Long Paper

Effectiveness of High-Fidelity Simulation as Learning Innovation in Clinical Nursing Education: A Systematic Review of Open-Access Articles

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Abstract

   The use of High-Fidelity Simulations (HFS) and the processes that go along with it has already been proven as an effective learning innovation and pedagogical approach in nursing education by many research studies. However, the presentation of those specific learnings has been generalized in broad and common terms. In general, this systematic review critically synthesizes existing scientific articles where specific areas in the teaching and learning process, after the use of high-fidelity simulation is found to be highly effective for practicing nurses, can be analyzed. This is a systematic review using a meta-synthesis of research studies from the Scopus database in 2021 that covered the effectiveness of HFS in clinical nursing. After screening the documents, 8 studies were selected which resulted in the identification of specific learning areas according to different scenarios, and the conceptualization of themes that can be used to classify students' and teachers' learnings. The learning experiences simply can't be classified into three general terms knowledge, performance, and confidence as those learning areas are best presented and deduced according to many scenarios.

Keywords – HFS, effectiveness of HFS, clinical nursing, simulation learnings

INTRODUCTION

The three essential components of the teaching and learning process, which are the teachers, the learners, and the curriculum (methodology and materials) create those specific experiences, reflections, and conceptualizations that trigger any form of development. In the case of nursing education concerning this review, clinical nurses depend on their proficient instructors to improve their practical clinical performance when using simulation methods. Without a doubt, the use of simulation in nursing education allowed clinical nurses and instructors to experience practical skills from the scenarios of clinical cases with the use of an interactive method in a more secure environment (Lee et al., 2020).

The current pandemic situation even pushed the academe in the nursing field to utilize High-Fidelity Simulations (HFS) as one of the best pedagogical approaches to ensuring that clinical nurses are truly capable of dispensing their work responsibilities. Most recent reviews regard the use of HFS as an effective method in increasing knowledge, skills/skill performance, collaboration, caring, and learning interest of nursing students; however, it was noted that their overconfidence was caused by the use of HFS was claimed to be hindering their real practice. Meanwhile, it was also found there is no significant difference when students use either Low-Fidelity Simulations (LFS) and HFS in the areas of theoretical knowledge, skill performance, and confidence, which is something nursing schools should carefully think about as the cost of HFS causes a funding issue as well (Li et al., 2022; Asegid & Assefa, 2021; Hua et.al, 2021; Chiyar, 2018).

From the initial readings, there appears to be a gap in understanding how HFS is specifically useful not only to nursing students but to their teachers as well. Almost all studies and reviews were looking into the effects it has on students. Further, there is no clear analysis of what specific areas in the teaching and learning process can be identified and explicated from the available empirical data and qualitative observations. The findings of many studies simply revealed in general terms that students' knowledge, skills, and other perceived areas are enhanced.   By analyzing existing literature on the effectiveness of the HFS, this article can point out what learnings are exactly exhibited by both actors: the student and the teacher.

General and Specific Objectives

In general, this systematic review critically synthesizes existing scientific articles where specific areas in the teaching and learning process, after the use of high-fidelity simulation is found to be highly effective for practicing nurses, can be analyzed. Specifically, the research aims in providing answers to the following objectives:
1. to identify specific learning areas that students and their teachers perceived to have obtained after using the HFS;

2. to synthesize the patterns of those learning areas into clustered themes; and
3. to analyze the methodologies used by the authors on how they arrived at their findings.

METHODOLOGY

A systematic literature review using meta-synthesis was conducted. In principle, the methodology used by Labrague et al. (2019) was duplicated to select articles that covered the effectiveness of HFS as a technological innovation for clinical nursing students and teachers. A thorough reading of each article was conducted to identify and synthesize the specific learnings mentioned. Included in the review is a critical analysis of the methodologies of the researchers to arrive at their findings. Moreover, gaps in the existing literature that direct future research studies were identified.

Search Strategies

The search strategy relied on the objectives formulated for this review. The documents used in this review were original scientific research studies from the electronic database of Scopus. The keywords used in the search engine are "effectiveness of HFS," "HFS technological innovation," and "nursing education."

Inclusion and Exclusion Criteria

This review was primarily aimed at identifying specific learnings that nursing students and teachers perceived that they obtained after using the HFS. It did not critically review the findings of the studies nor use any statistical measures to collate them. Relying on one electronic database, the researcher obtained only a few documents after the search was filtered according to relevance, peer-reviewed, English language only, and those documents published in 2021. Only one electronic database was used by the author as it was the only database that was readily available that provided a more organized and reliable search filter system. Moreover, the researcher opted to limit the time frame to provide the most updated review in context from the most recent documents published in 2021. This review depended on documents that were open access only from reliable journals; thus, other articles that require authors' permission and payment were excluded. Almost all documents for review utilized quantitative designs; the other two used mixed method and qualitative designs. Excluded in this review were those studies and articles that tackled the disadvantages of using HFS, comparisons between LFS and HFS, and those that were not representational of nursing education's context.

