question respondents	% of positive response [95% CI]	# positive respondents/# question respondents
Q1. Staff are easy to approach	94 [73–100]	17/18	92 [83, 97]	68/74	100 (5)	5/5
Q2. Students are encouraged to take part in discussions	94 [73–100]	17/18	87 [77, 93]	64/74	<5	<5
Q3. Staff are positive role models for nursing	94 [73–100]	17/18	95 [87, 99]	70/74	100 (5)	5/5
Q4. When required—I felt I could access the people and appropriate resources on this unit to enhance my learning	94 [73–100]	17/18	85 [75–92]	63/74	<5	<5
Q5. There is a good learning environment	94 [73–100]	17/18	97 [91–100]	72/74	<5	<5
Q6. Students are made to feel comfortable when they start each shift	89 [65–99]	16/18	88 [78–94]	65/74	<5	<5

Q7. There is a mutual interaction in the learning relationship between staff and students.	89 [65–99]	16/18	84 [73–91]	62/74	100 (5)	5/5
Q8. Staff encourage more independence as students' skills increase	89 [65–99]	16/18	97 ([91–100])	72/74	100 (5)	5/5
Q9. Students are satisfied with the supervision they receive	89 [65–99]	16/18	72 [60–82]	53/74	<5	<5
Q10. There is a spirit of solidarity among the clinical team	89 [65–99]	16/18	76 [64–85]	56/74	<5	<5
Q11. Staff inform students of possible learning experiences	83 [59–96]	15/18	92 [83–97]	68/74	100 (5)	5/5
Q12. Staff are supportive of those in a role of preceptors	67 [41–87]	12/18	93 [85–98]	69/74	<5	<5
Q13. Staff make an effort to get to know the students	56 [31–79]	10/18	81 [70–89]	60/74	<5	<5
Q14. The nursing philosophy is clearly defined	28 [10–53]	5/18	45 [33–57]	33/74	<5	<5
Average Domain 1	83 [59–96]	15/18	85 [75–92]	63/74	80 [28–99]	4/5

Qualitative Findings: Perceptions of DEU/CLU Practice Education Experience

Student, Nurses and Faculty Perceptions of Their DEU/CLU Practice Education Experience

There were 7 student respondents to the qualitative survey question, 30 nurse respondents, and 4 faculty respondents. Throughout data collection, questions and prompts were provided to specifically explore how they addressed evidence-informed practice in teaching and learning. However, participants consistently responded that clinical education priorities focused on urgent, immediate, and skills-oriented learning.

Student DEU/CLU Experiences

Students expressed both positive and frustrating experiences. Positive factors included (a) the value of working with multiple nurses, especially seeing different perspectives for decision-making, (b) appreciation for working with knowledgeable staff, especially when managing complex patients and workloads, (c) feeling part of the team when they were invited to participate in patient care activities, being offered skill development opportunities, and being taught with enthusiasm, and (d) feeling that nurses were their primary instructor when nurses sourced learning opportunities: “I enjoyed my experience because I had the [chance] to work with many different nurses, which helped me gain many different perspectives for decision-making” (BSN4 student).

However, students also reported their frustration or discomfort with (a) having to prove themselves to a new nurse every few days and (b) working with inexperienced and junior staff, and they indicated they did not feel safe in that environment. Some expressed the sense of powerlessness felt when working with junior nurses versus the empowerment felt when more senior nurses addressed their learning needs more effectively.

Nurse DEU/CLU Experiences

While nurses expressed support for the DEU/CLU model, they also expressed the desire to be included more in the evaluation process of the students they were supporting. They also reported many pragmatic challenges, such as the need to work with students on multiple shifts within the DEU/CLU experience to adequately identify a student's strengths and weaknesses. This could be accomplished by having the students on the same rotations as the nurses. Nurses also voiced the challenge of needing more time to explain things and teach a student, yet not being allotted the extra time or resources to do so. Many nurses spontaneously expressed a preference for the preceptorship model as they had a greater understanding of the student's learning needs and, had time together to build trust, and noted that the model was superior in situations where students were struggling. They also stated that students were less likely to “fall through the cracks.” Short staffing and the lack of available senior nurses in clinical practice were also highlighted, with a recommendation that a high-functioning DEU/CLU requires an adequate number of senior nurses so as not to place junior nurses in the role of mentoring students while they themselves are consolidating their nursing skills. Nurses also held the perception that academic faculty often did not have current clinical knowledge:

While academic faculty work hard and are extremely supportive of students, most do not have current nursing experience or any clinical experience in the area that the student is practising. This limits the educator's insight into student progress and identification of practice issues, which may prevent the student from being successful. (RN)

Faculty DEU/CLU Experiences

Academic faculty described challenges in connecting with and obtaining in-depth feedback about student practice to inform an accurate evaluation, often related to nurses' workload burdens. Faculty also observed that when DEU/CLU is short staffed, students were used for workload, which impacted both student learning and nurses' capacity to teach and mentor students. Faculty echoed the preferences of nurses that when students are struggling, the preceptor model is superior for mentorship consistency. Faculty identified the need for more time and resources to be dedicated to inter-institutional relationship building and partnership.

