Blended learning in undergraduate nursing education – A scoping review

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A B S T R A C T

Objectives: To provide a comprehensive scoping review of the existing literature regarding the use of blended learning in undergraduate nursing education. To align the varied educational terms and definitions with the broad definition of blended learning.
Design: Scoping review following established methodology.
Data sources: In consultation with library services, the academic literature was searched. Electronic databases searched included ERIC (OVID), Medline (OVID), PubMed, Nursing and Allied Health, and CINAHL Plus.
Review methods: A total of 189 potentially relevant nursing research articles published between the years of 2009 and 2019. Three reviewers independently reviewed the articles, leaving 37 relevant primary articles in the nursing field to be included in the scoping review.
Results: Nursing content delivered using blended learning approaches were organized into 8 themes. Themes include Professional Nursing Skills; Mental Health Nursing; Bioscience; Pharmacology, Specialty Populations; Nursing Assessment; Acute Care Nursing; and the Art of Nursing. A variety of blended learning approaches are being utilized in Undergraduate nursing education, the majority of which are happening in the classroom.
Conclusion: This scoping review presents explicit the degrees to which blended learning is referred to in the nursing education literature and expanded the definition of blended learning to encompass the terminology associated with distributed, decentralized, hybrid, and flexible learning. There is a wide, varied, and expanding number of blended learning approaches currently being utilized in nursing education to teach a wide range of nursing content and skills. An expanded scoping review focused on blended learning in psychiatric nursing, licenced practical nursing, nurse practitioners, and all graduate level nursing education programs is recommended as is additional research into the use of blended learning in the lab or clinical setting.

1. Introduction

Higher education systems continue to evolve in response to societal and technological changes. An example of this evolution in nursing education is the merging of traditional face-to-face learning systems with educational and communication technology, creating new blended methods to deliver nursing education curriculums (Graham, 2006; Fletcher et al., 2007). Blended learning eliminates the problem of geographical proximity, leveraging technology to provide an alternative enrollment and content delivery option for students who do not live close to a parent institution (Madison, 2013). Benefits to institutions with strong blended learning courses and programs include the ability to meet workforce demands, increased student drawing the pool, enhanced competitiveness with other programs, and a greater diversity in the student population (Madison, 2013; Martin et al., 2015). There is however a problem with the literature on blended learning in nursing education. The literature is splintered into a variety of terms with

varied definitions, many of which overlap each other, creating a muddled and unstable body of knowledge that makes future research more complicated (Martin and Trigwell, 2005; Siemens et al., 2015). It needs to be consolidated into a more cohesive and stable body of nursing research. The address this need, a comprehensive scoping review of the existing literature regarding the use of blended learning in undergraduate nursing education was completed.

2. Background

For consistency is this review, blended learning will be defined as any combination of face to face instruction with technology-mediated instruction, where all participants in the learning process are separated by distance some of the time (Siemens et al., 2015). This definition encompasses blended learning, distributed learning, decentralized learning, hybrid learning, and flexible learning. Although these learning approaches are slightly different, they all negate the problem

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of geographical distance between instruction sites and focus on learner-to-learner as well as instructor-to-learner interaction (Madison and Kumaran, 2016). In addition, blended learning approaches allow for institutions or programs to reduce course delivery costs and build program capacity by enhancing student drawing pools regionally, nationally, and internationally (Dietrich et al., 2013). Students also appreciate the flexibility that blended learning approaches offer, leading to better student engagement than distance education (O'Connor et al., 2011).

For consistency across this review, all the exemplars identified from the literature that include technology merged with a physical lab, classroom, or clinical learning experience will be referred to as blended learning. The aim of this scoping review is to examine and summarize the existing literature regarding the use of blended learning in undergraduate nursing education and organize them into a structure from which the reader can obtain a foundational understanding of the topic from a nursing perspective.

3. The review

Scoping reviews can be conducted to map a body of literature with relevance to time, location (e.g. country or context), source (e.g. peer-reviewed or grey literature), and origin (e.g. healthcare discipline or academic field) (Peters et al., 2015). They are particularly useful for bringing together literature in disciplines such as nursing that have emerging evidence in an area, as they are well suited to address questions beyond those related to the effectiveness or experience of an intervention (Peters et al., 2015). This scoping review follows the five-stage review process as identified by Arksley and O'Malley (2005) and later refined by Levac et al. (2010) and Peters et al. (2015). This methodological framework includes the following stages: Identifying the research question; Identifying relevant studies; Study selection; Charting the data; and Collating, summarizing, and reporting the results. The following research questions were created to help guide this scoping review: What blended learning approaches are currently utilized in undergraduate nursing education? What nursing content is being taught using blended learning approaches?

3.1. Literature search

A search of the academic literature was completed in the following databases: ERIC (OVID), Medline (OVID), PubMed, CINAHL Plus with Full Text, and Nursing and Allied Health Database (Fig. 1). The inclusion criteria included journal articles that were peer-reviewed, English-language with Full-text available, published within the last ten years, and nursing-specific at the undergraduate level. Articles involving graduate, nurse practitioner, and diploma-to-degree bridging programs; involving the review of an entire blended program; distance learning with no face-to-face component; or focused on the faculty experience involving implementation of blended approaches or transition to a blended program or course were excluded.