Search Outcomes

The initial search from Scopus resulted in 36 documents. After a quick reading of the titles and abstracts, only 18 documents were identified. The available documents that were for open access are 11; three of these were written in Korean. In total, 8 articles were deemed appropriate for review. The process that was followed to identify relevant documents is shown in Figure 1 below.
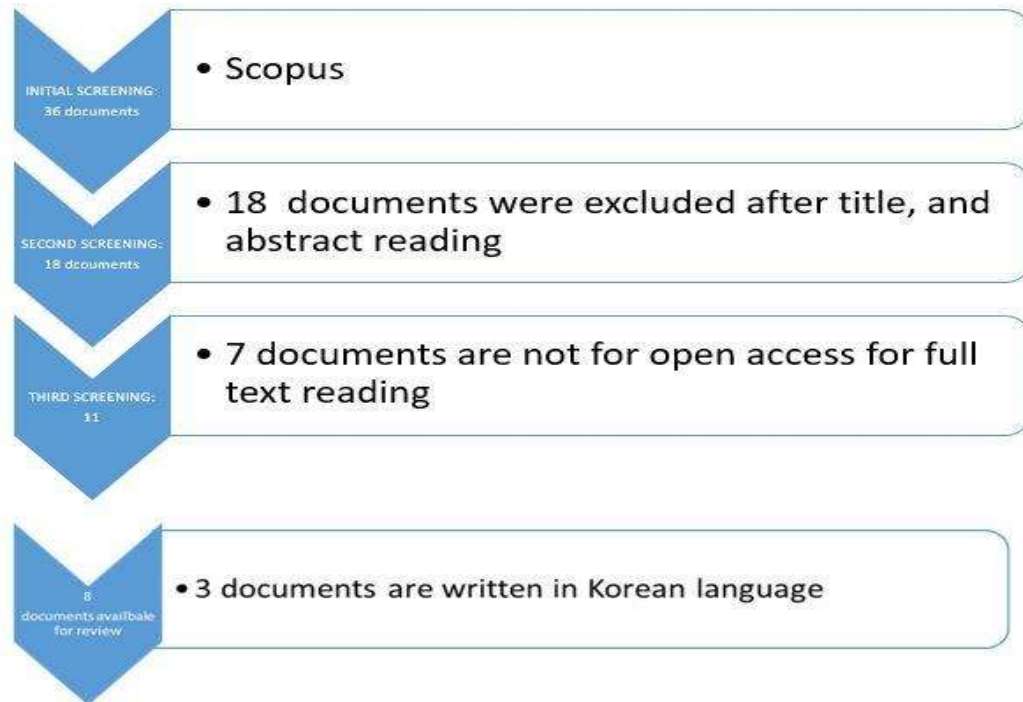

Figure 1. Flow Diagram of the Process of Identifying Documents for Review

Data Extraction and Synthesis

The researcher extracted the data which started by identifying author names, date of publication, type of document, research design, setting, sample size, and findings as presented in Table 1. Data extracted from quantitative, qualitative, and mixed-method studies were presented in a tabular and narrative form.

Design

This systematic review is a meta-synthesis. Eight documents were identified in the review (Table 1). Seven are quantitative with the use of various approaches like pre-test/post-test, questionnaires, observation, checklist, and longitudinal techniques. The

mixed-method study utilized survey and observation methods while the qualitative study embarked on a phenomenological approach.

Settings and Sample Size

As shown in Table 1, two studies were identified each from South Korea, Spain, and the United States: one each from Macao China, and Italy. The range of sample size was 15 to 415.

Table 1. Summary of the Eight Documents Published in 2021

Author Names	Research Design & Methodology	Settings & Samples	Findings & Implications (Concerning learning areas)
● **AeRi Jang** ● **Hyunyoung Park**	Mixed method Observation method using Tanner's CJM (video analysis) Use of Cronbach's alpha coefficient Verification of the effectiveness of the scenario application was analyzed using a t-test. Video analysis results on the frequency of students' clinical judgment were examined based on the mean, minimum, and maximum. Resolving observation disagreements: consensual	South Korea 80	Students: Clinical performance skills: increased noticing, interpreting, responding, reflecting skills Self-confidence: increased initiating and revisiting skills (advance care planning) Knowledge: increased interpreting & responding skills to bleeding, pain, nutrition, and education scenarios Teachers: During the simulation-based experience, simulation educators and facilitators should also use effective cues to help participants build self-confidence and achieve expected learning outcomes more attentive to enhancing nursing students' performance in

Table 1. Summary of the Eight Documents Published in 2021 (**continuation**)

