Baccalaureate Nursing Education Related to Aging and the Care of Older People: A Scoping

Review

by

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Abstract

Background: Although educators are working to improve gerontological content in baccalaureate nursing programs to keep pace with changing population demographics, it is unclear what types of education are occurring. The most recent scoping review conducted in 2015 by Koskinen *et al.* found that most studies related to gerontological content in nursing programs were of moderate quality and there were gaps in what was reported. The authors found that most research focused on students' attitudes toward older people, and none tested e-learning and online solutions.

Aim: The aim of this scoping review was to map baccalaureate nursing education research related to aging and the care of older people.

Method: A search was conducted in 6 databases, resulting in 1465 unique articles published between 2013 and 2023. Standardized criteria were used to screen the records, and 65 articles met all inclusion criteria. The inclusion criteria were baccalaureate nursing education studies, published in English between January 2013 to June 2023. Data were extracted on year, country, characteristics of interventions, methodological approach, evaluation methods, analysis, and types of outcomes. Since Koskinen *et al.* (2015) suggested the poor to moderate quality of reported research, the Mixed Methods Appraisal Tool (MMAT) was used to assess each article's quality in this review. Two types of analysis were applied – descriptive frequencies and directed content analysis.

Results: 16 countries were represented, with most studies from the USA (45%) followed by Canada (12%), Spain (9%) and Australia (8%). 33 were quantitative studies, 20 were qualitative, and 13 utilized mixed methods. Included articles focused on delivery of gerontological content,

and delivery methods such as simulation, asynchronous online learning modules, and clinical placements. Various standardized tools were utilized to measure quantitative outcomes, with the most common being Kogan's Attitudes toward Old People Scale, Jefferson Scale of Empathy, and Facts of Aging Quiz. Participants' attitude, knowledge, and skill were measured. 45 articles measured attitude, 41 measured knowledge and 21 measured skills. 35 articles measured different combinations of all three.

Conclusion: This review found improvement in the overall quality of reporting in studies, compared to Koskinen *et al.* (2015) findings. Although many studies focused on student nurses' attitudes toward older people, the numbers of studies examining knowledge and skill have increased. There is heterogeneity in tools used to evaluate quantitative outcomes. Notably, there is an increase in use of e-learning solutions, and simulation, as well as proliferation of clinical placements, mostly in gerontological community settings. Future research should include systematic reviews to assess the impact of individual educational initiatives.

Preface

This thesis is an original work by Kelly Baskerville. No part of this thesis has been previously published.

Acknowledgements

I would like to recognize my supervisor Dr. Sherry Dahlke for the mentorship, expertise, professional opportunities, and generous support which enabled me to complete my thesis. I also wish to acknowledge the practical and technical guidance provided by my supervisory committee, Dr. Kathleen Hunter and Dr. Hannah O'Rourke.

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Introduction

The population around the world is aging (World Health Organization (WHO, 2022). The World Health Organization (2022) predicts the proportion of people over 60 to exceed 20% by 2050. This means nurses are more likely to work with older people in all healthcare settings. Despite this global reality, baccalaureate nursing programs do not adequately prepare nurses to care for older people (Alsenany and Alsaif, 2014; Baumbusch and Andrusyszyn, 2002; Clendon, 2011; Dahlke *et al.*, 2020; Fetherstonhaugh *et al.*, 2022; McCleary *et al.*, 2017; Nawagi *et al.*, 2022; Okuyan *et al.*, 2020). Although nurse educators have been working to improve gerontological nursing education, the most recent scoping review examining research initiatives on gerontological nursing education by Koskinen *et al.* (2015) found poorly developed competencies and a wide variation in the quality of the included studies making it challenging to determine which educational approaches had potential utility for spread and scale up. Since Koskinen *et al.'s* (2015) review, there have been changes in how education is delivered as well as increased awareness of the need for nurses to graduate with gerontological competencies (Canadian Association Schools of Nursing, 2017). This scoping review reports on the current state of the research related to baccalaureate nursing education related to gerontology and care of older people since Koskinen *et al.'s* (2015) review.

Background

Gerontological education is important because as people age, they are more likely to accumulate both chronic and acute illnesses as well their presentation of acute illnesses can be different from younger people, sometimes exhibited through a change in the older person's function, such as alterations in cognition (WHO, 2022). Thus, gaps in nurses' gerontological

knowledge can affect a variety of practice areas, from hospital to facility-based residential care (Dahlke *et al.*, 2019). Nurses who lack adequate gerontological education may think that functional changes are normal aging rather that an acute illness, leading to inaccurate assessment and management of health concerns and ultimately negative outcomes for older people (Arain, *et al.*, 2020; Dahlke *et al.*, 2020; Khadaroo, et. al., 2015). Moreover, gaps in gerontological knowledge leads to beliefs about nursing practice with older people as simplistic, not requiring specialized education, and physically heavy (Foster *et al*, 2022; Garbrah *et al.*, 2017; Naughton *et al.*, 2019; Negrin *et al.*, 2022).

Gaps in gerontological nursing education have been attributed in part to a lack of nurse educators with expertise in gerontology who can dispel negative ageist beliefs and encourage students to work with older people (Foster *et al.*, 2022; Naughton *et al.*, 2019; Negrin *et al.*, 2022). Lack of preparation and negative perceptions about aging and care of older people deters nurses from gerontological practice, and contributes to a global healthcare human resource crisis (Garbrah *et al.*, 2017; Naughton, *et al.*, 2018; Okuyan *et al.*, 2020).

Three systematic reviews and two scoping reviews have been completed examining gerontological education for healthcare professionals. Two take a broad view, with a systematic review examining health and social sciences students (Martinez-Arnau *et al.*, 2022) and a scoping review on medical students (Masud *et al.*, 2022). Two systematic reviews have been conducted on students in pre-licensure nursing education programs. Yan *et al.*, (2022) identify four main types of education programs (four-year undergraduate program including both geriatric theory and clinical placement; stand-alone geriatric topic and clinical placement; integrated geriatric subject and clinical placement; stand-alone geriatric clinical placement). Unfortunately, not all types of gerontological education have been included, and they did not

report dose, mode of delivery, intended outcomes, or research methods used before recommending further examination of the content of geriatric education programs. Hsieh and Chen (2018) review examines long term care, and highlights not only the importance of the provision of content in geriatric and long term care in undergraduate nursing curriculum, but the heterogeneous nature of the studies which make a meta-analysis impossible. These reviews suggest there is a gap in knowledge about content and quality of research on aging and gerontological pre-licensure nursing education. The most recent scoping review of gerontological nursing education was completed by Koskinen *et al.* (2015), who also considered the quality of included studies.

Prior to building on Koskinen *et al.'s* (2015) review, the Prisma Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) was used to appraise the review, using the twenty-two checklist items in seven categories (Tricco *et al.*, 2018). Of the twenty-two items, evidence was found in the article of all items in: the title (item 1); abstract (item 2); introduction (items 3-4); results (items 14-18); discussion (items 19-21); funding (item 22). In the methods category two items 5 & 11 were absent but items 6 to 10 and 12 to 13 were present. The deficits were no listed protocol (5) and no listing of the variables used to seek data (item 11). See Table 1. Koskinen *et al.* (2015) used Arksey and O'Malley's (2005) method for scoping review. They state they examined the reliability and validity of studies; however it is unclear how they did this, other than to select some generalized principles of rigor, and looked to see if their studies had reported ethical approval and informed consent. See Appendix A.