Databases were searched using the following search terms, and titles and abstracts were assessed to determine if articles met the inclusion criteria. In this scoping review, key search terms were identified, and the following search strings were developed to search the databases; "Distributed Learning OR Learning Evaluations", "Distributed Learning OR Online Education", "Blended Learning", "Blended Learning OR Nursing", and "Flexible Learning AND Nursing Education". From ERIC (OVID), this search yielded 35 articles, Medline (OVID) yielded 7 articles, PubMed yielded 55 articles, CINAHL Plus with Full Text yielded 22 articles, Nursing and Allied Health Database yielded 82 articles.

In total, 201 records were retrieved from the data-base searches. After duplicates were removed, one hundred and eighty-nine papers were determined to be potentially relevant. After the titles and abstracts of the documents were screened, an additional 94 documents were excluded. Upon full text screening, an additional 58 documents were

excluded, leaving 37 documents that were included in the scoping review.

A review of these articles was undertaken by the research team which consisted of three members to enhance the reliability of the data collection and inductive content analysis. The charting of data involved the extraction of pertinent information from the included articles and entry into a spreadsheet and exported as a chart (Table 1).

4. Results

4.1. Numerical analysis

This review revealed a total of 37 research articles, published between the years 2011 and 2018 with almost half of the articles being published in the last year. This increase in publication frequency is noteworthy as the total number of articles published in the last 7 years prior to 2018 is only slightly more (18) than of those published in 2018 (15), possibly indicating an increased interest in blended learning in nursing education. Twenty-nine of the articles were focused on projects that took place in the classroom, with four focused on clinical teaching, and four focused on lab teaching. The 37 articles in this review were authored by a total of 103 people. There were six authors who contributed to two publications and a single author who contributed to three publications. Geographically, a total of four studies from Canada, ten from the US, three from the UK, ten from Australia, and single projects from Singapore, Norway, Malaysia, Korea, Taiwan, Ireland, China, and Brazil. Within the 37 articles reviewed, there were 7 qualitative projects, 14 quantitative projects, and 16 mixed methods projects.

4.2. Overview of content themes

Data from this extensive review was interpreted and organized into 8 content themes (Table 2). The themes include Professional Nursing Skills; Mental Health Nursing; Bioscience; Pharmacology, Specialty Populations; Nursing Assessment; Acute Care Nursing; and the Art of Nursing.

4.2.1. Theme - Professional Nursing Skills

The Professional Nursing Skills theme emerged from seven articles that focused on blended learning approaches to teach ethics, health education, supervisor skills, and research. The article by Hsu (2011) utilized a blended learning format to encourage meaningful learning of ethical issues in nursing practice. Specially created online learning scenarios with an ethics focus were integrated into a classroom learning environment, blending online and classroom learning environments. Findings from this article indicated a correlation between student satisfaction with blended learning and their attitudes towards case analysis as a teaching approach used in teaching nursing ethics (Hsu, 2011). Blended learning was used by Choi and Kim (2018) in a project focused on increasing flexibility in learning and building competency in nursing students' health education knowledge. This blended approach involved E-learning scenarios on smoking cessation being integrated into an existing, classroom based, smoking cessation program. Findings from this study indicate that a blended learning approach enhanced student ability to teach patients and that it provided more flexibility in student learning than traditional classroom instruction. In the article by McCutcheon et al. (2018), an online clinical supervisee skills training app was tested in a randomized, controlled trial to determine if blended learning improved learner knowledge, satisfaction, motivation and attitudes towards clinical learning of supervisor skills compared to online-only delivery. Results confirmed that the use of the online clinical supervisee skills training app improved learner knowledge, satisfaction, motivation, and attitudes (McCutcheon et al., 2018). Sowan and Jenkins (2013) studied the impact of the seven principles of effective teaching on the quality of blended course delivery, finding that student
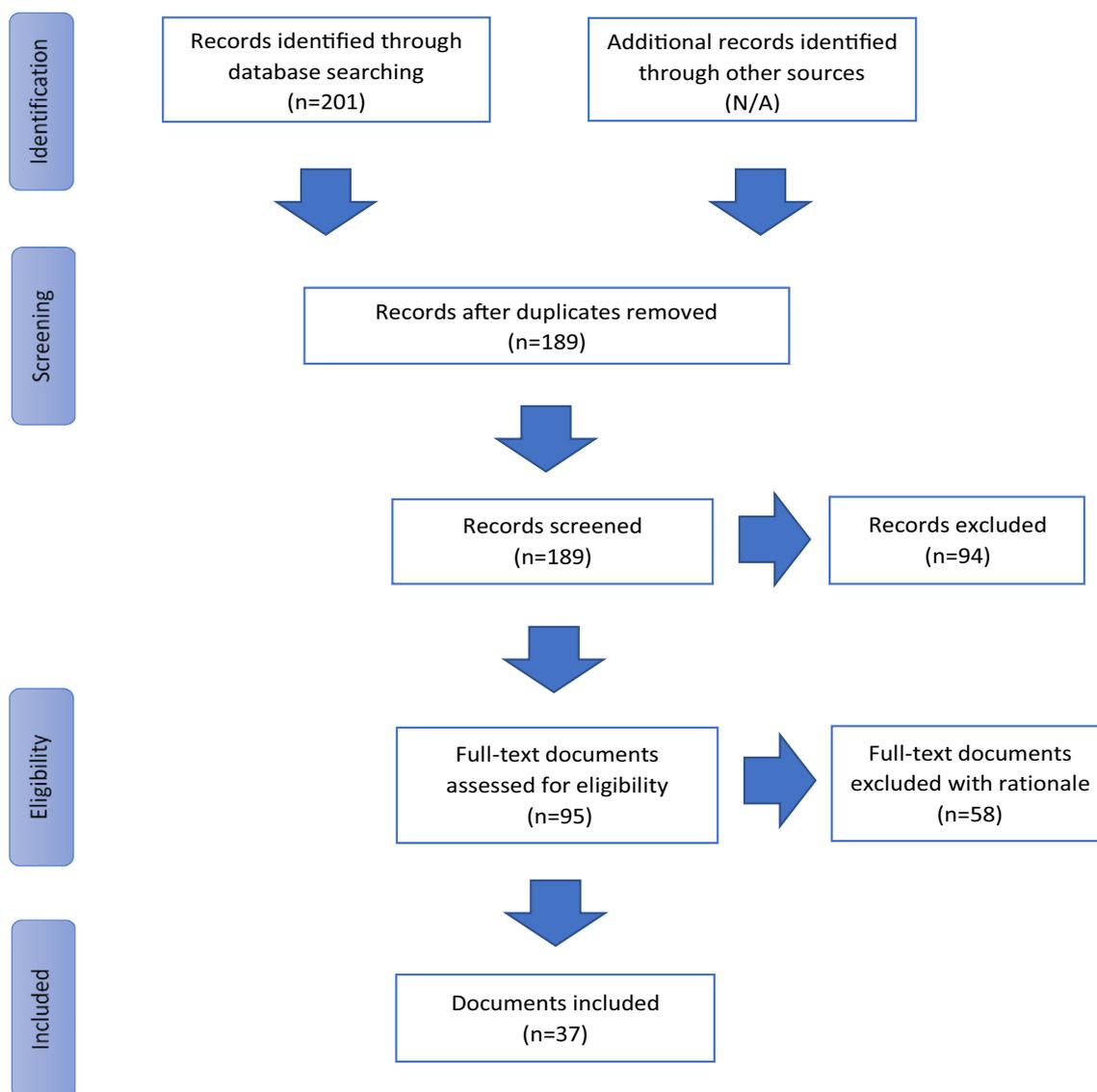
Fig. 1. PRISMA flowchart of included articles.