Author Names	Research Design & Methodology	Settings & Samples	Findings & Implications (Concerning learning areas)
			the "reflecting" phase of Tanner's model and in "emotional care."
			simulation educator should provide more cues and sufficient time for the nursing students to reach and finish the "reflecting" clinical judgment process in a scenario operation
● **Da-Hye Lee** ● **Eun-Ju Lim**	Pretest–post-test quasi-experimental design Use of Integrative Application of the Situation Background Assessment Recommendation (SBAR) Communication Method for handover knowledge Use of Patient, Assessment, Situation, Safety concerns, Background, Action, and Recommendation method (PASS-BAR) for handover performance Use of the ADDIE model for the research procedure	South Korea 30	Students: Increased handover knowledge of handover education Increased handover performance: Perform a handover of meaningful drugs, treatment, and diet Handover of the patient, room, and diagnosis Perform a handover of a patient's and caregiver's needs Perform a handover of a meaningful situation such as a procedure, date, etc.

Table 1. Summary of the Eight Documents Published in 2021 (**continuation**)

Author Names	Research Design & Methodology	Settings & Samples	Findings & Implications (Concerning learning areas)
	SPSS version 22.0 Handover knowledge, self-efficacy, and handover performance competency of participants, before and after participating in the simulation-based handover education the program was analyzed using a paired t-test.		Perform a handover after recognizing abnormal changes in vital signs Explain falls and their risks Self-efficacy: Even if I fail at first, I do not give up when learning something new. I can perform a sudden handover if a patient has to be taken to the ward. I do not give up on any task and ensure I complete it. I trust myself to perform a handover. I can handle unexpected events during a handover. Teachers: alternate education methods, such as lectures, be provided in addition to simulation-based education providing individual education when designing a simulation-based handover education program

Table 1. Summary of the Eight Documents Published in 2021 (**continuation**)

Author Names	Research Design & Methodology	Settings & Samples	Findings & Implications (Concerning learning areas)
● **Hao-Bin Yuan**	Quantitative Descriptive study The nursing assessment OSCE checklist (NAOC) was developed through the Delphi technique to assess students' nursing assessment skills in terms of patient identification, history inquiry, symptom assessment, physical examination, and humanistic care. A communication evaluation rubric (CER) was developed by the research team to assess therapeutic communication when students conducted a nursing assessment and patient education exercises observation using videos Cronbach's alpha SPSS 26.0 t-test was carried out to compare the mean scores of the NAOC and the CER between male and female students, year 2 and year 3 students, and	Macao, China 54	Students: Nursing assessment: received high scores in conducting blood oxygen saturation and cardiac and lung auscultation the better score for self-introduction and patients appease the better score for checking the patient and doctor's order the better score for causes assessment the better score for abdomen auscultation physical examination Communication: good rating skills in maintaining eye contact and listening Experience: (Student Simulated Patient) The simulation experience provided an avenue for students to implement therapeutic communication within a controlled environment Teachers: Providing feedback during the debriefing reduced students' anxiety

Table 1. Summary of the Eight Documents Published in 2021 (**continuation**)

Author Names	Research Design & Methodology	Settings & Samples	Findings & Implications (Concerning learning areas)
	with or without the experience of simulations or SP interactions the degree of discriminability reflected the ability of items to distinguish students' actual level analyzed by the Pearson correlation coefficient (r-value) between the score of each item and the total score		Foster the nursing students' cultural awareness and train students to assess the patients' feelings and ideas through a systematic clinical thinking mode in which the focus is on both the main clinical manifestations and related clinical manifestations
● **Oscar Arrogante** ● **Eva María López-Torre** ● **Laura Carrión-García** ● **Alberto Polo** ● **Diana Jiménez-Rodríguez**	Quantitative Descriptive cross-sectorial study Checklists IBM SPSS Statistics version 24.0 software for Windows T-test Cohen's d	Spain 234	Students: Nursing assessment: interpret correctly the complementary tests ordered by the physician Clinical Judgement and Decision-Making: Prioritize adequately nursing interventions Clinical Management and Nursing Care: Perform correctly the complementary test ordered by the physician Communication and Interpersonal Relationships: Appropriate communication with the physician Teamwork: Appropriate coordination among team members and demonstrating an effective teamwork

Author Names	Research Design & Methodology	Settings & Samples	Findings & Implications (Concerning learning areas)
			Teachers: Use the high-fidelity virtual OSCEs with standardized patients could be considered as another choice of OSCE not only in the current COVID-19 pandemic but could also be extended to normal situations, even post-pandemic
• Cynda Hylton Rushton • Sandra M. Swoboda • Nancy Reller, • Kimberly A. Skarupski • Michelle Prizzi • Peter D. Young • Ginger C. Hanson	Longitudinal study (Prospective repeated-measures study) 11 survey instruments 6 experiential workshops (4 hours) • Daily technology-enabled mindfulness and reflective practice • Pre- and post curriculum assessment • Self-report One session involved high-fidelity simulation with trained actors and a facilitated reflective debriefing t-tests or $\chi2$ tests	United States 415	Students: Mindfulness: recognizing, analyzing, and responding to ethical challenges and fostering moral resilience Ethical confidence and ethical competence: receiving formal ethics training, suggesting an opportunity to strengthen ethics education in academic and practice settings Work engagement: Exercise moral agency and expanded their commitment to contribute to the work setting. Resilience: 1) developing a personal moral compass; (2) cognitive flexibility, the ability to face one's fears; (3) being optimistic in the face of adversity; (4) altruism; and (5) active