Both nurses and students valued the presence of the academic faculty and interpreted their physical absence as a concern. Participants noted that it was even more critical to pay time and attention to building relationships between partners to make DEU/CLUs a success when faced with substantial nursing leadership, staff turnover, and patient mix changes.

Perspectives of DEU/CLU Opportunities for Improvement

Nurses expressed two key elements of the DEU/CLU model perceived to be beneficial: (a) students' exposure to a variety of nurses, enabling students to develop confidence working more independently, and (b) opportunities for unit teams to work with students/future employees before transition to professional practice. Paradoxically, the stated benefits of the DEU/CLU model for practice education were also the source of challenges. Participants perceived there was less student accountability when working with multiple nurses, more communication gaps about student practice and progression, and greater opportunity for weaker students to "fall through the gaps."

The CLU model allows some poorly practising BSN students to get through their clinical practicums as competent when they aren't actually safe and competent. The clinical supervision is shared by too many nursing staff, which leads to missed identification of poorly performing students. They fly under the radar. (RN)

Many nurses compared the DEU/CLU and preceptorship models and expressed the need for a hybrid model based on student capacity and level of independence. They perceived the preceptor model as superior for continuity in student-preceptor relationships, which enabled the building of trust and therefore facilitated more opportunities for teaching and learning, titrating up the degree of complexity in learning opportunities, reciprocal feedback, professional growth, and increasing independence appropriately for students: "It is easier for nurses to identify gaps of knowledge in students when they work consistently with them" (RN).

Impact of the Workplace Environment on Student Learning

Similar to the survey findings, nurse focus group participants expressed that the workplace environment had a strong influence on student learning in several ways. Workplace realities, including high patient census and over-census, increased patient acuity, and strained staffing levels, impacted the nurses' ability to provide feedback about student learning, create individualized learning opportunities for students, and have adequate time to mentor, coach, and debrief specific clinical scenarios. Nurses felt that heavy clinical workloads interfered with their ability to support students:

The clinical teachers are the RNs working 1:1 with students for their clinical practicums. They do this clinical teaching while taking on a full patient load. It takes more time when you have a student in order to fully explain and teach, although nursing is not allotted any

extra time to do so. When there is a busy practice environment the result is that staff appear burned out or short with students. (RN)

Additionally, with retirement trends in nursing, nurses expressed that there were fewer senior nurses and a higher number of new and junior nurses in DEU/CLU at any time. Senior nurses experienced the pressures of not only mentoring students but also being in charge and mentoring new staff members within the context of managing their full and complex patient assignment. Heavy workloads because of nurse shortages were also noted to contribute to students being “used as workload.”

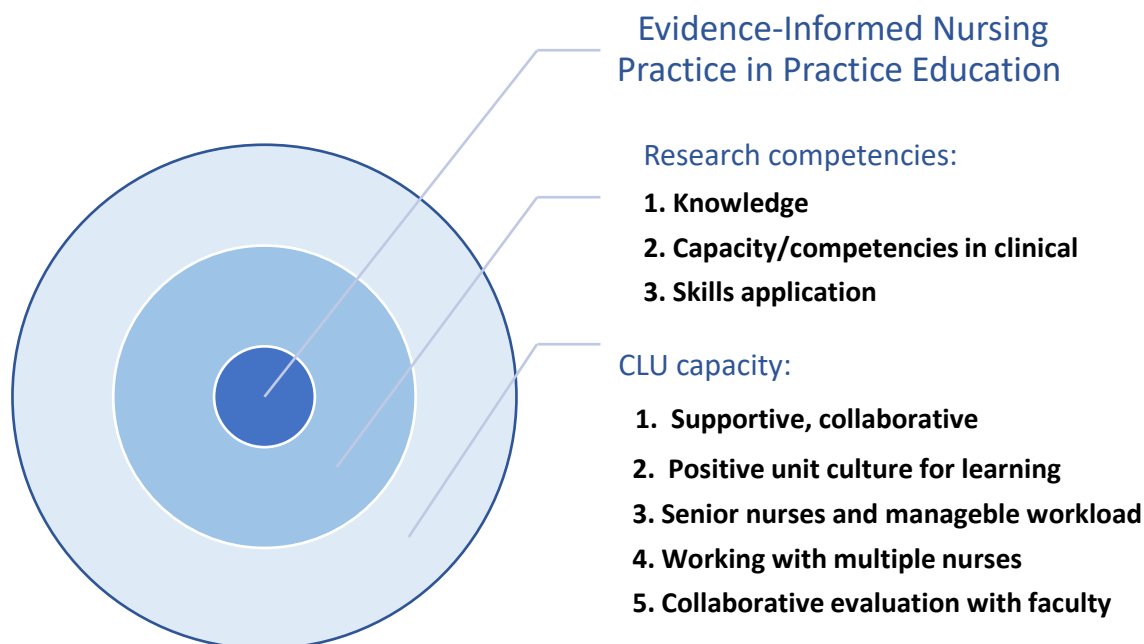
The rich voice of the study participants provided insight to the factors contributing to their experiences in the DEU/CLU learning practice environment and to those components supporting an evidence-informed culture of nursing practice. The findings align with the QCLEI role of staff in student learning, which highlights the requirements for staff approachability, student inclusion in discussions, staff being positive role models (and the inherent challenges when mentored by junior staff), being made to feel comfortable, and students satisfaction with the supervision they receive.