Table 1

Review of Koskinen et al. (2015) with Preferred Reporting Items for Systematic Reviews and

Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) Checklist

Section	Item	Prisma-ScR checklist item	Reported on page #
		Title	
Title	1	Identify the report as a scoping review.	15.
		Abstract	
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	15. Unclear on charting methods
		Introduction	
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	16. -Evaluate need to enhance research -Prioritize nursing education to better meet competence, career goals in the specialty
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	16. -Main research areas -How validity and trustworthiness are addressed
		Methods	
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	None listed
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years	17.

Section	Item	Prisma-ScR checklist item	Reported on page #
		considered, language, and publication status), and provide a rationale.	Abstract available, English, 1999-2012. Rationale included.
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	16, 26. Search in March 2013. Databases listed; rationale listed in limitations section.
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	16. Listed in PRISMA flowchart and in text
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	17. "Retrieval of studies" section
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	17. No forms listed, created by team. Two researchers collected basic data. One researcher extracted and categorized; refined and confirmed with research team.
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Not listed.
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	18-21 (Table 1), 24. Did not conduct an appraisal but extracted descriptions of each study's validity and trustworthiness – did not list how the elements were chosen, other than report what was found in text.

Section	Item	Prisma-ScR checklist item	Reported on page #
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	17. Inductive content analysis: created subcategories, then identified overarching categories
Results			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	16. PRISMA flowchart
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	17-24.
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	18-21. (Table 1). Authors' own descriptions only.
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	17-24.
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	17-24.
Discussion			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	24-26.
Limitations	20	Discuss the limitations of the scoping review process.	26.
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	26.

Section	Item	Prisma-ScR checklist item	Reported on page #
		Funding	
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	27.

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, *et al.* PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.

Healthcare education has undergone a significant period of innovation since Koskinen *et al.*'s (2015) review including the introduction of simulation and other technologies, yet it is unclear if this is reflected in research focused on gerontological nursing education (Masud *et al*, 2022; Siew *et al*, 2021). The overall quality of Koskinen *et al.'s* (2015) review was assessed as rigorous enough to build from for this review. To enhance rigour, a quality assessment measure – the Mixed Methods Assessment Tool - was used in this review.

Nursing organizations in several countries have made efforts to address the gaps in undergraduate education. For example, in 2010, the American Association of Colleges of Nursing and John A. Hartford Foundation published a list of entry to practice gerontological competencies for the United States, and in 2017 a similar set of competencies was released by the Canadian Association of Schools of Nursing (CASN, 2017; Moody *et al.*, 2020). Although some educators are working to improve gerontological content in baccalaureate nursing programs (Ciriello & Karl, 2020; Fetherstonhaugh *et al.*, 2022), it is unclear if there have been improvements in education approach or content and/or what delivery methods of nursing education related to older people is occurring. Moreover, it is unclear if there has been scaling up and spread of educational initiatives. A map of gerontological education is an important first step to understand what is occurring to prepare student nurses to work with older adults and a worldwide ageing population (WHO, 2022). Increased pressure to deliver nursing education in online formats during the global pandemic, and the introduction of simulation to education must also be considered (Lai *et al.*, 2023; Siew *et al.*, 2021; Smith and Farra, 2022). The aim of this scoping review was to map research related to baccalaureate nursing education on aging and the care of older people. We need to know the current state of nursing education and related

interventions before conducting systematic reviews to assess intervention effectiveness or making suggestions or changes to nursing education programs.

Methods

Design

The Joanna Briggs Institute's (JBI) Scoping Review Framework protocol for scoping reviews was used to guide the steps to conduct this scoping review (Peters *et al.*, 2020). The research question was: "what is the research about gerontological nursing education in baccalaureate nursing programs?"

Search Procedures

Our search terms were defined in consultation with an academic librarian utilizing key concepts of the research question and library guides. Koskinen *et al.*'s (2015) search terms were refined to include baccalaureate nursing students, attitudes, and curriculum. See Appendix B for Koskinen's search protocol and Appendix C for this review's search, which extended Koskinen's search protocol. Databases searched were CINAHL, Medline, EMBASE, Education Resources Information Centre (ERIC), Scopus, Education Database and Education Research Complete. In addition, we used established search protocols for each of the databases searched, when available (Campbell, 2021a; 2021b; 2021c). See Appendix C.

Inclusion and Exclusion Criteria

The inclusion and exclusion criteria expanded on the criteria used in Koskinen *et al.'s* (2015) review using the Population, Concept, Context (PCC) framework (Peters *et al.*, 2020). See Table 5. The population was nursing students, defined as those who graduate from

baccalaureate nursing programs to become Registered Nurses (RNs). The concept for this review

is gerontological education, defined as education about aging and evidence informed care of

older people. "Older people" is defined as 60 years and older (WHO, 2022). The context was

nursing programs, defined as education delivered in a baccalaureate level course for students to

become RNs.

Inclusion criteria were studies published in English related to gerontological nursing for

baccalaureate nursing education between January 2013 to June 2023. Research was included

about both curriculum changes and individual educational interventions.

Exclusion criteria were articles published in languages other than English because we did

not have resources available for translation costs. Articles published prior to the year 2013 were

excluded as this was the end date of the previous scoping review on the topic (Koskinen *et al.*,

2015), and we were interested in capturing studies published after this date. Graduate education

or nursing programs (such as licensed practical nurse) or research focused on nurse educators

were excluded because the focus of this review was on baccalaureate education and each type of

nursing education has a different scope. Also excluded were review articles, opinion articles, and

grey literature given the proliferation of research articles uncovered in our search, and more

importantly, our focus on mapping the research evidence.

Screening/ Study Selection

Zotero (Corporation for Digital Scholarship, 2023), was used to manage the files

identified in the search and uploaded to Covidence, which was used to manage the screening

process (Covidence, 2023). Covidence identified and removed duplicate articles. All article titles

and abstracts were then screened by two researchers (KB and SD) using the inclusion and

exclusion criteria, and any remaining duplicate articles were removed. See Appendix D. Next,

the full text manuscripts were reviewed in full and screened based on the inclusion/ exclusion

criteria. Studies lacking information on a majority of elements identified for extraction, including

sample, data collected, method of research, or outcomes were excluded. KB and SD met to

discuss any differences in selections to reach agreement in both steps. A Preferred Reporting

Items for Systematic Reviews and Meta-Analysis (PRISMA) flow diagram was created to

outline the screening and selection process and results (Moher *et al.*, 2009).