Author Names	Research Design & Methodology	Settings & Samples	Findings & Implications (Concerning learning areas)
			coping skills, mentoring, and a supportive social network
			Teachers: Mindful Ethical Practice and Resilience Academy (MEPRA) maybe most effective as a retention intervention for nurses with less than 10 years of experience.
• **Charles P. Tilley** • **Janna Roitman** • **Kimberly P. Zafra** • **Mary Brennan**	Quantitative pre- and post-surveys Utilization focused evaluation of high-fidelity, simulation-enhanced IPE (Sim-IPE) The Interprofessional Collaborative Competency Attainment Survey (ICCAS) Student satisfaction surveys t-tests STATA V12	United States 115	Students: Communication 1. Promote effective communication among members of an IP team 2. Actively listen to IP team members' ideas and concerns 3. Express my ideas and concerns without being judgmental 4. Provide constructive feedback to IP team members 5. Express my ideas and concerns in a clear, concise manner Collaboration 6. Seek out IP team members to address issues 7. Work effectively with IP team members to enhance care 8. Learn with, from, and about IP team members to enhance care Roles and responsibilities

Table 1. Summary of the Eight Documents Published in 2021 (**continuation**)

Author Names	Research Design & Methodology	Settings & Samples	Findings & Implications (Concerning learning areas)
			9. Identify and describe my abilities and contributions to the IP team
			10. Be accountable for my contributions to the IP team
			11. Understand the abilities and contributions of IP team members
			12. Recognize how others' skills and knowledge complement and overlap with my own Collaborative patient/family-centered approach
			13. Use an IP team approach with the patient to assess the health situation
			14. Use an IP team approach with the patient to provide whole person care
			15. Include the patient/family in decision-making Conflict management/resolution
			16. Actively listen to the perspectives of IP team members
			17. Take into account the ideas of IP team members
			18. Address team conflict in a respectful manner Team functioning
			19. Develop an effective care plan with IP team member

Table 1. Summary of the Eight Documents Published in 2021 (**continuation**)

Author Names	Research Design & Methodology	Settings & Samples	Findings & Implications (Concerning learning areas)
			20. Negotiate responsibilities within overlapping scopes of practice Teachers: Faculty emphasized strong communication and collaboration skills in the design of the simulation experience as these skills is essential for students transitioning into an advanced practice nursing or pharmacist role. Sim-IPE is an effective pedagogy; should be expanded and integrated into all graduate curricula
• Angelo Dante • Vittorio Masotta • Alessia Marcotullio • Luca Bertocchi • Valeria Caponnetto • Carmen La Cerra • Cristina Petrucci • Celeste Marie Alfes • Loreto Lancia	Qualitative phenomenological study in-depth interviews thematic analysis One week before performing the interviews, students were provided with the open-ended questions to allow time to both reflect on their experience and consequently, bring out their most significant perceptions	Italy 15	Students: Pragmatic learning experience: immerged in an educational context that allowed them to put their theoretical knowledge into practice Emotional path: anxiety, embarrassment, and skepticism were relieved Confidence: Improve students' confidence in their technical skills and non-technical skills, such as teamwork abilities

Table 1. Summary of the Eight Documents Published in 2021 (**continuation**)

Author Names	Research Design & Methodology	Settings & Samples	Findings & Implications (Concerning learning areas)
	1) bracketing, 2) intuiting, 3) analyzing, and 4) describing		Expectations: application of theory to practice and the possibility to self-evaluate their ability Teachers: Use multiple exposures to high-fidelity simulation as a pragmatic learning experience enhancing the students' ability to apply theory into practice improve the quality of the learning process, review any phases considered problematic, and guarantee their efficacy Use of scaffolding process by which faculty created learning opportunities with increasing complexity, providing an educational framework for learning by which students attempted to reach new knowledge and skills through their initiative, motivation, and resourcefulness
● **Guillermo Escribano Sánchez** ● **María Ruzafa-Martínez** ● **César Leal-Cost** ● **José Luis Díaz-**	Quasi-experimental study Questionnaire for the Evaluation of Learning Strategies of University Students (CEVEAPEU)	Spain 200	Students: Debriefing phase (learning strategies increased) use of DWGR: self-efficacy and expectations, the value of the task, internal attribution, knowledge of

Table 1. Summary of the Eight Documents Published in 2021 (**continuation**)

Author Names	Research Design & Methodology	Settings & Samples	Findings & Implications (Concerning learning areas)
• **Agea** • **Antonio Jesús Ramos-Morcillo** **Alfonso García Sánchez**	Cronbach's alpha SPSS® v25 program		the objectives and evaluation criteria, self-evaluation, intrinsic motivation, the organization of information, personalization, creativity, critical thinking, the acquisition of information, the elaboration of information, storage, memorization, the use of mnemonic rules, and the use and transfer of information acquired Debriefing phase (learning strategies increased) use of DWOGR: social interaction and learning with peers, and the control of the context Teachers: simulation facilitators use a graphical representation in the analytical phase of the debriefing session when discussing the strengths and weaknesses of the students' behavior.