Discussion

Our findings indicate that developing and sustaining a knowledge-informed practice culture within a DEU/CLU practice education model requires implementation of a number of essential characteristics (see Figure 1).

Figure 1

Quantitative and Qualitative Components for Evidence-Informed Nursing Practice Education



Sufficient DEU/CLU Resources

The QCLEI survey findings demonstrated consistent student, nurse and faculty positive response rates (94% to 100%) for the role of staff in supporting student learning. Despite nurses’

individual efforts, system and operational aspects such as limited equipment and learning space, heavy nurse workloads, and lack of access to senior nurse mentorship were perceived as suboptimal for practice education. Both nurses and faculty reported gaps in communication between the education program and nursing units, including information sharing related to student learning and evaluation, unit capacity limitations for providing mentorship, and expectations regarding supporting student progression. These findings align with the assessment of the QCLEI survey findings, where the positive response rate was only 13% for using an evidence-informed approach to determining unit capacity for supporting student education, for staff attendance at mentorship training, and for availability of funds to support student practice education. Because the observational design of this study, we are unable to determine the impact of insufficient resources specifically on evidence-informed practice education, but there is justification to explore this in the future.

Supportive and Collaborative Leadership

Forber et al. (2016) have noted that “the success of any particular model [for nursing education] depends on its reliability, validity, viability and sustainability” (p. 90). Practice education models require effective collaboration between two complex systems: health care and post-secondary education. Infrastructure components include effective partnerships, shared academic–practice governance structures, unit cultures of evidence-informed practice and educational excellence, shared disciplinary nursing foundations, responsive and supportive leadership at multiple levels, and clarity of roles and responsibilities (Marcellus et al., 2021). Despite the significant erosion of resources and limited attention to sustainability commonly reported across DEU literature, participants in this study felt that the DEU/CLUs maintained reasonable support for individualized student learning. However, both nurses and academic faculty expressed concern regarding nurses’ ability to provide adequate clinical teaching and oversight, and the erosion may have contributed to a vulnerability in DEU/CLU model delivery.

Positive Unit Culture of Learning

Critical operational requirements identified by participants for optimal functioning of the DEU/CLU model include having stable rotations of experienced nurses available within clinical settings and experienced academic educators present and available during practice rotations. These requirements are not guaranteed in current health care and academic environments. Tuckwood et al. (2022) have described a “workforce demand paradox,” in which the health system needs more nurses but because of the nursing shortage, the nurses in clinical practice with time and resources to offer quality supervision of student learning are not adequately available (see also Virkstis et al., 2019). Nurses expressed their concerns related to inadequate numbers of senior nurses available to provide quality clinical teaching, and this combined with high patient acuity and heavy workloads resulted in students inadvertently being used as workload. Additionally, despite specific prompts for responses about evidence-informed nursing practice, participants focused their concerns on more immediate, skills-oriented learning. This may be due to perceived immediate priorities but may also reflect the consistent low response rates across all three groups regarding the lack of a clearly defined philosophy of nursing. More investigation is needed on the effect of how current clinical workplace environmental realities, including nurse exhaustion, moral distress, burnout, and high use of agency nurses, impact student clinical learning and capacity to apply evidence skills and competencies in these circumstances.

Students Prepared With Basics Through Levelled Learning

The capacity for evidence-informed practice is a core competency for new graduates. Within the DEU/CLU model, the role of academic faculty is to support students and clinical teams integrating evidence and theory into practice (Edgecombe & Bowden, 2014; Marcellus et al., 2021). The role of point-of-care nurses includes finding learning opportunities for individual students, supporting evidence-informed patient care, and contributing to student learning, development of critical thinking skills, and evaluation. Despite the limitations identified in the quality of the clinical learning environment and the multiple challenges expressed by nurses, students scored well overall in the Research Competencies Assessment, suggesting that the identified environmental challenges did not immediately influence the quality of their learning.

