Impact of vicarious learning through peer observation during simulation on student behavioural measures

K. Livsey & E. Lavender-Stott

Abstract

Introduction: Having student peers observe and provide feedback has been found to aid learning in nursing and other health professions training settings (Cushing, Abbott, Lothian, Hall, & Westwood, 2011; Eldridge, Bear, Wayne, & Perea, 2013). Prior studies have documented student perceptions about the value of these experiences, but few studies examine the impact of these modalities on student behavioural outcomes. In this study, we describe the use of peer observation to evaluate student performance during a home visit simulation scenario using a standardised patient to explore whether serving as a peer observer supports vicarious learning to promote skill development in areas of assessment, communication, critical thinking and technical skills.

Methods: Groups of four students were subdivided into dyads, with one pair of students serving as peer evaluators and one pair being engaged in a home visit simulation scenario using a standardised patient. Students then reversed roles. Peer observers and faculty members rated student behaviours using the Creighton Simulation Evaluation Instrument (CSEI), which examines technical, critical thinking, assessment and communication skills.

Results: Groups of students who witnessed the scenario as peer evaluator prior to engaging in the simulation experience scored significantly higher mean scores on communication and assessment measures than those participating in the scenario first. In addition, peers tended to score their colleagues lower than faculty evaluators.

Conclusions: Findings from this study indicate that integrating peer observation into simulation experiences can enhance student learning, particularly in the areas of assessment and communication.

University of North Carolina Wilmington

Correspondence:
Dr. Kae Livsey, Associate Professor
Western Carolina University School of Nursing
28 Schenk Parkway, Suite 300
Asheville, NC 28803
USA
Email: klivsey@.wcu.edu

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Introduction

The use of peer evaluation for performance assessments in clinical practice settings is emerging within the literature as an effective method to promote reflective practice among nurses (Chaves, Baker, Chaves & Fisher, 2006; Mantesso, Petrucka, & Bassendowski, 2008; Sawyer & Roberts, 2005). Peer observation embedded in simulation design may support vicarious, or observational, learning—learning that occurs by watching others. The concept of vicarious learning was originally coined by Bandura (1962). Having student peers observe and provide feedback has been found to aid learning in nursing and other health professions training settings (Cushing et al., 2011; Eldredge et al., 2013). Incorporation of standardised patients within simulation experiences provides additional fidelity as well as unique feedback from the patient perspective and has been found to enhance student learning particularly related to communication (Bosse et al., 2012) and clinical decision-making skills (Guhde, 2010). Prior studies have documented student perceptions about the value of these experiences; however, few studies examine the impact of these modalities on student behavioural outcomes.

The aim of this study is to explore whether serving as a peer observer supports vicarious learning to promote skill development in the areas of assessment, communication, critical thinking and technical skills. Peer observers in this study also scored the performance of their peers using a standardised instrument and provided formalised feedback to their peers on their performance during the simulation.

Theoretical framework

The study is guided by Bandura's (1986) social learning theory, which posits that people learn from one another through a variety of mechanisms, including observation. Through vicarious learning, individuals construct ideas about certain behaviours, and what they have observed serves as a cue for replicating certain behaviours (Bandura, 1986). This theory supports the notion that serving as an observer of others' behaviour aids learning and can enhance self-efficacy.

Literature review

Peer evaluation involves a systematic process by which a colleague assesses and evaluates performance of another peer or peers. According to Rout & Roberts (2008), engaging in peer evaluation helps learners "to determine their strengths and weaknesses and review the quality of their practice, to provide evidence to use as the basis of recommendations by obtaining the opinion of their peers" (p. 428). Specific benefits of integrating peer teaching, mentoring or evaluation in health professions education settings include enhanced peer collaboration and collegiality, and further development of skills in

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evaluation and assessment (Secomb, 2008). Other studies report that peer feedback enhances student knowledge and provides students with new insights as well as skills in giving and receiving feedback (Rush, Firth, Burke, & Marks-Maran, 2012).

Despite prior studies finding that some students report discomfort in evaluating their peers, students still expressed that the process was valuable to their learning (Cushing et al., 2011; Kim-Godwin et al., 2013). Prior studies have also examined differences in scoring by self-assessment, peer evaluation or faculty evaluation and found that peer scores tend to be higher than faculty or self-report scores (Chaves et al., 2006; Lanning, Brickhouse, Gunsolley, Ranson, & Willet, 2011).