performance in the blended course improved compared to previous courses that did not employ the seven principles of effective teaching. This study integrated the Blackboard learning management system (LMS) and Tegrity video capture systems into the classroom. Gagnon et al. (2013) compared student "knowledge, satisfaction, and self-learning readiness" outcomes in the blended learning format and a traditional classroom format, findings included no significant differences in the three outcomes identified, though the blended learning format was more effective for learners with lower levels of motivation. The blended approach for this project involved internet-based tutorials and a traditional classroom learning environment. Gallegos and Nakashima (2018) determined that the blended learning application helped engage students and supported student interaction and knowledge application. This project provided students access to iPad's during class time to access online resources. Strickland et al. (2012) explored the usefulness of podcast-based blended learning to encourages students to apply research skill and knowledge in a practical fashion, with results indicating that diversity in blended learning formats, including podcasts, helped to increase student understanding and application of research skills.

4.2.2. Theme - Mental Health Nursing

Mental Health nursing was present in two articles where blended learning strategies were used to teach mental health related content. Furnes et al. (2018) studied student perspectives regarding the use of a blended learning approach to deliver low-cost, yet effective education. This study used online videos accessible through an LMS as part of a traditional classroom-based course. Findings included student satisfaction and perceived improvements in mental health communication upon completion of the course (Furnes et al., 2018). Kidd et al. (2012) sought to determine the usefulness of the blended learning platform, Second Life®, to simulate realistic situations in a risk-free educational setting, where no harm may come to patients. For this project, students needed to complete mental health learning scenarios created within Second Life® as part of a classroom-based course. Findings concluded that the blended learning strategy was effective in teaching mental health nursing content (Kidd et al., 2012).

4.2.3. Theme - Bioscience

The theme of "Bioscience" consisted of six articles. Garnett and Button (2018) aimed to determine student motivation as a result of digital badge use and established digital badges to signify preparation in a flipped classroom context. Results indicated that students who self-

Table 1
Reviewed article information.