Data extraction

Data were extracted into a table that captured key elements (i.e., primary author, year

published, article title), and contextual detail (i.e., country, study objectives, inclusion and

exclusion criteria, target population, concept being tested, setting). Research methodology data

were extracted and organized by categories listed in Koskinen *et al.*'s (2015) review on sample

information/demographics, (i.e., number of participants, description of nursing education

program or students), data collection methods (i.e., questionnaire, observation, textual data,

individual interview, group interview), data analysis methods (i.e., statistical analysis,

quantitative content analysis, qualitative analysis, qualitative content analysis, thematic analysis,

phenomenological or hermeneutic analysis, or framework analysis). Of note, framework analysis

was not identified in Koskinen *et al.*'s (2015) article, but was added as it appeared in this

review's included articles. In this review, research method was extracted into defined categories

that would allow for use of the MMAT (i.e., qualitative, quantitative randomized control trial,

quantitative non-randomized control trial, quantitative descriptive, mixed methods). Koskinen *et*

al. (2015) stated they extracted, "the descriptions of any possible educational intervention or

solution… when collecting this information, the authors' original terms were used" (p. 17). To

capture the qualities of education interventions in greater depth and standardization for analysis

in this review, more detailed information was extracted. First was the type of the education (i.e.,

geriatric home care clinical simulation, clinical placement in Long Term Care (LTC) setting),

then mode of delivery (e.g., classroom, clinical placement, simulation, laboratory), dose of

intervention (i.e., length of delivery by hours, weeks, semester, and whether the education was

standalone or integrated throughout the nursing program), timing of delivery (i.e., year of

nursing program). Lastly, data were extracted on criteria used to measure outcomes (e.g., Likert-

type survey developed by authors, standardized measures like Kogan's Attitudes toward Old

People Scale), focus of outcome (i.e., knowledge, skill, attitude), reported outcomes of the

intervention (e.g., yes, no, or unclear change in knowledge, skill, attitude), and authors'

statements on significance of findings (i.e., "the current study found that attitudes toward the

elderly and knowledge of aging increased after a service learning component with senior citizens

at a community senior center"). Data extraction was guided by an instruction and definition

reference (Appendix E) into a spreadsheet. For example, an element of extraction was "study

objective(s): Extract the authors' verbatim statement(s) of the purpose of the study (e.g., What is

the effect of an education module on working with older people on the attitudes of nursing

students?)". This process was tested by KB with five articles, representing a range of

interventions, and refined after discussion with the other researchers.

Quality Appraisal

Although quality appraisal is not a requirement of scoping reviews because they do not

aim to synthesize the results of studies (Peters *et al.*, 2020), given Koskinen *et al.'s* (2015)

reported methodological challenges, a quality appraisal was essential to understand if these

challenges had improved over time. The Mixed Methods Appraisal Tool (MMAT) was used to

assess the quality of each included article (Hong *et al.*, 2018). The MMAT is a critical appraisal tool that allows for evaluation of the quality of quantitative, quantitative, and mixed methods research using a standardized method. Each study must clearly identify a clear research question, and demonstrate the collected data aligns with the research question. Further, each study must meet defined quality criteria for the method chosen. This standardized appraisal process is replicable and addresses aspects of rigor in each research methodology, which is an advantage over the generalized method utilized by Koskinen *et al.* (2015), which requires significant interpretation by the reader.

Data Analysis

Two types of analysis were applied to data extracted from each of the articles: descriptive frequencies and content analysis. Frequencies were calculated to describe and summarize type of intervention, context/setting, dose, and quality of evaluation of the intervention based on MMAT quality criteria. Directed content analysis (Hsieh & Shannon, 2005) was used to develop categories for educational interventions, as the categories provided by Koskinen *et al.* (2015) represented more generalized categories, some of which did not differentiate between approaches described in this review's included articles, and did not include clear categories for simulation or online learning. After initial extraction data from included articles using authors' verbatim descriptions, education was organized by delivery method, and seven categories were defined by K.B. based on mode of delivery of the intervention: classroom, online synchronous, online asynchronous, clinical laboratory, clinical placement, simulation in classroom, and simulation in clinical laboratory. See Appendix E for definitions.

Table 2

Example of Analysis of Education Delivery Categories

Original extract	Concepts identified	Education delivery categories
3-credit course entitled Caring for the Older Adult, comprising 30 h of theory and 30 h of practicum	Theory in classroom Practicum / placement	• Classroom • Clinical placement
Students in the experimental group… take part in the 4-hour geriatric home care simulation on their regularly scheduled clinical day… The experience took place in a unique home-based simulation laboratory	Simulation in clinical laboratory	• Simulation in clinical laboratory

Analysis of all data was shared and refined with input from S.D. Samples of analysis of education delivery categories are summarized in Table 2 below.

Ethical Considerations

This review did not include any primary data collection, including only published studies. Therefore, no ethical approval was required.

Findings

This scoping review identified: (i) content of educational programs, (ii) delivery method of gerontological education, (iii) how gerontological education programs have been evaluated and what evidence is available to support their effectiveness, (iv) global patterns and methods used to deliver education. We identified 2,583 studies from database searches. 1465 were reviewed for title and abstract, and 135 were included for full text screening. Ultimately, 65

articles, representing 63 studies were included in the review (see fig 1. PRISMA flow diagram

for details). The PRISMA extension for scoping reviews (PRISMA-ScR) was used to report the

review process. See Figure 1. (Peters *et al.*, 2020).
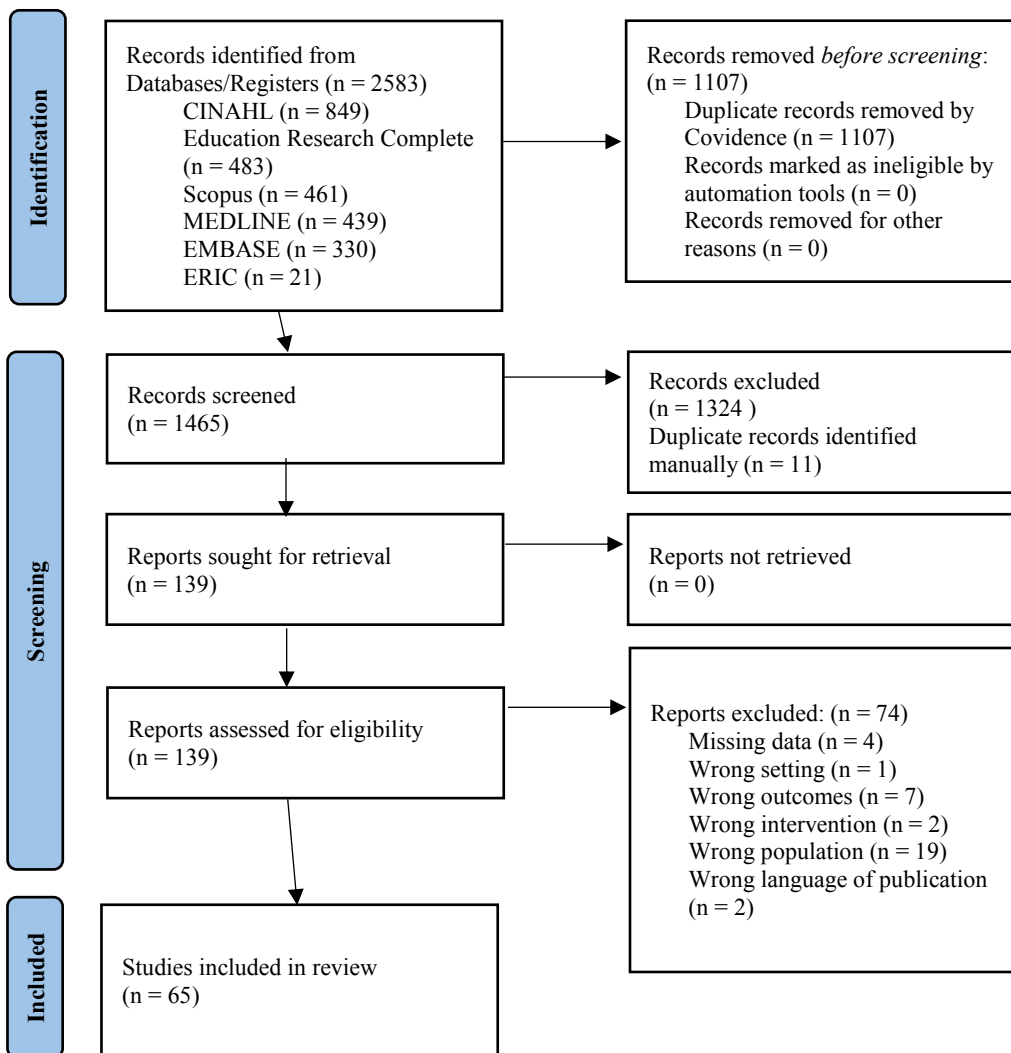
Figure 1. PRISMA diagram

Characteristics of Studies

All studies were discussed in a single report, with a few exceptions. In two cases, single studies were reported in two articles (Arrogante *et al.*, 2022, 2023; Eaton, 2015 and Eaton & Donaldson, 2016). In other cases, authors completed one study, then completed further research to examine the same concepts (Hovey *et al.*, 2018 and Hovey & Shropshire, 2021, and Lea *et al.*, 2014, 2015).