Researchers have also explored how the brain works when observing others and the impact of vicarious learning on student learning. Monfardini et al. (2013) examined neural processing during observational learning experiences and found neural processing during vicarious learning experiences to be similar to those neural processes used in learning from trial and error. Stegmann, Pilz, Siebeck and Fischer (2012) explored whether learning through direct engagement in simulation using a standardised patient or vicarious learning gained by observing the simulation affected knowledge about patient–provider communication skills among medical students. They found vicarious learning through peer observation to be *more valuable* than direct experience in the simulation, especially when combined with a structured evaluation script offered by peer evaluators. They further explored whether the order in which the student served as observer or engaged in the simulation had any impact on vicarious learning and found that students benefitted from vicarious learning, regardless of the order in which it occurred. These findings provide some evidence that vicarious learning can support knowledge acquisition, but whether this learning impacted student behaviours was not examined. A study involving business students found that vicarious learning through observation prior to engaging in direct activity enhanced student performance on certain tasks (Hoover, Giambatista, & Belkin, 2012). Based on the review of the nursing literature, this study is the first to specifically examine the impact of vicarious learning through peer observation on student clinical performance behaviours among nursing students.

Methods

Approval from the University of North Carolina—Wilmington institutional review board for the protection of human subjects was obtained prior to any data collection for the study. Students provided informed consent to participate in the study, and those who participated in the study were enrolled in a five-credit semester long community health course during their first semester of the second year of an undergraduate baccalaureate nursing program at the University of North Carolina—Wilmington, a public university in the southeastern United States. As part of their community health clinical component, students were required to participate in a 30-minute simulated home visit scenario, with a standardised patient serving as the client to be visited by the

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student nurses (in pairs). The sample included for data analysis in this study comprised 48 dyads of nursing students from two cohorts during the 2011−2012 academic year. No identifiable data was collected on individual students participating in the simulation.

Instruments

In this study, the instrument used to evaluate student behaviours during the simulation was the Creighton Simulation Evaluation Instrument (CSEI). Psychometric properties of the CSEI have been evaluated for validity and reliability as part of the development of the instrument for use in evaluating student performance in simulations (Todd, Manz, Hawkins, Parsons, & Hercinger, 2008). The CSEI includes four subscales to assess student performance on measures of assessment, communication, critical thinking and communication, skills identified by the American Association of Colleges of Nursing (AACN) (2008) as being important competencies for baccalaureate nursing students to meet. Previous research has found reliability of the CSEI scale to be high, α=.98 (Adamson et al., 2011). Inter-rater reliability for the CSEI using intra-class correlation was also examined and was .95 (95% CI=.70, .99) (Adamson et al., 2011).

Faculty members participating in the study were trained on the use of the CSEI, including guidance from the developers on how to use and refine the instrument to reflect specific desired behaviours to be displayed for scoring based on the unique simulation scenario. These predetermined behaviours were included on the instrument for scoring, and a minimum of two of the desired behaviours under each element of the four subscales was required in order for a point to be awarded for that item. Subscale scoring was as follows: assessment (max 4 points), communication (max 5 points), critical thinking (max 8 points) and technical skills (max 5 points) for a possible total score of 22.

Procedures

The client story for the simulation was a 47-year-old African American female who had been recently discharged from the hospital following admission due to a hypertensive crisis. The client, who also has Type 2 diabetes, was discharged with an open wound on her leg, requiring daily dressing changes. The simulation scenario was designed using best practices from the NLN/Jeffries Simulation Framework (Jeffries, 2007), which included time to prepare for the scenario and guided debriefing sessions. The scenario for the simulation had been used and refined during the previous academic year, based on student, standardised patient and faculty feedback. The experience also included a "homework assignment" for students to review medications being taken by the client for interactions or contraindications. The simulation experience used in this study was intended to serve as a learning opportunity for students, and feedback based on performance scoring was used to provide formative feedback as opposed to "a competency check." The overarching goals of the project were to provide students with an opportunity to practise nursing skills in a simulated home visit scenario with a standardised patient and the opportunity to learn from having witnessed, executed and debriefed about the scenario. The scenario was executed in an apartment-style setting, which included a number of props to represent potential contraindications

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for medications or potential environmental safety hazards. A daily log displaying an upward trend in blood pressure and blood sugar readings (with missing entries) was also included as a prop in the "home environment," as well as a medication box with missing doses.

