

# The Effectiveness of Simulation-based Zoom Learning on Enhancing Clinical Decision Making for Nursing Students

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## Introduction

- Given the current outbreak of the novel coronavirus (COVID-19), the Hospital Authority and universities have stepped up social distancing to combat the outbreak. Clinical practicum and assessment for nursing students has been suspended since January 2020.
- Final year nursing students are required to achieve clinical decision making for graduation and for the licensure of registered nurse in Hong Kong. The conventional use of Zoom education poses challenges and difficulties in clinical course development and student assessment (Kenny, 2002; Smith et al., 2009). With the successful experience in simulation-based teaching in the Nethersole School of Nursing, we propose a project to enhance clinical decision making by adopting simulation-based Zoom learning (SBZL) in online platform for students studying the Bachelor of Nursing (BNurs) programme.
- Simulation-based teaching is a teaching strategy that applies simulation technique to replace and amplify real experiences with guided ones in a fully interactive fashion (Lateef, 2010). It has been adopted in education of various health professionals to improve students' knowledge, skills and behaviour, and patient-related outcomes (Cook et al., 2011). In undergraduate nursing education, previous literature demonstrated its effectiveness in knowledge acquisition and psychomotor skills development, and improvement in students' self-efficacy, confidence and critical thinking (Cant & Cooper, 2017). After simulation training, students started to have the feeling of being a nurse and strive for maturing in the profession (Lestander et al., 2016). More importantly, patient safety can be ensured by simulation training in a controlled environment (Hughes, 2008).

## Objectives

- To provide support to teachers for the development of courseware and implementation of SBZL
- To enhance students' knowledge on clinical decision making, perception of capabilities and teaching and learning environment via SBZL
- To disseminate evaluation result and advocate for innovative and good practice in university nursing education

## Methods

- Participants:** All year 5 BNurs students were invited to join the SBZL
- Study design:** Pre-test post-test design and a historical control
- SBZL development and implementation:**
  - Briefing phase:** Students were provided with information related to the patient and tasks for Zoom discussion.
  - Participation phase:** Students provided their plan of care (clinical decision making) through Zoom to the facilitator (laboratory staff) who operates the simulators to provide simulated feedbacks to the students.
  - Debriefing phase:** Instructor explained the scenario and reflected the experience with students.

*A total of 38 case scenarios of total client care were developed and simulated using the six simulators with manikins in the simulation learning unit situated at the Clinical Learning and Simulation Center of the Nethersole School of Nursing.*

- Measurement of evaluation:**
  - Academic score compared with the previous cohort
  - Student Engagement Questionnaire (SEQ) compared before and after the SBZL, and with the previous cohort after the SBZL

## Results and Discussion

**Table 1**  
Comparison of students' capabilities and perceptions of teaching and learning environment before and after the intervention (n = 92)

SEQ (5 = strongly agree; 1 = strongly disagree)	Mean ± SD		Mean difference	p*
	Pre	Post		
Capability				
Critical thinking	3.95 ± 0.36	4.01 ± 0.35	0.06 ± 0.42	0.180
Creative thinking	3.68 ± 0.52	3.93 ± 0.42	0.24 ± 0.48	<0.001
Self-managed learning	3.93 ± 0.40	4.02 ± 0.39	0.08 ± 0.45	0.087
Adaptability	4.05 ± 0.41	4.02 ± 0.42	-0.03 ± 0.46	0.500
Problem solving	3.95 ± 0.39	3.96 ± 0.41	0.01 ± 0.47	0.827
Communication skills	3.93 ± 0.53	3.93 ± 0.48	0.01 ± 0.56	0.926
Interpersonal skills and groupwork	3.80 ± 0.61	3.91 ± 0.54	0.10 ± 0.60	0.105
Computer literacy	3.72 ± 0.68	3.86 ± 0.59	0.14 ± 0.60	0.032
Teaching and learning environment				
Active learning	3.92 ± 0.46	4.12 ± 0.45	0.20 ± 0.50	<0.001
Teaching for understanding	3.94 ± 0.40	4.09 ± 0.47	0.15 ± 0.42	0.001
Feedback to assist learning	3.65 ± 0.65	3.96 ± 0.48	0.31 ± 0.65	<0.001
Assessment	3.80 ± 0.49	3.96 ± 0.44	0.15 ± 0.44	0.001
Relationship between teachers and students	3.87 ± 0.53	4.07 ± 0.51	0.20 ± 0.53	<0.001
Workload	3.70 ± 0.58	3.90 ± 0.51	0.21 ± 0.49	<0.001
Relationship with other students	3.78 ± 0.66	3.80 ± 0.59	0.03 ± 0.66	0.696
Cooperative learning	3.81 ± 0.62	3.93 ± 0.47	0.12 ± 0.51	0.027
Coherence of curriculum	3.86 ± 0.45	3.97 ± 0.45	0.11 ± 0.49	0.034