Included articles were conducted between the years 2013 and 2023. Over the years of 2013 to 2018, there were thirty-two articles published that met inclusion criteria, and between 2019 to 2023, thirty-three were published. The number of articles published each year between 2013 and 2023 varied from 1 to 12, with the greatest number published in 2015 (n = 8), 2016 (n = 9), 2021 (n= 8), and 2022 (n = 12). See Table 3.

Table 3

Article Distribution by Publication Year

Year of publication	Citation	Number = n N = 65 (percentage)
2013	Davies *et al.,* 2013; Grealish *et al.,* 2013; King *et al.,* 2013; Smith & Barry, 2013; Walton & Blossom, 2013	5 (7.7%)
2014	Lea *et al.,* 2014	1 (1.5%)
2015	Beauvais *et al.,* 2015; Chen *et al.,* 2015; Eaton, 2015; Eccleston *et al.,* 2015; Lea *et al.,* 2015; Mattos *et al.,* 2015; Pesut *et al.,* 2015; Sarabia-Cobo & Castanedo Pfeiffer, 2015	8 (12.3%)
2016	Cobbett *et al.,* 2016; Eaton & Donaldson, 2016; Kimzey *et al.,* 2016; Koehler *et al.,* 2016; Koskinen *et al.,* 2016; Lin *et al.,* 2016; Redfield *et al.,* 2016; Suikkala *et al.,* 2016; Turrentine *et al.,* 2016	9 (13.8%)

2017	Brown & Bright, 2017; Mattsson & Rosendahl, 2017; Skinner, 2017; Trueman, 2017	4 (6.2%)
2018	Gholamzadeh *et al.,* 2018; Hovey *et al.,* 2018; Indar *et al.,* 2018; Olson *et al.,* 2018; Patton, 2018	5 (7.7%)
2019	Fernandes *et al.,* 2019; Gray-Miceli & Morse, 2019; Iwasaki *et al.,* 2019	3 (4.6%)
2020	Cheng *et al.,* 2020; Garbarino & Lewis, 2020; Ross *et al.,* 2020; Torkshavand *et al.,* 2020; Valaitis *et al.,* 2020	5 (7.7%)
2021	Cao *et al.,* 2021; Dahlke *et al.,* 2021; Demirtas & Basak, 2021; Gipson *et al.,* 2021; Glass *et al.,* 2021; Hovey & Shropshire, 2021; Jeong & Kwon, 2021; Parker *et al.,* 2021	8 (12.3%)
2022	Abdelnasser *et al.,* 2022; Arrogante *et al.,* 2022; Boscart *et al.,* 2022; Crownover *et al.,* 2022; Dukes *et al.,* 2022; Fernandez-Gutierrez *et al.,* 2022; Henrichs *et al.,* 2022; Hsu *et al.,* 2022; Kalogirou *et al.,* 2022; Sakamoto, 2022; Sanchez De Miguel *et al.,* 2022; Wu *et al.,* 2022	12 (18.4%)
2023	Arrogante *et al.,* 2023; Dobarrio-Sanz *et al.,* 2023; Love *et al.,* 2023; Pariseault *et al.,* 2023; Smyth *et al.,* 2023	5 (7.7%)

Sixteen countries were represented, with most articles describing studies taking place in the USA (n = 30), followed by Canada (n = 8), Spain (n = 6), Australia (n = 5), Taiwan (n = 3), two each from Finland and Iran and one study each from: China, Egypt, Hong Kong, Ireland, Japan, Korea, Portugal, Singapore, Sweden, and Turkey. See Table 4.

Table 4

Article Distribution By Country

Country	Citation	Total =n; 65=N (percentage)
USA	Beauvais *et al.*, 2015; Brown & Bright, 2017; Chen *et al.*, 2015; Crownover *et al.*, 2022; Davies *et al.*, 2013; Eaton, 2015; Eaton & Donaldson, 2016; Garbarino & Lewis, 2020; Gipson *et al.*, 2021; Gray-Miceli & Morse, 2019; Henrichs *et al.*, 2022; Hovey & Shropshire, 2021; Hovey *et al.*, 2018; Kimzey *et al.*, 2016; King *et al.*, 2013; Koehler *et al.*, 2016; Love *et al.*, 2023; Mattos *et al.*, 2015; Olson *et al.*, 2018; Pariseault *et al.,* 2023; Patton, 2018; Redfield *et al.*, 2016; Ross *et al.*, 2020; Sakamoto, 2022; Skinner, 2017; Smith & Barry, 2013; Trueman, 2017; Turrentine *et al.*, 2016; Walton & Blossom, 2013	29 (44.6%)
Canada	Boscart *et al.*, 2022; Cobbett *et al.*, 2016; Dahlke *et al.*, 2021; Dukes *et al.*, 2022; Indar *et al.*, 2018; Kalogirou *et al.*, 2022; Pesut *et al.*, 2015; Valaitis *et al.*, 2020	8 (12.3%)
Spain	Arrogante *et al.*, 2022, 2023; Dobarrio-Sanz *et al.*, 2023; Fernandez-Gutierrez *et al.*, 2022; Sanchez De Miguel *et al.*, 2022; Sarabia-Cobo & Castanedo Pfeiffer, 2015	6 (9.2%)
Australia	Eccleston *et al.*, 2015; Grealish *et al.*, 2013; Lea *et al.*, 2014, 2015; Parker *et al.*, 2021	5 (7.7%)
Taiwan	Lin *et al.*, 2016; Hsu *et al.*, 2022; Wu *et al.*, 2022	3 (4.6%)
Finland	Koskinen *et al.*, 2016; Suikkala *et al.*, 2016	2 (3.1%)
Iran	Gholamzadeh *et al.*, 2018; Torkshavand *et al.*, 2020	2 (3.1%)
China	Cao *et al.*, 2021	1 (1.5%)
Egypt	Abdelnasser *et al.*, 2022	1 (1.5%)
Hong Kong	Cheng *et al.*, 2020	1 (1.5%)
Ireland	Smyth *et al.*, 2023	1 (1.5%)
Japan	Iwasaki *et al.*, 2019	1 (1.5%)
Korea	Jeong & Kwon, 2021	1 (1.5%)
Portugal	Fernandes *et al.*, 2019	1 (1.5%)
Singapore	Glass *et al.*, 2021	1 (1.5%)
Sweden	Mattsson & Rosendahl, 2017	1 (1.5%)
Turkey	Demirtas & Basak, 2021	1 (1.5%)