Clear and Known Communication Processes

Despite many years of the DEU/CLU model being the predominant approach to senior student practice education in this setting, many nurses expressed a continued preference for the preceptor model. This was also reflected in the QCLEI in which students scored significantly lower than nurses ($p = .008$) related to supporting preceptor roles, and in which students scored low on staff making an effort to know the students. While the DEU/CLU model was judged effective for students progressing well in their practice learning, students who needed more support were perceived to “fall through the cracks.” Although some participants felt that the preceptorship model was preferable to the DEU/CLU model, in reality there continues to be insufficient numbers of experienced nurses in the health system to provide learning guidance and regulatory supervision. There are now also insufficient numbers of experienced academic faculty (Forber et al., 2015). Although nurses expressed a strong preference for having academic educators with current practice experience, the siloing of education and practice with the shift to colleges and universities has introduced many structural barriers to supporting academic faculty in maintaining clinical expertise.

Recommendations for Practice and Research

It is essential for academic and practice partners to develop and sustain a shared commitment to evidence-informed practice. To our knowledge, there has been no research evaluating the role of BSN practice education models in developing competence in evidence-informed practice within Canada, despite being a key domain in the national competency framework. Further research is required to study how this competence develops in nursing students within the practice setting. This study has brought to light the factors to consider for a deeper exploration of the association between evidence-informed practice, DEU/CLU education practice models, and importantly, the status of the clinical environment. Given the concerns from nurses and faculty on the observed impact of high patient acuity, heavy workloads, and high proportion of new nursing graduates mentoring new students, it behooves us to conduct more in-depth research to determine whether associations or cause-effect relationships exist between these factors and BSN learning experiences and outcomes. This is particularly compelling given the realities of nurse and nurse educator shortages not only across Canada but internationally, and with the challenges unlikely to be adequately resolved in the near future.

Limitations

Several limitations to this study limit an in-depth interpretation of the study findings and their implications. First, we did not have accurate data on the number of potential respondents in

each study group, so we were unable to calculate response rates. We used convenience sampling, subjecting the study to sampling bias and limiting generalizability of the study findings. Second, sample sizes for the student and faculty sub-groups are small with resulting wide CIs, and therefore rigorous statistical comparison across groups was limited. Cells with less than five in the faculty group were not included in statistical comparisons. Third, approximately 25% of the nursing group did not complete the quality of learning environment questions, and despite multiple strategies used to engage nurses in focus groups—including integrating a point-of-care nurse into the research team to advise on approaches for engagement—recruitment remained challenging (Raymond et al., 2018; Timmins et al., 2022). This may have been related to fear of expressing their opinions and the realities of their actual working conditions. Fourth, this is an exploratory study investigating multiple concepts without clearly articulated hypothesis of relationships between variables. While this approach provides important information for future rigorous study designs, it limits the depth of interpretation of our results. Finally, while the instruments used for survey data collection have undergone previous psychometric testing within nursing, we did not validate psychometric domains with our specific study groups. The research team conferred face and content validity of the instruments and questions used. Despite these limitations, we believe that our findings provide insights into this emerging area of study. Specifically, we note the difficulty of actually researching evidence-informed practice within the contemporary health care milieu, even after decades of emphasis on evidence-based medicine, evidence-based practice, and evidence-informed practice (nursing).

Conclusion

This mixed methods study contributes to a growing body of knowledge around the influence of practice education models on student learning and readiness for professional evidence-informed practice. Workplace challenges, such as nursing shortages and higher acuity of patients, have affected the time and capacity of nurses to integrate supporting student learning into their workloads. The resources required for sustaining effective DEUs and other BSN practice education models are substantial. In constrained academic and practice environments, supports for student learning often erode in the face of insufficient resources (Edgecombe & Bowden, 2014; Marcellus et al., 2022). Despite these challenges, the quality of the learning environment for nursing education must be protected and resourced for students to feel supported in their learning and prepared for evidence-informed practice in increasingly complex health system environments. Adequate resources to ensure academic–practice collaboration, nurse and academic faculty mentoring and orientation, and effective communication are necessary. The need for partnerships among nurse leaders, staff nurses, and academic faculty is more urgent than ever, holding the potential, over time, to contribute to the renewal of clinical care units into environments of evidence-informed teaching and learning for students and new graduates, while continuing the critical work of supporting the provision of quality, evidence-informed care (Duncan et al., 2023).

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