Author(s)	Year	Sample	Objective	Methodology	Summary of findings	Country	Content focus
Al-Hatem, Masood, & Al-Samarraie	2018	218	To explore the use of Second Life (SL) to build students' confidence, motivation and self-regulated learning.	Quantitative	SL can positively affect learning. Confidence and motivation. Enhancing self-regulated learning.	Malaysia	Emergency room assessment
Alvarez, Dal Sasso, & Lyengar	2017	75	To evaluate a blended learning approach to teach the assessment of acute pain in adults and newborns.	Quantitative	Notes significant differences in student learning. Mobile technology was a persuasive method.	Brazil	Acute pain assessment
Blissit	2016	56	To compare learning outcomes and satisfaction in a traditional and blended pathophysiology course.	Quantitative	No difference in learning outcomes, enhanced student satisfaction. Recommend further research.	US	Patho
Blum	2018	38	To examine the benefit of podcast in teaching critical thinking.	Quantitative	No difference in critical thinking outcomes. Students valued the podcasts, more research needed with diversified demographics.	US	Critical thinking skills
Cant, Young, Cooper, & Porter	2015	367	To explore nursing students' views on a web-based simulation program.	Mixed methods	Was functional, feasible, and easy to use and was reported to have high fidelity and realism. High satisfaction.	Australia	Assessment
Choi, Kim	2018	44	To evaluate student competence and motivation from a blended learning course on smoking cessation intervention for smokers.	Quantitative	Concluded that the blended learning approach was effective.	Korea	Health education
Coyne, Frommolt, Rands, Kain, & Mitchell	2018	91	To view best practice and provide links between theory and practice by using simulation videos in a blended learning context.	Quantitative	Successfully increased students' self-assessment of their knowledge. Recommend additional research in blended learning is needed.	Australia	Child & family
Croteau, Howe, Timmons, Nilson, & Parker	2011	53	To determine if the use of The Village improved scores of nursing students on a national normalized computer-based pharmacology test.	Quantitative	Improved student understanding. Recommend additional research on Pharmacotherapy with larger samples.	US	Pharmacology
Furnes, Kvaal, & Hoye	2018	100	To explore students' experiences of a blended learning mental health nursing communication course.	Mixed methods	Blended learning viewed as useful, flexible. Preferred teacher be present for videotaped simulations.	Norway	Mental health communication
Gagnon, Gagnon, Desmartis, & Njoya	2013	102	To determine the effectiveness of a blended learning intervention on student knowledge, satisfaction, and self-learning readiness.	Quantitative	Blended approach had no direct impact on the 3 outcomes measured. Online modules effective for students with low motivation.	Canada	Research
Gallegos & Nakashima	2018	58	To describe the use of iPads and Nearpod interface in an undergraduate nursing class.	Mixed Methods	Students found iPads very useful, Nearpod engaged students, enhanced learning and minimized distractions.	US	Research
Garnett & Button	2018	272	To explore the use of digital badges as motivation to prepare for bioscience classes.	Quantitative	Digital badges may work for motivated students who enjoy games. Recommend further research.	Australia	Bioscience
Hanson	2016	51	To explore student experiences with a flipped classroom approach in a pharmacology class.	Mixed Methods	Students who engaged in flipped activities performed better. Not well received by all students.	Australia	Pharmacology
Harrington, Vanden Bosch, Schoofs, Beel-Bates, & Anderson	2015	82	To objectively compare learning outcomes in the same class using flipped and traditional strategies.	Quantitative	No statistical difference in any of the grade outcomes. Concluded that Flipped learning was as effective as traditional pedagogy.	US	Medical surgical theory
Harris, Purnell, Fletcher, & Lindgren	2013	16	To help prepare students to provide both culturally sensitive and competent care through online learning.	Qualitative	Students more aware of their own biases and the importance of being prepared to provide culturally sensitive care.	US	Cultural competency
Heidke, Howie, & Ferdous	2018	32	To determine if healthcare consumer voice vignettes can increase student empathy.	Quantitative	Students had statistically significant higher empathy scores after viewing consumer voice vignettes online.	Australia	Caring/helping skills
Hsu Hsu & Hsieh (2 articles)	2011	99	To explore (1) the students' satisfaction and attitudes, (2) relationship between satisfaction and attitudes in BL.	Quantitative	Correlations between students' satisfaction with blended learning and case analysis attitudes.	Taiwan	Ethics
Johnston, Barton, Williams-Pritchard, Todorovic	2018	2500	To describe the impact of open source, high-quality YouTube video use in nursing and paramedic education.	Mixed methods	Enhanced access (number of views) and duration of watching time. Enhanced student engagement was the most valuable contributor to academic success.	Australia	Physiology
Johnston, Massa, & Burne	2013	499	To compare students who had access to recorded lectures online and those who didn't have access.	Quantitative	Weak relationship between access to recorded lectures and overall performance in the course. Overall academic performance decreased.	Australia	Anatomy and physiology
Kidd, Knisley, & Morgan	2012	126	To assess the effectiveness of a Second Life® (SL) virtual simulation as a teaching strategy.	Quantitative	Moderately effective as an educational strategy. Technical difficulties were experienced.	US	Mental health assessment
Lister, Vaughn, Brennan-Cook, Molloy, Kuszajewski, & Shaw	2018	73	To teach students about telenursing for screening, assessment, and patient education during a home visit.	Mixed methods	Telenursing was a beneficial method to effectively teach learners.	US	Geriatric assessment

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Table 1 (*continued*)