Finally, the majority of studies met all MMAT quality criteria, see Table 5. Only one of

the qualitative studies was missing two quality criteria: are there clear research questions; do the

collected data allow to address the research questions (Gipson *et al.*, 2021). Three randomized controlled trials were missing one quality criteria: are the outcome assessors blinded to the intervention provided (Gholamzadeh *et al.*, 2018); are the confounders accounted for in the design and analysis (Abdelnasser *et al.*, 2022); are there complete outcome data (Hovey & Shropshire, 2021). One quantitative descriptive study was missing three quality criteria: are there clear research questions; do the collected data allow to address the research questions; are the measurements appropriate (Gray-Miceli & Morse, 2019), and one was missing one quality criteria: is the sample representative of the target population (Hovey *et al*, 2018). Finally, two mixed methods studies were missing quality criteria. Arrogante *et al.* (2023) was missing four criteria: is there an adequate rationale for using a mixed methods design to address the research question; are the different components of the study effectively integrated to answer the research question; are the outputs of the integration of qualitative and quantitative components adequately addressed; do the different components of the study adhere to the quality criteria of each of the tradition of the methods involved. Skinner (2017) was unclear in two criteria: are the outputs of the integration of qualitative and quantitative components adequately interpreted; are divergences and inconsistencies between quantitative and qualitative results adequately addressed.

Table 5

Mixed Methods Appraisal Tool (MMAT) Evaluation of Included Articles

Citation	Screening Questions		1. Qualitative Studies				
	S1. Are there clear research questions?	S2. Do the collected data allow to address the research questions?	1.1 Is the qualitative approach appropriate to answer the research question?	1.2 Are the qualitative data collection methods adequate to address the research question?	1.3 Are the findings adequately derived from the data?	1.4 Is the interpretation of results sufficiently substantiated by data?	1.5 Is there coherence between qualitative data sources, collection, analysis, and interpretation?
Cao *et al.*, 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Boscart *et al.*, 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Brown & Bright, 2017	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Crownover *et al.*, 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Davies *et al.*, 2013	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dobarrio-Sanz *et al.*, 2023	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Eaton, 2015	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gipson *et al.*, 2021	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes
Indar *et al.*, 2018	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Iwasaki *et al.*, 2019	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lin *et al.*, 2016	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Citation	S1.	S2.	1.1	1.2	1.3	1.4	1.5
Mattsson & Rosendahl, 2017	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Olson *et al.*, 2018	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pariseault *et al.,* 2023	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sakamoto, 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Smyth *et al.*, 2023	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Suikkala *et al.*, 2016	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Trueman, 2017	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Valaitis *et al.*, 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walton & Blossom, 2013	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Screening Questions			2. Quantitative RCT			
Citation	S1. Are there clear research questions?	S2. Do the collected data allow to address the research questions?	2.1 Is randomization appropriately performed?	2.2 Are the groups comparable at baseline?	2.3 Are there complete outcome data?	2.4 Are outcome assessors blinded to the intervention provided?	2.5 Did the participants adhere to the assigned intervention?
Cheng *et al.*, 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fernandez-Gutierrez *et al.*, 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gholamzadeh *et al.*, 2018	Yes	Yes	Yes	Yes	Yes	No	Yes
Glass *et al.*, 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Citation	Screening Questions		3. Quantitative Non-Randomized				
	S1. Are there clear research questions?	S2. Do the collected data allow to address the research questions?	3.1 Are the participants representative of the target population?	3.2 Are measurements appropriate regarding both the outcome and intervention (or exposure)?	3.3 Are there complete outcome data?	3.4 Are the confounders accounted for in the design and analysis?	3.5 During the study period, is the intervention administered (or exposure occurred) as intended?
Abdelnasser et al., 2022	Yes	Yes	Yes	Yes	Yes	Unclear	Yes
Arrogante et al., 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Beauvais et al., 2015	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Chen et al., 2015	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cobbett et al., 2016	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dahlke et al., 2021	Yes	Yes	Yes	Yes	No	Yes	Yes
Demirtas & Basak, 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dukes et al., 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Eccleston et al., 2015	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hovey & Shropshire, 2021	Yes	Yes	Yes	Yes	Unclear	Yes	Yes
Kalogirou et al., 2022	Yes	Yes	Yes	Yes	No	Yes	Yes
Koehler et al., 2016	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Koskinen et al., 2016	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Citation	S1.	S2.	3.1	3.2	3.3	3.4	3.5
Love *et al.*, 2023	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ross *et al.*, 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sanchez De Miguel *et al.*, 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sarabia-Cobo & Castanedo Pfeiffer, 2015	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Smith & Barry, 2013	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Torkshavand *et al.*, 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wu *et al.*, 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Screening Questions		4. Quantitative Descriptive				
Citation	S1. Are there clear research questions?	S2. Do the collected data allow to address the research questions?	4.1 Is the sampling strategy relevant to address the research question?	4.2 Is the sample representative of the target population?	4.3 Are the measurement appropriate?	4.4 Is the risk of nonresponse bias low?	4.5 Is the statistical analysis appropriate to answer the research question?
Fernandes *et al.*, 2019	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gray-Miceli & Morse, 2019	Unclear	Unclear	Yes	Yes	No	Yes	No
Henrichs *et al.*, 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hovey *et al.*, 2018	Yes	Yes	Yes	Unclear	Yes	Yes	Yes
Jeong & Kwon, 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Citation	S1.	S2.	4.1	4.2	4.3	4.4	4.5
Parker *et al.*, 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Patton, 2018	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Redfield *et al.*, 2016	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Screening Questions		5. Mixed Methods				
Citation	S1. Are there clear research questions?	S2. Do the collected data allow to address the research questions?	5.1 Is there an adequate rationale for using a mixed methods design to address the research question?	5.2 Are the different components of the study effectively integrated to answer the research question?	5.3 Are the outputs of the integration of qualitative and quantitative components adequately interpreted?	5.4 Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?	5.5 Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?
Arrogante *et al.*, 2023	Yes	Yes	No	No	No	Yes	No
Eaton & Donaldson, 2016	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Garbarino & Lewis, 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Grealish *et al.*, 2013	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hsu *et al.*, 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kimzey *et al.*, 2016	Yes	Yes	Yes	Yes	Yes	Yes	Yes
King *et al.*, 2013	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lea *et al.*, 2015	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Citation	S1.	S2.	5.1	5.2	5.3	5.4	5.5
Lea *et al.*, 2014	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mattos *et al.*, 2015	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pesut *et al.*, 2015	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Skinner, 2017	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes
Turrentine *et al.*, 2016	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Educational Delivery Methods

Several education delivery methods were used: clinical placement, defined as education in an acute care, community, residential care or clinic setting (n = 39); classroom, defined as a formal lecture in an in-person encounter (n = 34); clinical laboratory, defined as a setting for demonstration and practice of psychomotor skills (n = 19); simulation in clinical laboratory, defined as imitation of clinical experience in an interactive manner using high-fidelity mannequins or aging suits in a clinical laboratory (n = 14); online asynchronous, defined as an electronic learning activity where students can engage at a time of their choosing (n = 7); simulation in classroom defined as imitation of clinical experience in an interactive manner using a mask or role play in a classroom (n = 3); online synchronous, defined as an electronic learning activity where all students engage at the same time (n = 1). Twenty-six studies used one educational method, thirty-one used two methods, and nine used three or more. See Table 6.