Review Limitations

This review identified some limitations to fully providing more reliable, accurate, and detailed findings: other documents written in other languages are not included in this review which may have potential data that help elucidate the topic covered; articles that require permission and payments are filtered out which may add to the number of relevant documents for review; the only search database that the researcher look into may miss out more studies from other electronic databases, and the reliance on one year of publication (2021) limited the identification and analysis of the topic. These limitations

were due to the inability of the author to read other languages besides English, limited financial resources, time constraints, perceived lack of reliability of other databases, and being a sole author of this systematic review.

RESULTS

The findings of this study center on its three objectives: 1. to identify specific learning areas that students and their teachers perceived to have obtained after using the HFS; 2. to synthesize the patterns of those learning areas into clustered themes, and 3. to analyze the methodologies used by the authors on how they arrived at their findings. Careful interpretation of the findings is required due to the limitations of the number of articles that were reviewed. All articles were critically analyzed and reviewed from the methodology to the findings. Two themes that covered the purposes of this study are formulated under the headings: Specific Areas of Learnings, and Methodology Review. The specific areas of learnings explicitly found for students and implicitly discussed by teachers are presented in a table.

Specific Areas of Learnings

Almost all research studies that were reviewed presented their findings in terms of the general skills that nursing students were seen to have statistically improved. The researcher had to refer to the tables of each finding to identify those specific areas of learning. Meanwhile, teachers like clinical nursing instructors, facilitators, and physicians who are also educators were not the direct population sample of all studies; thus, a careful reading of what was explicitly and impliedly revealed by the authors on their learnings was considered by the researcher. Tables 2 and 3 below identified those specific learnings one each for students and teachers under clustered themes besides the general and common labeling such as knowledge, performance, and confidence.

Table 2. Identified Specific Students' Learning According to Scenarios, and Four Attributions

Study context & Simulation Scenarios	Individual & Personal Attributions	Cognitive Attributions	Collaboration Attributions	Clinical Performance & Experience Attributions
Patients with upper gastrointestinal bleeding based on Tanner's clinical judgment model	initiating and revisiting skills (advance care planning)	interpreting & responding skills to bleeding, pain, nutrition, and education scenarios	-	noticing, interpreting, responding, reflecting

Table 2. Identified Specific Students' Learning According to Scenarios, and

Four Attributions (**continuation**)				
Study context & Simulation Scenarios	**Individual & Personal Attributions**	**Cognitive Attributions**	**Collaboration Attributions**	**Clinical Performance & Experience Attributions**
Completion of the simulation process: pre-briefing, clinical simulation (simulated clinical scenarios), and debriefing using DWGR and DWOGR	self-efficacy and expectations the value of the task self-evaluation intrinsic motivation	knowledge of the objectives and evaluation criteria critical thinking the acquisition of information, the elaboration of information memorization	social interaction and learning with peers, and the control of the context (DWOGR)	organization of information use and transfer of information acquired use of mnemonic rules
Simulation-based handover education intervention	Explain falls and their risks	communicate well and effectively during handover	handover of meaningful drugs, treatment, and diet handover of the patient, room, and diagnosis handover of a patient's and caregiver's needs handover of a meaningful situation such as a procedure, date, etc. handover after recognizing abnormal changes in vital signs	

Table 2. Identified Specific Students' Learning According to Scenarios, and

Four Attributions (**continuation**)

Study context & Simulation Scenarios	Individual & Personal Attributions	Cognitive Attributions	Collaboration Attributions	Clinical Performance & Experience Attributions
Objective structured clinical examination (OSCE) within a high-fidelity simulation using a student-simulated patient (SSP)	the better score for self-introduction and patients appease implement therapeutic communication within a controlled environment	the better score for causes assessment	good rating skills in maintaining eye contact and listening	received high scores in conducting blood oxygen saturation and cardiac and lung auscultation the better score for checking the patient and doctor's order the better score for abdomen auscultation physical examination
Describe an innovative teaching proposal and compare nursing competence acquisition in final year nursing students through virtual and in-person OSCE modalities	Appropriate communication with the physician	interpret correctly the complementary tests ordered by the physician Prioritize adequately nursing interventions	Appropriate coordination among team members and demonstrating an effective teamwork	Perform correctly the complementary test ordered by the physician