Author(s)	Year	Sample	Objective	Methodology	Summary of findings	Country	Content focus
Massey, Byrne, Higgins, Weeks, Shuker, Coyne, Mitchell, & Johnston	2017	176 [24%]: Second survey	To implement and evaluate an innovative approach to preparing students for Objective Structured Clinical Examinations (OSCE) in an acute care nursing course.	Mixed methods	Online OSCE exemplars increased self-rated student confidence, knowledge, and capacity to prepare and provided clarity around assessment expectations. OSCE exemplars were well received and accessed frequently. Did not enhance performance.	Australia	OSCE acute care
McCutcheon, O'Halloran, Lohan	2018	122	Will students who received clinical supervisee skills training via a blended learning approach score higher in terms of motivation and attitudes towards clinical supervision, knowledge of clinical supervision and satisfaction of learning method, than those who received an online only teaching approach.	Multi-method	Blended learning provides added pedagogical value when compared to online learning in terms of teaching undergraduate nurses' clinical supervision skills.	UK	Supervisor skills
Missildine, Fountain, Summers, & Gosselin	2013	589	To determine the effects of a flipped classroom and innovative learning activities on academic success and student satisfaction.	Quantitative	Blending learning with interactive classroom activities can result in improved learning but not necessarily improved student satisfaction.	US	Adult health
Neumeier, & Small	2014	20	To examine asynchronous online discussion as a format for clinical post-conference.	Mixed methods	Enhanced flexibility, engagement, and satisfaction. Challenging for some students. More research recommended	Canada	Communications
O'Flaterty, & Laws	2014	236	To explore student utilization and perceived benefits from participating in web-based virtual classroom and provided a comparison of scholastic outcomes using course grades.	Mixed methods	Initial results suggest that blended approach with academic support may have increased student retention and final course pass rates compared to those who did not take up the VC tutoring.	Australia	Anatomy and physiology
Raymond, Jacob, Lyons	2016	35	To explore student opinions of working in peer groups for online learning sessions in a pharmacology course.	Qualitative	Enhanced convenience and ease of completion. Some technology issues. Not preferred by all students	Australia	Pharmacology
Redmond, Davies, Cornally, Adam, Daly, Fegan, & O'Toole	2018	192	To evaluate the educational attributes of a blended learning approach to teach wound care skills.	Mixed methods	Enhanced wound care outcomes and competency. High student satisfaction regarding perceived usefulness, impact, access and integration.	Ireland	Wound care
Shang, Lui	2018	108	To address the challenges of teaching of physiology. To engage students in a more active and individual form of study.	Quantitative	Enhanced flexible learning time and improvement of independent study skills.	China	Physiology
Shaw, Molloy, Vaughn, Crego, Kuszajewski, Brisson, & Hueckel	2018	84	To examine the feasibility and acceptability of using telepresence robots in clinical education.	Mixed methods	Concluded that telepresence robots are a feasible option for clinical simulation. Some problems with program integration.	US	Pediatrics
Shorey, Kowitlawakul, Devi, Chen, Soong, & Ang	2018	124	To examine the effectiveness of blended learning pedagogy in teaching communication skills	Quantitative	Enhanced course satisfaction, better attitudes towards communication skills, improved communication self-efficacy.	Singapore	Communications
Shorey, Siew, Ang	2018	74	To explore first year student experiences with blended learning pedagogy.	Qualitative	Enhances learning outcomes and confidence in using communication skills.	Singapore	Communications
Sowan & Jenkins	2013	105	To examine the value of using the seven principles of effective teaching to design and deliver a research course using a blended learning design.	Mixed methods	Blended learning course had successful student learning outcomes.	US/Jordan	Research
Strickland, Gray, Hill	2012	71	To evaluate the use of Podcasts in a research course aimed at bridging the theory/practice gap.	Mixed methods	Enhanced student understanding of content. Some issues related to technology reliability.	UK	Research
Swift, Efstathious, Lamea	2016	129	To evaluate the use of LabTutor in combination with classroom teaching approaches.	Mixed methods	Decreased student anxiety about computer-based learning. Enhanced confidence in anatomy and physiology knowledge.	UK	Process of learning physiology
Terry, Moloney, Bowtell, & Terry	2016	179	To implement a blended learning approach and evaluate the student learning outcomes and perceptions of device use.	Mixed methods	Blended approach had better learning outcomes compared to face-to-face instruction.	Australia	IV pump
Verkuyl, Hughes, Tsui, Betts, St-Amant, & Lapum	2017	20	To explore students' experiences with the Virtual Gaming Simulation.	Qualitative	Virtual gaming simulation can provide experiential learning opportunities in a safe and realistic environment.	Canada	Health assessment

Table 2
Content themes.