Table 6

Articles By Education Delivery Method

Delivery method	Citation (Author, year)	Total =n; 65=N (percentage)
Clinical placement	Beauvais *et al.*, 2015; Boscart *et al.*, 2022; Brown & Bright, 2017; Davies *et al.*, 2013; Dobarrio-Sanz *et al.*, 2023; Eaton, 2015; Eaton & Donaldson, 2016; Eccleston *et al.*, 2015; Garbarino & Lewis, 2020; Gipson *et al.*, 2021; Gray-Miceli & Morse, 2019; Grealish *et al.*, 2013; Henrichs *et al.*, 2022; Hovey & Shropshire, 2021; Hovey *et al.*, 2018; Hsu *et al.*, 2022; Indar *et al.*, 2018; Iwasaki *et al.*, 2019; Kimzey *et al.*, 2016; Koehler *et al.*, 2016; Lea *et al.*, 2015; Lea *et al.*, 2014; Lin *et al.*, 2016; Mattos *et al.*, 2015; Mattsson & Rosendahl, 2017; Olson *et al.*, 2018; Pariseault *et al.,* 2023; Parker *et al.*, 2021; Patton, 2018; Redfield *et al.*, 2016; Sakamoto, 2022; Smyth *et al.*, 2023; Trueman, 2017; Turrentine *et al.*, 2016; Valaitis *et al.*, 2020; Walton & Blossom, 2013;	37 (56.9%)

Delivery method	Citation (Author, year)	Total =n; 65=N (percentage)
	Wu *et al.*, 2022	
Classroom	Arrogante *et al.*, 2022; Cao *et al.*, 2021; Chen *et al.*, 2015; Cobbett *et al.*, 2016; Dobarrio-Sanz *et al.*, 2023; Fernandez-Gutierrez *et al.*, 2022; Gholamzadeh *et al.*, 2018; Glass *et al.*, 2021; Grealish *et al.*, 2013; Henrichs *et al.*, 2022; Hsu *et al.*, 2022; Indar *et al.*, 2018; Jeong & Kwon, 2021; Koehler *et al.*, 2016; Koskinen *et al.*, 2016; Lea *et al.*, 2014; Lea *et al.*, 2015; Lin *et al.*, 2016; Love *et al.*, 2023; Mattos *et al.*, 2015; Mattsson & Rosendahl, 2017; Olson *et al.*, 2018; Parker *et al.*, 2021; Patton, 2018; Pesut *et al.*, 2015; Redfield *et al.*, 2016; Ross *et al.*, 2020; Sanchez De Miguel *et al.*, 2022; Sarabia-Cobo & Castanedo Pfeiffer, 2015; Torkshavand *et al.*, 2020; Valaitis *et al.*, 2020	31 (47.7%)
Clinical laboratory	Cao *et al.*, 2021; Cheng *et al.*, 2020; Crownover *et al.*, 2022; Demirtas & Basak, 2021; Eaton, 2015; Eaton & Donaldson, 2016; Fernandes *et al.*, 2019; Gray-Miceli & Morse, 2019; Henrichs *et al.*, 2022; Jeong & Kwon, 2021; Parker *et al.*, 2021; Patton, 2018; Ross *et al.*, 2020; Skinner, 2017; Smith & Barry, 2013; Suikkala *et al.*, 2016; Torkshavand *et al.*, 2020	18 (27.7%)
Simulation in clinical lab	Cheng *et al.*, 2020; Crownover *et al.*, 2022; Demirtas & Basak, 2021; Fernandez-Gutierrez *et al.*, 2022; Fernandes *et al.*, 2019; Gray-Miceli & Morse, 2019; Henrichs *et al.*, 2022; Jeong & Kwon, 2021; Parker *et al.*, 2021; Patton, 2018; Ross *et al.*, 2020; Skinner, 2017; Smith & Barry, 2013; Torkshavand *et al.*, 2020	14 (21.5%)
Online, asynchronous	Cobbett *et al.*, 2016; Dahlke *et al.*, 2021; Dukes *et al.*, 2022; Kalogirou *et al.*, 2022; Kimzey *et al.*, 2016; Sanchez De Miguel *et al.*, 2022; Sarabia-Cobo & Castanedo Pfeiffer, 2015	7 (10.8%)
Simulation in classroom	Arrogante *et al.*, 2022; Arrogante *et al.*, 2023; Chen *et al.*, 2015	3 (4.6%)
Online, synchronous	Abdelnasser *et al.*, 2022	1 (1.5%)

Settings for clinical placements

Settings for clinical placement varied, with the most common taking place in non-healthcare settings - older peoples' homes or community senior centers (n = 14), with a majority in the USA (n = 15), although there was some variety, as six other countries were represented. This was followed by facility-based living, in either Long Term Care (Canada and USA) (n = 5) or Aged Care Facilities (Australia) (n = 5). A few studies provided education about older people in acute care units within hospitals (n = 3) or medical clinics (n = 2). See Table 7.

Table 7

Clinical Placement By Setting And Country

Clinical placement setting Total = n; 37 = N (percentage of total)	Country	Citation (author, year)
Community n = 19 (51.3%)	USA	Beauvais *et al.*, 2015; Brown & Bright, 2017; Davies *et al.*, 2013; Eaton, 2015; Eaton & Donaldson, 2016; Garbarino & Lewis, 2020; Gipson *et al.*, 2021; Hovey & Shropshire, 2021; Kimzey *et al.*, 2016; Koehler *et al.*, 2016; Mattos *et al.*, 2015; Olson *et al.*, 2018; Patton, 2018; Redfield *et al.*, 2016; Walton & Blossom, 2013
	Australia	Eccleston *et al.*, 2015
	Canada	Valaitis *et al.*, 2020
	Japan	Iwasaki *et al.*, 2019
	Spain	Dobarrio-Sanz *et al.*, 2023
	Sweden	Mattsson & Rosendahl, 2017
	Taiwan	Hsu *et al.*, 2022

Clinical placement setting Total = n; 37 = N (percentage of total)	Country	Citation (author, year)
Long Term Care, Supportive Living n = 11 (29.7%)	USA	Gray-Miceli & Morse, 2019; Henrichs *et al.*, 2022; Hovey & Shropshire, 2021; Hovey *et al.*, 2018; Kimzey *et al.*, 2016; Pariseault *et al.*, 2023; Trueman, 2017
	Canada	Boscart *et al.*, 2022; Indar *et al.*, 2018
	Ireland	Smyth *et al.*, 2023
	Taiwan	Lin *et al.*, 2016
Residential Aged Care n = 4 (10.8%)	Australia	Grealish *et al.*, 2013; Lea *et al.*, 2014, 2015; Parker *et al.*, 2021
Hospital n = 3 (8.1%)	USA	Hovey & Shropshire, 2021; Hovey *et al.*, 2018
	Taiwan	Wu *et al.*, 2022
Medical clinics n = 2 (5.4%)	USA	Sakamoto, 2022; Turrentine *et al.*, 2016

Duration and timing of education

Studies described a wide range in the duration of education. Most of the education interventions were described as occurring over a "course" or semester, where time, or weeks of the course or semester were not defined (n = 36). This was followed by shorter standalone interventions ranging between 10 minutes to 12 hours (n = 17). Eleven articles did not describe the time duration (n = 11). Education was delivered at a variety of points in nursing programs, although five articles did not specify when the educational intervention was delivered. Of the other sixty, forty-nine provided the education in only one year of the program: year one (n = 6);

year two (n = 18); year three (n = 13); year four (n = 11); year five (n = 1). Seven articles

describe studies that provided education to a mix of students at different points of their program:

year one or two (n = 3); year three or four (n = 3); year four or five (n = 1). Five articles

described studies that provided education to students over a longer period: two studies involved

education over year two and three, while there was one study using the following combinations:

year one, two and three; year two, three and four, and year one through year four. See Table 8.