Groups of students were randomly subdivided into dyads by faculty members, with one pair of students serving as peer evaluators and one pair of students being engaged in the simulation scenario. Peer evaluators were located in a conference room with an audio/video feed to be able to observe the scenario while it occurred in real-time. A faculty member was present in an observation room adjacent to the home-care simulation suite with the same audio/video feed that the peer evaluator group was watching. Both the faculty member and peer evaluator dyad evaluated the performance of the group of two students engaged in the simulation using the CSEI. An additional faculty member was placed with the peer evaluation group to orient them to the use of the CSEI and to facilitate consensus amongst the peer evaluator groups' scoring on the CSEI and feedback to provide their peers during the debriefing session following the simulation.

Following the debriefing session, groups of students switched roles, and the dyad that had served as peer evaluators engaged in the scenario (with slight changes to patient symptoms and modified trends on the blood pressure/blood glucose log), while the other pair of students served as peer evaluators. Each dyad had an opportunity to debrief with faculty and peer evaluators following engagement in the 30-minute simulation. An additional debriefing session was held with the standardised patient in attendance after both groups of students had engaged in the simulation to allow feedback to the students from the "client's" perspective. The simulation scenario was repeated a total of four times during each simulation day.

Data analysis

Data analysis included use of descriptive statistics to determine whether mean scores on the CSEI differed based on order. Independent t-tests were used to determine whether significant differences existed between the scores of groups of students who had served as peer evaluators prior to being engaged in the scenario and those executing the scenario first. Cronbach's alpha was used to establish reliability. Finally, intraclass correlation coefficients (ICC) were used to examine inter-rater reliability between student and faculty evaluators on each of the subscales of the CSEI instrument. Statistical significance was set at p=<.01 to minimise the possibility of Type I error (incorrectly rejecting null hypothesis—that order of participation as peer evaluator made no difference to the score).

Results

Ninety-six group scores were used for data analysis; these comprised the student (n=48) and faculty (n=48) CSEI ratings of the dyads engaged in the simulation. Mean total scores for all groups of students ranged from 5 to 22 (M=16.96, SD=3.55). Mean total scores for groups of students who served as peer evaluators first ranged from 10−22 (M=17.94, SD=2.97). Mean total scores for those groups of students engaged in the scenario prior to serving as a peer evaluator ranged from 5−22 (M=15.98, SD=3.83).

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With the exception of the technical skills subscale, mean scores for students who served as peer evaluators first were higher than those students who participated in the simulation experience first (See Table 1).

An independent t-test was used to examine whether these differences were significant. Groups of students who served as peer observers first scored significantly higher on the assessment (M=3.05, SD=.92, p=.000) and communication subscales (M=3.73, SD=1.07, p=.000) than those students who engaged in the scenario first [assessment (M=2.73, SD=.96), communication (M=3.35, SD=.81)]. No significant differences were found between the groups on overall scores on the total CSEI, technical skills or critical thinking subscales (See Table 1).

Table 1
CSEI Score by Subscale and T-test Scores by Order of Participation in Simulation

Scale	Mean (SD) all groups/ both types of evaluators	N	Range	M Sim 1st	N	SD	M Peer 1st	N	SD	T-test Value	Significance Level
Assessment	3.052 (.922)	96	1–4	2.729	48	.961	3.375	48	.761	3.647	.000*
Communication	3.792 (1.071)	96	0–5	3.354	48	.805	4.104	48	1.175	3.646	.000*
Critical thinking	5.989 (1.511)	96	2–8	5.750	48	1.432	6.229	48	1.564	1.565	.121*
Technical skills	4.239 (1.122)	96	1–7	4.167	48	1.223	4.133	48	1.017	.635	.527
Total score	16.958 (3.564)	96	5–23	15.979	48	3.828	17.937	48	2.970	2.800	.006

* significance ($p \leq .01$)