SD: standard deviation; SEQ: student engagement questionnaire.

All participants who completed both pre- and post-intervention questionnaires were included in the analysis.

\*The p-value is obtained from paired sample t-test, comparing changes of test scores within intervention group.

SEQ (5 = strongly agree; 1 = strongly disagree)

	Mean ± SD	
	After SBZL	Historical control <sup>†</sup>
Capability		
Critical thinking	4.00 ± 0.37	4.05 ± 0.45
Creative thinking	3.94 ± 0.42	3.95 ± 0.56
Self-managed learning	4.03 ± 0.43	4.02 ± 0.56
Adaptability	4.06 ± 0.45	4.14 ± 0.48
Problem solving	3.99 ± 0.42	4.13 ± 0.45
Communication skills	3.94 ± 0.47	4.03 ± 0.56
Interpersonal skills and groupwork	3.93 ± 0.54	4.03 ± 0.56
Computer literacy	3.85 ± 0.59	NA <sup>‡</sup>
Teaching and learning environment		
Active learning	4.13 ± 0.47	3.95 ± 0.59
Teaching for understanding	4.13 ± 0.49	4.07 ± 0.55
Feedback to assist learning	3.99 ± 0.53	4.01 ± 0.58
Assessment	3.97 ± 0.48	4.04 ± 0.50
Relationship between teachers and students	4.07 ± 0.55	4.04 ± 0.57
Workload	3.93 ± 0.51	3.50 ± 0.89
Relationship with other students	3.80 ± 0.62	3.70 ± 0.73
Cooperative learning	3.92 ± 0.48	3.90 ± 0.68
Coherence of curriculum	3.96 ± 0.50	3.93 ± 0.58

NA: not available; SD: standard deviation; SEQ: student engagement questionnaire.

All participants who completed the post-intervention questionnaire (n = 110) were included in the analysis.

<sup>†</sup>The data of historical control was collected by CLEAR in 2018-2019.

<sup>‡</sup>Computer literacy was not assessed in the previous cohort.

**Table 3** Comparison of students' assessment score between participants after SBZL and historical control

	Mean	
	After SBZL	Historical control <sup>*</sup>
NURS 4123	79.69	77.69
NURS 4124	77.16	76.56

All participants who completed the pre- and post-intervention questionnaire, and had the assessment score (n = 87) were included in the analysis.

\*The historical control involves all students in the cohort of 2018-2019.

- A total of 102 students completed the intervention, with 92 of them completed both pre- and post-intervention questionnaires were included in the analyses. Students had significantly improvement in SEQ creative thinking, computer literacy, active learning, teaching for understanding, feedback to assist learning, assessment, relationship between teachers and students, workload, cooperative learning and coherence of curriculum scores ( $p < 0.05$ ) (Table 1). Similar scores were noted in students after SBZL when compared with the historical control (Table 2). In terms of the assessment scores (Table 3), students after SBZL obtained higher scores than the previous cohort.
- The results demonstrated the improvement in students' knowledge on clinical decision making, perception of capabilities and teaching and learning environment after SBZL.

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