Analysis and Evaluation methods

Research Methodology

The research methodology of included study articles were: twenty qualitative studies; twenty

non-randomized control studies; 13 mixed methods studies; eight quantitative descriptive studies

and four were randomized controlled trials (RCTs). Qualitative studies used the following types

of education delivery: clinical placement (n = 17); classroom (n = 7); clinical laboratory (n = 4);

simulation in clinical laboratory (n = 1). Non-randomized control studies used the widest variety

of education delivery methods: classroom (n = 10), followed by online asynchronous (n = 6),

clinical placement (n = 5), clinical laboratory (n = 4), simulation in clinical laboratory (n = 4),

then simulation in classroom (n = 2) and online synchronous (n = 1).

Table 8

Duration And Timing Of Education Delivery

Citation (Author, year)	Duration	Timing of education (Year of program)	Year 1	2	3	4	5
		One semester or course (with or without clinical component)					
Cao *et al.*, 2021	54 hours (39 hours theoretical courses, 15 hours of practical courses)	2		X			
Cobbett *et al.*, 2016	24 hours plus lecture	1	X				
Crownover *et al.*, 2022	One semester (hours not specified)	3			X		
Davies *et al.*, 2013	16-week course (hours not specified)	3			X		
Dobarrio-Sanz *et al.*, 2023	40 hours (12 hours class, visits, and monthly tutorials)	3			X		
Eaton, 2015	20 hours over 4 months	2 and 3		X	X		
Eaton & Donaldson, 2016	20 hours over 4 months	2 and 3		X	X		
Fernandez-Gutierrez *et al.*, 2022	40 hours over 4 months	3			X		
Garbarino & Lewis, 2020	6 hours over one semester	3			X		
Gholamzadeh *et al.*, 2018	8 hours over two days	3 or 4			X	X	
Gray-Miceli & Morse, 2019	14 clinical days over 7 weeks, plus an 8-hour workshop	4				X	
Grealish *et al.*, 2013	14 week semester	1, 2 and 3	X	X	X		

Citation (Author, year)	Duration	Timing of education (Year of program)	Year				
			1	**2**	**3**	**4**	**5**
One semester or course (with or without clinical component)							
Henrichs *et al.*, 2022	24 hours plus an 8 hour clinical	3			X		
Hsu *et al.*, 2022	36 hours over 18 weeks	5					X
Indar *et al.*, 2018	8 hours	4				X	
Koehler *et al.*, 2016	60 hours (30 hours theory; 30 hours practicum)	2		X			
Koskinen *et al.*, 2016	5 days	2		X			
Lea *et al.*, 2014	80 hours and 2-3 hour workshop	1	X				
Lea *et al.*, 2015	3 weeks clinical and 2 hour workshop	2		X			
Lin *et al.*, 2016	36 hours over 18 weeks	2		X			
Mattos *et al.*, 2015	Weekly 3 hour clinical, over one semester	3			X		
Mattsson & Rosendahl, 2017	5 week full-time course	4				X	
Olson *et al.*, 2018	60 hours over 10 weeks (30 hours didactic content, 30 hours practicum)	Not specified					
Parker *et al.*, 2021	12 weeks (10 weeks classroom and simulation, 2 week clinical placement)	1	X				
Patton, 2018	2 weeks (hours not specified)	4				X	
Pesut *et al.*, 2015	2 day workshop and 80 hours clinical over 12 weeks	3 or 4			X		

Citation (Author, year)	Duration	Timing of education (Year of program)	Year				
			1	2	3	4	5
One semester or course (with or without clinical component)							
Redfield *et al.*, 2016	4 hours meeting over one year, plus preparation and discussion (time not specified)	3			X		
Sakamoto, 2022	30 hours over one semester	Not specified					
Sanchez De Miguel *et al.*, 2022	2 hours per week, over a 7 week semester	Not specified					
Sarabia-Cobo & Castanedo Pfeiffer, 2015	150 hours	3			X		
Smith & Barry, 2013	110 hours (Weekly 3 hour didactic lecture and 8-hour clinical over a 10-week semester)	4				X	
Smyth *et al.*, 2023	2.5 hours training and 4 week clinical placement	2		X			
Suikkala *et al.*, 2016	One course (hours not specified)	2		X			
Trueman, 2017	One clinical rotation, hours not specified	1	X				
Turrentine *et al.*, 2016	4 hours in clinical skills laboratory; other hours not specified	3			X		
Walton & Blossom, 2013	7 weekly home visits over one semester, classroom hours not specified	2		X			

Citation (Author, year)	Duration	Timing of education (Year of program)	Year				
			1	**2**	**3**	**4**	**5**
One standalone education intervention (less than a semester or course)							
Abdelnasser *et al.*, 2022	4 hours	1	X				
Arrogante *et al.*, 2022	30 minute simulation and debrief, preparation time not specified	2		X			
Arrogante *et al.*, 2023	40 minute simulation and debrief, preparation time not specified	2		X			
Chen *et al.*, 2015	3 hours	2		X			
Cheng *et al.*, 2020	0.75 hours	Not specified					
Dahlke *et al.*, 2021	1.5 hours	1 or 2	X				
Demirtas & Basak, 2021	4.25 hours	1	X				
Dukes *et al.*, 2022	1.5 hours	1 or 2	X	X			
Fernandes *et al.*, 2019	12 hours	2		X			
Glass *et al.*, 2021	One 10-minute session	4				X	
Jeong & Kwon, 2021	40-minute training session, then Aging Suit Experience (hours not specified)	2		X			
Kalogirou *et al.*, 2022	One module in eight sections (hours not specified)	1 or 2	X	X			

Citation (Author, year)	Duration	Timing of education (Year of program)	Year				
			1	2	3	4	5
One standalone education intervention (less than a semester or course)							
Kimzey *et al.*, 2016	Module intervention group: time not specified. Clinical intervention group: 7 hours (six hours clinical, one hour post-conference)	4				X	
Love *et al.*, 2023	4 hours	Not specified					
Ross *et al.*, 2020	2.5 hours (90 minute lecture and 1 hour simulation)	3			X		
Skinner, 2017	4 hours	4				X	
Torkshavand *et al.*, 2020	Classroom time not specified, and 90 minute simulation or 90 minute lecture	4				X	
One clinical placement (not combined with other types of education delivery)							
Beauvais *et al.*, 2015	12 hours clinical, other hours not specified	2		X			
Boscart *et al.*, 2022	12 weeks, hours not specified	4				X	
Brown & Bright, 2017	Weekly visit for one semester, hours not specified	3 or 4			X	X	
Eccleston *et al.*, 2015	3 weeks	2		X			
Gipson *et al.*, 2021	Two clinical sessions per week (hours not specified), over 10 weeks	4				X	

Citation	Duration	Timing of education	Year				
(Author, year)		(Year of program)	**1**	**2**	**3**	**4**	**5**
One clinical placement (not combined with other types of education delivery)							
Hovey & Shropshire	One clinical placement cycle	2		X			
Hovey *et al.*, 2018	Half semester at each of the two clinical settings	2		X			
Iwasaki *et al.*, 2019	One hour visits weekly or bi-weekly over one year	1, 2, 3 and 4	X	X	X	X	
Pariseault *et al.*, 2023	1 day	2		X			
Valaitis *et al.*, 2020	72 hours (6 hours per week over 12 weeks)	3			X		
Wu *et al.*, 2022	144 hours over four weeks	4 or 5				X	X

Mixed methods studies used the following: clinical placement (n = 9); classroom (n = 6); clinical laboratory (n =2) and one each for simulation in classroom, simulation in clinical laboratory, and online asynchronous. Quantitative descriptive studies used four different delivery methods in almost equal frequency: clinical placement (n = 6); clinical laboratory (n = 6); simulation in clinical laboratory (n = 6); classroom (n = 5). Of the RCTs, three types of education interventions evaluated: classroom (n = 3); simulation in clinical laboratory (n = 2); clinical laboratory (n = 1). See Table 9.