Table 2
Mean Scores by Faculty and Peers and T-tests for Significance

	Type of Evaluator	N	Mean	SD	T-test Value	Significance Level
Assessment	Faculty	48	3.187	.959	1.447	.151
	Peer	48	2.917	.871		
Communication	Faculty	48	3.625	1.023	-.953	.343
	Peer	48	3.833	1.117		
Critical thinking	Faculty	48	5.958	1.623	-.202	.841
	Peer	48	6.021	1.406		
Technical skills	Faculty	48	4.375	.913	1.186	.239
	Peer	48	4.104	1.292		
Total score	Faculty	48	17.112	3.36	.458	.648
	Peer	48	16.791	3.747		

* significance ($p \leq .01$)

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Cronbach's alpha was used in this study to evaluate reliability of the CSEI and was found to be acceptable (.79). An intraclass correlation coefficient was used to determine the inter-rater reliability for the data. The average measure ICC=.999, $p<.001$, with a 95% confidence interval of .998–1.00. This indicates high inter-rater reliability was found between peer and faculty raters. Mean performance scores for groups of students by faculty members were higher than group scores by peer evaluators on the assessment and technical skills subscales and total score (see Table 2); however, none of these differences were found to be statistically significant.

Discussion

This study provides new information for health professions educators who are designing simulation experiences for students and also highlights how peer observation may enhance learning and student performance related to specific student behavioural outcome measures. Much of the prior research on use of peer observation of simulation in nursing education has explored student perceptions, self-confidence and satisfaction (Guhde, 2010; Kim-Godwin et al., 2013; Perera, Mohamadou, & Kaur, 2010). Findings from this study support prior studies that have examined the impact of vicarious learning among other types of professional students (Hoover et al., 2012; Stegmann et al., 2012). Groups of students who witnessed the scenario as a peer evaluator prior to being engaged in the simulation experience scored significantly higher mean scores on the communication and assessment subscale measures than those who participated in the simulation scenario first. In contrast, having witnessed the scenario prior to engaging in it did not significantly affect performance scores on the critical thinking or technical skills subscales. Other than the technical skills subscale, groups of students who served as peer evaluators prior to engaging in the simulation had higher mean scores on the total CSEI as well as assessment, communication and critical thinking subscale measures. These findings may be indicative of findings from Stegmann et al. (2012) related to the value of vicarious learning, regardless of order of observation.

Peer observers scored their colleagues lower than faculty members for assessment and technical skills, while scoring their peers higher on communication and critical thinking behaviours. These mixed findings warrant further exploration regarding other potential confounding variables that may have contributed to these findings. Studies using a larger sample should be conducted to minimise the possibility of type II error. As the review of the literature indicates, some studies have found peer observers to generally rate their peers' performance higher than faculty members (Chaves et al., 2006; Lanning et al., 2011), while others report little differences between faculty and student raters (Jensen, 2013; Moineau, Power, Pion, Wood, & Humphrey-Murto, 2011).

Lack of significant differences between groups on performance measures, while informative, does not recognize other added benefits of learning that might have occurred, such as enhancement of skills in providing feedback to peers, development of self-confidence and self- efficacy and other benefits not reflected in this data.

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Limitations

A number of limitations exist in this study. Beside small sample size, there are a number of confounding variables that could affect the results. For example, use of the same client scenario might have given the peer evaluator groups an unfair advantage related to client assessment, in that they would be familiar with assessment parameters and issues in the home environment that had been identified by students who were first engaged in the scenario. The second run of the scenario included a modification of client symptoms to attempt to control for this confounding variable. These modifications included changing the glucose and blood pressure log in the home to show a different trend than in the first run of the scenario, as well as the client demonstrating differing symptoms and psychosocial issues (such as grief due to loss of husband).

Another potential confounding factor relates to whether familiarity with the scoring criteria used to evaluate performance provided an additional advantage to the groups of students serving as peer evaluators prior to engaging in the simulation. Additionally, while students were randomly assigned to dyads, scoring results of performance during the simulation may have been impacted by whether these dyads included strong or weak students. Factors related to group assignments and student skill levels may explain the lower score of peer evaluators groups related to technical skills. Finally, we did not explore other factors that might have impacted student performance, such as age or prior experience.

Implications

While findings of this study are limited by the use of a small convenience sample, preliminary findings indicate that integrating peer observation into simulation experiences can enhance student learning, particularly in the areas of assessment and communication. Health professions educators should continue to explore this and other methods to enhance student learning when designing simulation experiences.

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