Table 2. Identified Specific Students' Learning According to Scenarios, and

Four Attributions (**continuation**)

Study context & Simulation Scenarios	Individual & Personal Attributions	Cognitive Attributions	Collaboration Attributions	Clinical Performance & Experience Attributions
A curricular intervention using MEPRA	recognizing, analyzing, and responding to ethical challenges and fostering moral resilience developing a personal moral compass being optimistic in the face of adversity altruism	cognitive flexibility, the ability to face one's fears	Exercise moral agency and expanded their commitment to contribute to the work setting. active coping skills, mentoring, and a supportive social network	receiving formal ethics training, suggesting an opportunity to strengthen ethics education in academic and practice settings
Utilization focused evaluation of high-fidelity, simulation-enhanced IPE (Sim-IPE) **All IPE students had completed relevant coursework in health promotion, pharmacology and diagnosis and management of chronic conditions**	Communication: 1. Promote effective communication among members of an IP team 2. Actively listen to IP team members' ideas and concerns 3. Express ideas and concerns without being judgmental 4. Provide constructive feedback to IP team members 5. Express ideas	Roles and responsibilities: 1. Identify and describe my abilities and contributions to the IP team 2. Be accountable for my contributions to the IP team 3. Understand the abilities and contributions of IP team members 4. Recognize how others' skills and knowledge	Collaboration: 1. Seek out IP team members to address issues 2. Work effectively with IP team members to enhance care 3. Learn with, from, and about IP team members to enhance care Collaborative patient/family-centered approach: Use an IP team approach with	Conflict management/resolution Actively listen to the perspectives of IP team members Take into account the ideas of IP team members Address team conflict in a respectful manner

Table 2. Identified Specific Students' Learning According to Scenarios, and

Four Attributions (**continuation**)				
Study context & Simulation Scenarios	**Individual & Personal Attributions**	**Cognitive Attributions**	**Collaboration Attributions**	**Clinical Performance & Experience Attributions**
	and concerns in a clear, concise manner	complement and overlap with my own	the patient to assess the health Situation	
			Use an IP team approach with the patient to provide a whole person Care	
			Include the patient/family in the decision-making	
			Team functioning: Develop an effective care plan with IP team members	
			Negotiate responsibilities within overlapping scopes of practice	

Table 2. Identified Specific Students' Learning According to Scenarios, and

Four Attributions (**continuation**)				
Study context & Simulation Scenarios	**Individual & Personal Attributions**	**Cognitive Attributions**	**Collaboration Attributions**	**Clinical Performance & Experience Attributions**
Phenomenologic al study to nursing students who attended the postgraduate intensive care course	Emotional path: anxiety, embarrassment , and skepticism were relieved	Pragmatic learning experience: immerged in an educational context that allowed them to put their theoretical knowledge into practice	Confidence: Improve students' confidence in their technical skills and non-technical skills, such as teamwork abilities	Expectations: application of theory to practice and the possibility to self-evaluate their ability

Table 3. Explicitly and Implicitly Identified Specific Learnings for Teachers

Study context & Simulation Scenarios	**Innovative Methods**	**Facilitating Techniques**	**Innovative Tools & Materials**
Patients with upper gastrointestinal bleeding based on Tanner's clinical judgment model	-	During the simulation-based experience, simulation educators and facilitators should also use effective cues to help participants build self-confidence and achieve expected learning outcomes more attentive to enhancing nursing students' performance in the	-

Table 3. Explicitly and Implicitly Identified Specific Learnings for Teachers (**continuation**)

Study context & Simulation Scenarios	Innovative Methods	Facilitating Techniques	Innovative Tools & Materials
		"reflecting" phase of Tanner's model and in "emotional care" simulation educator should provide more cues and sufficient time for the nursing students to reach and finish the "reflecting" clinical judgment process in a scenario operation	
Completion of the simulation process: pre-briefing, clinical simulation (simulated clinical scenarios), and debriefing using DWGR and DWOGR	-	-	simulation facilitators use a graphical representation in the analytical phase of the debriefing session when discussing the strengths and weaknesses of the students' behavior
simulation-based handover education intervention	alternate education methods, such as lectures, be provided in addition to simulation-based education providing individual education when designing a simulation-based handover education program	-	-

Table 3. Explicitly and Implicitly Identified Specific Learnings for Teachers (**continuation**)

Study context & Simulation Scenarios	Innovative Methods	Facilitating Techniques	Innovative Tools & Materials
Objective structured clinical examination (OSCE) within a high-fidelity simulation using a student-simulated patient (SSP)	Foster, the nursing students' cultural awareness and train students to assess the patients' feelings and ideas through a systematic clinical thinking mode in which the focus is on both the main clinical manifestations and related clinical manifestations	Providing feedback during the debriefing reduced students' anxiety	
Describe an innovative teaching proposal and compare nursing competence acquisition in final year nursing students through virtual and in-person OSCE modalities	Use the high-fidelity virtual OSCEs with standardized patients	-	-
A curricular intervention using MEPRA	Mindful Ethical Practice and Resilience Academy (MEPRA) maybe most effective as a retention intervention for nurses with less than 10 years of experience.	-	-