Category	Articles	Year	Content	Environment	Method	Country
Professional Nursing Skills	Hsu	2011	Ethics	Classroom	Quan	Taiwan
	Choi & Kim	2018	Health education	Classroom	Mixed	Korea
	McCutcheon et al.	2018	Supervisory skills	Classroom	Qual	UK
	Gagnon et al.	2013	Leadership	Classroom	Quan	Canada
	Sowan & Jenkins	2013	Research	Classroom	Mixed	US/Jordan
	Gallegos & Nakashima	2018	Research	Classroom	Mixed	US
	Strickland et al.	2012	Research	Classroom	Mixed	UK
Mental Health Nursing	Furnes et al.	2018	MH communication	Classroom	Mixed	Norway
	Kidd, Knisley, & Morgan	2012	MH theory	Classroom	Qual	US
Bioscience	Garnett & Button	2018	Bioscience	Classroom	Quan	Australia
	Shang & Liu	2018	Bioscience	Classroom	Mixed	China
	Johnston et al.	2018	Physiology	Classroom	Mixed	Australia
	Swift et al.	2016	Physiology	Lab	Qual	UK
	Johnston et al.	2012	Anatomy & physiology	Classroom	Mixed	Australia
	O'Flaherty & Laws	2014	Anatomy & physiology	Classroom	Mixed	Australia
Pharmacology	Croteau et al.	2011	Pharmacology	Classroom	Quan	US
	Hanson	2016	Pharmacology	Classroom	Mixed	Australia
	Raymond et al.	2016	Pharmacology	Classroom	Qual	Australia
Specialty Populations	Missildine	2013	Adult health	Classroom	Quan	US
	Coyne et al	2018	Child & family	Classroom	Quan	Australia
	Shaw et al.	2018	Pediatrics	Clinical	Mixed	US
	Lister et al.	2018	Geriatrics	Clinical	Mixed	US
Nursing Assessments	Verkuyl et al	2017	Health assessment	Classroom	Qual	Canada
	Al-Hatem et al	2018	ER assessment	Classroom	Quan	Malaysia
	Cant et al	2015	Assessment	Lab	Mixed	Australia
	Alvarez et al	2016	Acute pain assessment	Classroom	Quan	Brazil
Acute Care Nursing	Blissit	2016	Patho	Classroom	Quan	US
	Harrington	2015	Medical surgical theory	Classroom	Quan	US
	Redmond et al	2018	Wound care	Classroom	Mixed	Ireland
	Terry et al	2016	IV pump	Lab	Mixed	Australia
	Massey et al	2017	OSCE acute care	Lab	Mixed	Australia
The Art of Nursing	Neumeier & Small	2014	Communications	Clinical	Qual	Canada
	Blum	2018	Critical thinking	Classroom	Quan	US
	Shorey et al.	2018	Communications	Classroom	Mixed	Singapore
	Shorey, Siew, Ang	2018	Communications	Classroom	Qual	Singapore
	Heidke	2018	Caring/helping skills	Classroom	Quan	Australia
	Harris et al	2013	Cultural competencies	Classroom	Qual	US

reported an interest in digital badges were motivated to prepare for classroom sessions if digital badges were available as an incentive (Garnett and Button, 2018). Johnston et al. (2018) developed and integrated supplemental YouTube videos as a blended learning strategy to maintain student interest and engagement in a physiology class, which has been a source of learner stress due to the rapid pace and perceived content difficulty. The developed YouTube video resources were well-received by students and widely accessed (Johnston et al., 2018). Blended learning, in the form of online learning scenarios integrated into a traditional classroom, was utilized by Shang and Liu (2018) to increase student engagement and allow customization of physiology content to meet individual learner needs and the challenges associated with teaching large physiology classes. Most surveyed students preferred the blended learning format compared to the traditional in-class format due to the increased flexibility and independence the blended course provided (Shang and Liu, 2018). Blended strategies were used in another bioscience focused study to address concerns associated with increased class sizes (Johnston et al., 2013). Findings showed that while students appreciated the flexibility of recorded lectures, in-class attendance decreased and access to recorded lectures was only was only weakly related to overall academic performance in the course (Johnston et al., 2013). O'Flaherty and Laws (2014) explored utilization, perceptions, and academic outcomes of distance students in web-based virtual classrooms, as a strategy to allow students to learn in remote areas through social interactions that virtual classrooms provide. Students voluntarily participated in the virtual classroom and course pass rates improved compared to previous cohorts (O'Flaherty and Laws, 2014). Swift et al. (2016) explored the use of LabTutor, a blended strategy to supplement bioscience learning while maintaining a

traditional classroom structure, with students reporting that LabTutor was useful and enjoyable.

4.2.4. Theme - Pharmacology

Examples of blended learning approaches to teach Pharmacology were found in three articles. Croteau et al. determined if the use of "The Village" could improve student scores on a standardized computerized pharmacology test by promoting deeper understanding of pharmacology and allowing for practical application of pharmacological concepts (Croteau et al., 2011). Results supported the hypothesis that student academic outcomes and practical application would improve with the use of "The Village" (Croteau et al., 2011). Hanson (2016) focused on understanding the student perspective of the flipped classroom approach, including their views on blended learning and concluded that this blended approach engaged students and enhanced the learning of drug mechanisms of action and drug interactions. Raymond et al. (2016) determined student perceptions of peer group work and implemented the flexible blended approach of peer learning in an online course to encourage collaboration and discussion between students. Results indicated that most students enjoyed the online peer groups, though some preferred alternate learning styles, therefore peer groups may serve as a valuable component of a larger blended course structure (Raymond et al., 2016).

4.2.5. Theme - Specialty Populations

Four specialty populations were identified and organized into a theme. Lister et al. (2018) used telepresence technology as a tool to help Geriatric assessment in a clinical situation to improve patient's outcome and reduce costs. This project encouraged students to

recognize the need to change their communication styles while using telepresence technologies and recognize the vital role that telehealth will play in the future of healthcare (Lister et al., 2018). According to Shaw et al. (2018), reasons that make integrating telehealth technology into health care student's curricula beneficial are that is; eliminates location as a barrier; has potential to enhance the engagement of health care students with patients and other clinicians; can be used as to find and link additional placement sites. The importance of family-centered care in the existing complex healthcare environment is highlighted in nursing education, Coyne et al. (2018) found simulation video as a useful blended method of presenting this information to nursing students. The study showed that simulation videos could increase the students' confidence and knowledge about Child and Family care and suggested to incorporate to develop future courses. Results of Missildine et al. (2013) study indicated that flipping the classroom decreased student's attrition rates, enhanced student learning, and no impact on student satisfaction.

4.2.6. Theme - Nursing Assessment

This theme consists of four articles focused on assessment. Cant et al. (2015), employed FIRST2 ACT Web, a web-based simulation program, as a blended learning approach in the lab environment to teach students how to assess the needs of a deteriorating patient. Findings indicate that student satisfaction and learning outcomes were enhanced after using the FIRST2 ACT Web online simulations. Al-Hatem et al. (2018) used Second Life®, an online virtual world, to build student confidence and motivation and enhance the quality of their self-regulated learning. Alvarez et al. (2017), used m-OVADor (Mobile Virtual Learning Object for the Assessment of Acute Pain), accessed online via a mobile device, to adequately assess a patient's pain in the clinical learning environment. Verkuyl et al. (2016), utilized a 3-D virtual gaming situation as a safe learning environment to facilitate a health assessment course for nursing students in order to apply knowledge, advance their skills, and reflect on clinical decision making while receiving immediate feedback. Findings from all four studies indicated that the blended approach resulted in good learning outcomes and high levels of student satisfaction.

4.2.7. Theme - Acute Care Nursing

This theme consists of five articles focused on content associated with acute care nursing. Blissitt (2016) and Harrington et al. (2015) compared face-to-face lecture with Blended and Flipped classrooms respectively to find the best content delivery practice to nursing students. Both studies found no statistically significant difference between the blended teaching approach and face-to-face learning and suggest that further investigation is needed to demonstrate which approach is more appropriate for students in terms of learning outcomes. Findings from Terry et al. (2016) showed that although there was no difference between students who used an online intravenous pump emulator (IVPE) and those in face-to-face classes, students who were assigned to a group with access to both IV pump and IVPE showed significantly better results compared to those in the face-to-face group. Massey et al. (2017) and Redmond et al. (2018) were focused on improving student preparation for real-life clinical situations by integrating digital online learning activities into the classroom. Results showed that video exemplars decreased student anxiety associated with OSCE preparation but did not significantly increase student performance (Massey et al., 2017); while Reusable Learning Objects (RLOs) proved to be effective in enhancing student knowledge and practice-based learning (Redmond et al., 2018).

4.2.8. Theme - the Art of Nursing

This theme pulls together six studies. Patients and their families expect nurses to be caring, compassionate, culturally competent, excellent communicator's, and critical thinkers. This knowledge and skills are associated with the art of nursing and are necessary to provide high quality patient centered care (Palos, 2014). Studies from Shorey et al. (2018a) and Shorey et al. (2018b) explored and examined the effectiveness of a blended learning course to teach communication skills. In this project, an online learning component was integrated into a traditional classroom-based course. Both studies showed that blended learning approaches can be used to build strong communication skills in nursing students. Neumeier et al. (2014) employed an asynchronous online post-conference as a way for those who have personal or contextual problems to reflect on clinical practice. Results showed that although asynchronous online clinical post-conference was perceived as effective by students, additional research is needed to further investigate the impact of asynchronous online clinical post-conference on student learning outcomes. Blum's (2018) study focused on using online podcasts to enhance the critical thinking skills of student nurses. Results indicated that the online podcasts were well liked by the students but did not significantly improve their critical thinking skills. Heidke et al. (2018) utilized a blended course design to incorporate the patient perspective or 'consumer voice' into the classroom and tested its efficacy in increasing student's empathy towards vulnerable, disadvantaged and stigmatised population groups. Results from this project were positive, indicating that there was a statistically significant increase in students' empathy towards these population groups. Harris et al. (2013) conducted a four-week blended learning summer course as a strategy to prepare nursing student to be able to provide culturally sensitive and competent patient care. Results were encouraging, indicating that students felt that this approach to teaching cultural competence was effective, with researchers recommending extension of the four-week course to a full semester to further determine the effectiveness of the strategy.

5. Discussion

This scoping review pulls together the nursing literature on distributed, decentralized, hybrid, and flexible learning, and aligns it with the larger body of nursing research focused on blended learning, creating the most comprehensive scoping review on the topic to date. Most of the articles reviewed merged technology with the face-to-face classroom environment, with only four articles focusing on the lab setting (Cant et al., 2015; Massesy et al. 2017; Swift et al., 2016; Terry et al., 2016) and three articles focusing on the clinical setting (Lister et al., 2018; Neumeier and Small, 2014; Shaw et al., 2018). This itself is significant, indicating that there is heavy utilization of blended learning approaches to address problems associated with content taught in the classroom and that there is a paucity of literature related to the potential of blended learning approaches in lab and clinical environments.

Though all the articles reviewed utilized teaching approaches that fit with the definition of blended learning, it is quite clear that nurse researchers are still using different terms to describe the wide range of configurations that blend traditional teaching approaches with educational technologies in nursing education. This scoping review reinforces the position that, from a nursing education perspective, blended learning encompasses the terms distributed learning, decentralized learning, hybrid, and flexible learning, and advocates for the use of a single term to unify future research in this field. All the articles reviewed included a blended learning approach that merged technology with a physical learning environment and addressed primarily the problem of geography while offering students enhanced access to content and flexibility to their learning.