Table 3. Explicitly and Implicitly Identified Specific Learnings for Teachers (**continuation**)

Study context & Simulation Scenarios	Innovative Methods	Facilitating Techniques	Innovative Tools & Materials
Utilization focused evaluation of high-fidelity, simulation-enhanced IPE (Sim-IPE) **All IPE students had completed relevant coursework in health promotion, pharmacology and diagnosis and management of chronic conditions**	Sim-IPE is an effective pedagogy; should be expanded and integrated into all graduate curricula	Faculty emphasized strong communication and collaboration skills in the design of the simulation experience as these skills is essential for students transitioning into an advanced practice nursing or pharmacist role.	-
Phenomenological study to nursing students who attended the postgraduate intensive care course	Use multiple exposures to high-fidelity simulation as a pragmatic learning experience enhancing the students' ability to apply theory into practice.	improve the quality of the learning process, review any phases considered problematic, and guarantee their efficacy Use of scaffolding process by which faculty created learning opportunities with increasing complexity, providing an educational framework for learning.	attempted to reach new knowledge and skills through their initiative, motivation, and resourcefulness.

Methodology Review

Overall, the methodologies of the authors based on their chosen research design are found to be reliable and appropriate. Looking at the number of samples of all studies, they are construed to be acceptable considering their scope and limitations. Meanwhile, the statistical treatments of the quantitative studies are varied like the use of Cronbach's alpha coefficient, Cohen's d, t-tests, SPSS 26.0, SPSS® v25 program, IBM SPSS Statistics

version 24.0 software for Windows, SPSS version 22.0, STATA V12, and Pearson correlation coefficient.

Including the mixed-method study, all are viewed as unique as they made use of different frameworks: IPE (Sim-IPE), ADDIE model, and Tanner's CJM; and tools: Interprofessional Collaborative Competency Attainment Survey (ICCAS), Communication evaluation rubric (CER), Nursing assessment OSCE checklist (NAOC), Patient, Assessment, Situation, Safety concerns, Background, Action, Recommendation method (PASS-BAR), Situation Background Assessment Recommendation (SBAR), and Evaluation of Learning Strategies of University Students (CEVEAPEU). All these studies work on simulation scenarios including the use of the HFS procedures where pre-tests and post-tests and observations were the common methodologies.

The lone qualitative research in the form of a phenomenological study is very distinct compared to the other seven articles. It relied on Husserl's descriptive phenomenology where five steps are involved: 1) bracketing, 2) intuiting, 3) analyzing, and 4) describing. The selected excerpts presented in a narrative form, however, appear to be lacking as there could be other themes that failed to be included in the analysis of those lived experiences.

DISCUSSION

On Specific Areas of Learning for Students. The general areas of interest of many studies pertain to knowledge, performance, and confidence. Most of the authors of the eight studies used the same areas; some used elaborated areas while others conceptualized specific learning skills. Given the consolidation of all specific learnings identified from the studies reviewed, the researcher conceptually crafted the areas of Individual & Personal Attributions; Cognitive Attributions; Collaboration Attributions; and Clinical Performance & Experience Attributions to objectively put all those specific learnings under a more flexible clustered theme. It should be noted, however, that these learnings need to be put in the right study context by providing the simulation scenarios of each distinct study.

The "Individual & Personal Attributions" theme deals with any learning that may refer to the "self" or to any personal development to which the learning can be attributed. These may reflect the values, decisions, reflections, and others of the nursing student him/herself who demonstrated an increased skill in those areas (Subotnik, et al., 2019). For instance, one of the studies focused on self-efficacy in which one of the items is: "*Even if I fail at first, I do not give up when learning something new*" found that all nursing students rated themselves high in this specific item despite the statement being generic. Perhaps, closer to the use of HFS, the nursing students, in another study, felt that their "*anxiety, embarrassment, and skepticism were relieved*" after a series of simulation exercises. These learnings are self-inherent.

Next is the "Cognitive Attributions" as a replacement of "knowledge" for the reason that there are mental processes that do not necessarily mean the acquisition of new information. These mental processes can be layered and enhanced depending on specific tasks that require knowledge learning before and after a performance (Jin, et al., 2019). An example of this is "interpret correctly the complementary tests ordered by the physician" and "prioritize adequately nursing interventions." Behavioral terms like "interpret" and "prioritize" in context are suitable references for cognition.

The "Collaboration Attributions" mainly refer to the ability of the nursing student to work with others and to see him/herself as a contributor in the completion of group-related tasks. Such a term is used by the researcher to show how some learnings can be classified as "collaborative learning" rather than learning on improving one's "self-efficacy." The *Confidence: Improve students' confidence in their technical skills and non-technical skills, such as teamwork abilities*" can be very tricky at a glance as it may refer to the development of one's self due to the term "confidence." The classification of this specific learning under "collaboration attributions" is appropriate as the term "teamwork abilities" is an important context of the statement especially so when nursing students improve their confidence when they are given simulation scenarios that assess their ability to work as a team according to one of the studies reviewed (Butcher, et al., 2019).

Finally, the "Clinical Performance & Experience Attributions" encompasses not just performance skills, but also those actual experiences that enhance skills thereby improving performance. The nursing assessment skills like "noticing, interpreting, responding, reflecting" are best learned when they are utilized in a simulation scenario; therefore, mastery of skills means improved clinical performance (Dong, et al., 2022).

On Specific Areas of Learning for Teachers. The process of identifying the specific learnings on the teachers' side was a challenging task for this review as almost all studies were directed at students' context. However, there are two out of the eight articles directly involved the professionals and experts. Careful reading to understand the implications of those students' learnings to teachers' way of facilitating is used as a technique by the researcher.

The clustered themes of "Innovative Methods;" "Facilitating Techniques;" and "Innovative Tools & Materials" are created to classify those learnings by teachers. These learnings are also put in clear contexts to avoid misrepresentation of those explicitly and implicitly statements of the authors.

The "Innovative methods" refer to the innovative approaches that teachers can opt to try when HFS is involved and when the simulation scenario fits the courses and practical training that they need to teach. Naturally, these methods comprised most of the learning from those eight articles as they shape any teaching models. For instance, one of the studies viewed that teacher-facilitator participants learned how to use the Mindful Ethical Practice and Resilience Academy (MEPRA) and concluded that it may be

most effective as a retention intervention for nurses with less than 10 years of experience. It implies that other teachers can also diversity their methods by trying them. Revathi, et al. (2019) claimed that innovative methods can also *empower people, strengthen governance, and galvanize the effort to achieve the human development goal.*

"Facilitating Techniques" simply refers to those techniques used by teachers to facilitate training, lectures, demonstrations, and the like. Half of the studies that were reviewed pointed out some of these techniques like in one of the studies where it revealed that teachers "provided feedback during the debriefing which reduced students' anxiety." The study of Burgess, et al. (2020) re-echoed that teacher feedback optimizes learning, especially in the healthcare learning setting.

The researcher included "Innovative Tools & Materials" although any learnings under it are minimal from the review of the eight studies. Only two were identified from two studies: "*attempted to reach new knowledge and skills through their initiative, motivation, and resourcefulness*" and "*simulation facilitators use a graphical representation in the analytical phase of the debriefing session when discussing the strengths and weaknesses of the students' behavior.*" The first one was identified as a "tool" as it refers to those personal choices of teachers. The choice of starting something new, getting inspired to do something, and finding ways to accomplish something is a personal tool that each individual has. It is just a matter of being aware of it and making it accessible for something productive to be done. Meanwhile, the use of an "innovative material" like the graphical representation added to any learning and facilitating material, as recommended by one of the studies, stands in its context. However, Nes, et al. (2021) cautioned that *pedagogical models for teaching technological literacy in nursing education are also needed.*

CONCLUSIONS AND RECOMMENDATIONS

This review, despite having a considerable number of limitations, highlighted those specific learning areas that the students exhibited after going through the HFS procedures. However, the researcher found that these learning experiences simply can't be classified into three general terms of knowledge, performance, and confidence as those learning areas are best presented and deduced according to scenarios. The researcher attempted to identify those learnings that the teachers, facilitators, and experts may have acquired in the process, which resulted in the concepts of three domains: Innovative Methods, Facilitating Techniques, and Innovative Tools & Materials. More and more innovative frameworks are beginning to flourish in the field which could only mean that the validation of their usefulness is highly needed.

The eight articles reviewed showed that there are no recent research studies conducted solely for teachers, facilitators, and experts in teaching any form of simulation in the field of nursing education; thus, researchers are encouraged to cover areas that can be best explored using these professionals. More research studies should be conducted

on how the HFS is effectively used since 2020 when the pandemic hit the global population as it may provide a better understanding of its practicality. In addition, future research can be conducted on the identified specific learning areas rather than on the general domains of knowledge, performance, and confidence. Researchers who want to try doing systematic reviews such as this can comprehensively identify other learning areas from other various simulation scenarios. It was also revealed that very few researchers use phenomenological studies in the field of nursing education in the context of using any simulation types of different scenarios. Doing this qualitative study may provide a different perspective in investigating similar research topics.

IMPLICATIONS

Identifying specific learning attributes from the practical experience of clinical students and their teachers according to situations and contexts in using HFS will help in creating learning and training modules that will measure and assess students' learning effectively. The use of HFS as a learning innovation can only be appreciated when clinical teachers are also trained in understanding how their students view the different processes of using the HFS.

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