The range of blended learning approaches identified in this scoping review is wide and varied. Of the 37 articles in this review, 10 specifically mentioned the use of a type of LMS and an additional 9 articles mentioned the use of online content delivery, a key feature of learning management systems. Six articles use blended approaches that are described as simulation online video scenarios (Cant et al., 2015; Hsu, 2011; Hsu and Hsieh, 2011; Johnston et al., 2018; Redmond et al., 2018; Terry et al., 2016). Other blended learning approaches

mentioned the use of podcasts (Blum, 2018), E-learning (Choi and Kim, 2018), WebCT (Strickland et al., 2012), and lecture capture (Missildine et al., 2013). Two articles describe the use of web-based virtual classrooms (Croteau et al., 2011; O'Flaherty and Laws, 2014) two articles mentioned the use of remote presence and/or telepresence technology (Lister et al., 2018; Shaw et al., 2018), and an additional two articles involving the use of custom-built application for a handheld smart device (Alvarez et al., 2017; Gallegos and Nakashima, 2018). Two other articles involve blended approaches that utilize Second Life (Kidd et al., 2012; Al-Hatem et al., 2018), a virtual gaming platform that allows users to access an online 3-D virtual world. Another article blended a different virtual gaming platform with online learning modalities and lecture time (Verkuyl et al., 2017). A single article involved the use of LabTutor, a software suite developed by ADInstruments Inc. which provides a range of hands-on laboratory background for students including experimental background and protocols, data acquisition and analysis, and report generation (ADInstruments, 2019). This list of examples of blended learning approaches is not exhaustive, as the inclusions and exclusion criteria for this scoping review potentially eliminated uncaptured examples. However, this review clearly shows that there is a significant number of blended learning approaches being explores, combining different technologies with classroom, lab, and clinical learning environments.

It also became apparent that undergraduate nursing education used blended learning approaches to teach a wide range of nursing content and skills and that no aspect of the nursing curricula is excluded from a blended learning perspective. From foundational nursing concepts related to professional nursing practice and ethics to specialty nursing knowledge related to physiology and pharmacology, there is evidence in the literature that indicated that blended learning approaches are being integrated into undergraduate nursing education at all levels and from all directions. The blended learning approaches included in this review provide some optimism for the future, indicating that many of the problems associated with teaching content related to professionalism, mental health, assessment, biosciences, nursing care for special populations, pharmacology, acute care nursing, can be improved upon or addressed through blended learning. The art of nursing was also well represented in the research literature reviewed. Empathy for patients, cultural competency, and communication skills are intrinsically linked, making it essential for nursing education programs to have an integrated curriculum (Calvillo et al., 2009). Though the importance of strong communication skills has long been accepted as essential professional nursing practice, there is still a lack of evidence to support specific teaching interventions as being effective in teaching communication skills to undergraduate nurses (Grant and Jenkins, 2014). The articles reviewed reinforce this perspective, arguing that new and innovative approaches are needed to teach communication skills to future nurses.

This scoping review also helped to clarify the impact of blended learning approaches on student engagement, satisfaction, and student learning success in nursing education. Blended learning approaches within higher education in general have been referred to as the optimal environment for enhancing student engagement and learning success (Dziuban et al., 2013). With numerous examples of enhanced engagement and student learning success identified from this scoping review, this perspective is clearly supported by the nursing literature. Satisfaction is generally understood to be the extent to which students have enjoyed their studies (Bedggood and Donovan, 2012), and is the product of factors including student engagement and learning success. This review also identified numerous examples of blended learning approaches that enhanced student satisfaction, supporting the perspective that the use of blended learning approaches in nursing education enhances student engagement, learning outcomes, and overall satisfaction.

6. Conclusion

This scoping review illustrated the degree to which blended learning is referred to in the nursing education literature and challenged the definition of blended learning to encompass and align with the terminology associated with distributed, decentralized, hybrid, and flexible learning. While the definition of blended learning offered in this review is more inclusive of the terminology used to describe the use technology in the classroom, it the nursing perspective on blended learning that appears to have changed the most. Within nursing education, this review has shown that blended learning in undergraduate nursing education is rapidly becoming the new standard in Nursing education.

What blended learning approaches are currently utilized in undergraduate nursing education? The research questions helped to uncover the evidence needed to state that there is a wide, varied, and expanding number of blended learning approaches currently being utilized in nursing education.

What nursing content is being taught using blended learning approaches? The blended approaches identified in the scoping review are being used in the classroom, lab, and clinical learning environments. The content being taught using blended learning approaches is outlined in the content themes, presenting a wide range of content areas where blended approaches appear to be heavily utilized.

7. Limitations and future research

A systematic appraisal of the quality of the research was not undertaken as part of this review. However, inclusion criteria in this review included only articles published in peer reviewed journals and excluded articles translated into English, ensuring a baseline level of quality. This review provides a thorough overview of the topic of blended learning in undergraduate nursing education, describes the wide range of blended learning approaches currently utilized in undergraduate nursing education, and identifies some of the gaps in the research literature. A follow-up systematic review of blended learning research is needed to establish a quality baseline for research and identify best practices for the use of blended learning in nursing education.

As the inclusion criteria focused on undergraduate nursing education, the examples of blended learning approaches identified from this review do not represent the entirety of those used in nursing education. To attain a more comprehensive overview of the blended learning approaches used in nursing education, future research should be expanded in scope to include psychiatric nursing, licenced practical nursing, nurse practitioners, and all graduate level nursing education programs.

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