Table 9

Education Delivery Methods, By Research Design

Research design	Education delivery method	Citation (author, year)
Qualitative	Classroom	Cao *et al.*, 2021; Dobarrio-Sanz *et al.*, 2023; Indar *et al.*, 2018; Lin *et al.*, 2016; Mattsson & Rosendahl, 2017; Olson *et al.*, 2018; Valaitis *et al.*, 2020
	Clinical laboratory	Cao *et al.*, 2021; Crownover *et al.*, 2022; Eaton, 2015; Suikkala *et al.*, 2016
	Clinical placement	Boscart *et al.*, 2022; Brown & Bright, 2017; Davies *et al.*, 2013; Dobarrio-Sanz *et al.*, 2023; Eaton, 2015; Gipson *et al.*, 2021; Indar *et al.*, 2018; Iwasaki *et al.*, 2019; Lin *et al.*, 2016; Mattsson & Rosendahl, 2017; Olson *et al.*, 2018; Pariseault *et al.*, 2023; Sakamoto, 2022; Smyth *et al.*, 2023; Trueman, 2017; Valaitis *et al.*, 2020; Walton & Blossom, 2013
	Simulation in clinical laboratory	Crownover *et al.*, 2022
Quantitative randomized control trial	Classroom	Fernandez-Gutierrez *et al.*, 2022; Gholamzadeh *et al.*, 2018; Glass *et al.*, 2021
	Clinical laboratory	Cheng *et al.*, 2020

Research design	Education delivery method	Citation (author, year)
	Simulation in clinical laboratory	Cheng *et al.*, 2020; Fernandez-Gutierrez *et al.*, 2022
Quantitative non-randomized control trial	Classroom	Arrogante *et al.*, 2022; Chen *et al.*, 2015; Cobbett et al., 2016; Koehler *et al.*, 2016; Koskinen *et al.*, 2016; Love *et al.*, 2023; Ross *et al.*, 2020; Sanchez De Miguel *et al.*, 2022; Sarabia-Cobo & Castanedo Pfeiffer, 2015; Torkshavand *et al.*, 2020
	Online, synchronous	Abdelnasser *et al.*, 2022
	Online, asynchronous	Cobbett et al., 2016; Dahlke *et al.*, 2021; Dukes *et al.*, 2022; Kalogirou *et al.*, 2022; Sanchez De Miguel *et al.*, 2022; Sarabia-Cobo & Castanedo Pfeiffer, 2015
	Clinical laboratory	Demirtas & Basak, 2021; Ross *et al.*, 2020; Smith & Barry, 2013; Torkshavand *et al.*, 2020
	Clinical placement	Beauvais *et al.*, 2015; Eccleston *et al.*, 2015; Hovey & Shropshire, 2021; Koehler *et al.*, 2016; Wu *et al.*, 2022
	Simulation in classroom	Arrogante *et al.*, 2022; Chen *et al.*, 2015
	Simulation in clinical laboratory	Demirtas & Basak, 2021; Ross *et al.*, 2020; Smith & Barry, 2013; Torkshavand *et al.*, 2020
Quantitative descriptive	Classroom	Henrichs *et al.*, 2022; Jeong & Kwon, 2021; Parker *et al.*, 2021; Patton, 2018; Redfield *et al.*, 2016
	Clinical laboratory	Fernandes *et al.*, 2019; Gray-Miceli & Morse, 2019; Henrichs *et al.*, 2022; Jeong & Kwon, 2021; Parker *et al.*, 2021; Patton, 2018
	Clinical placement	Gray-Miceli & Morse, 2019; Henrichs *et al.*, 2022; Hovey *et al.*, 2018; Parker *et al.*, 2021; Patton, 2018; Redfield *et al.*, 2016
	Simulation in clinical laboratory	Fernandes *et al.*, 2019; Gray-Miceli & Morse, 2019; Henrichs *et al.*, 2022; Jeong & Kwon, 2021; Parker *et al.*, 2021; Patton, 2018
Mixed methods	Classroom	Grealish *et al.*, 2013; Hsu *et al.*, 2022; Lea *et al.*, 2015; Lea *et al.*, 2014; Mattos *et al.*, 2015; Pesut *et al.*, 2015

Research design	Education delivery method	Citation (author, year)
	Online, asynchronous	Kimzey *et al.*, 2016
	Clinical laboratory	Eaton & Donaldson, 2016; Skinner, 2017
	Clinical placement	Eaton & Donaldson, 2016; Garbarino & Lewis, 2020; Grealish *et al.*, 2013; Hsu *et al.*, 2022; Kimzey *et al.*, 2016; Lea *et al.*, 2015; Lea *et al.*, 2014; Mattos *et al.*, 2015; Turrentine *et al.*, 2016
	Simulation in classroom	Arrogante *et al.*, 2023
	Simulation in clinical laboratory	Skinner, 2017

Sample

The included studies had an average of 82 baccalaureate nursing student participants, ranging from 6 (Indar *et al.*, 2018) to 531 (Abdelnasser *et al.*, 2022) per study, and represent a total of 5,349 nursing students. Quantitative non-randomized trials had the largest average samples of students, with a range of 36 (Smith & Barry, 2013) to 531 (Abdelnasser *et al.*, 2022) and average of 136.85. This was followed by quantitative randomized control trials, with a range of 32 (Gholamzadeh *et al.*, 2018) to 169 (Glass *et al.*, 2021) and an average of 85.75 students. Quantitative descriptive studies had an average of 83 students, ranging from 45 (Fernandes *et al.*, 2019) to 216 (Henrichs *et al.*, 2022). Studies utilizing mixed methods for research averaged 52.3 students, with samples ranging from 8 (Pesut *et al.*, 2015) to 132 (Mattos *et al.*, 2015), and qualitative studies had the least, with an average 46.25 students and samples ranging from 6 (Indar *et al.*, 2018) to 327 (Iwasaki *et al.*, 2019) students. Although 327

participants in a sample is unusual in a qualitative study, the researchers examined students'

textual data from annual reports of learning using qualitative methods. See Table 10.

Data Collection

When collecting data related to impacts of educational approaches, forty-six studies used

questionnaires, 16 used students' written reports and journals, eleven conducted interviews of

individuals, eight interviewed groups, and five used observations of students. More than 70% of

studies, or 49 of 65, utilized only one method to collect data, while twelve studies used 2

methods, three studies used 3 methods, and one study used four methods (Grealish *et al.*, 2013).

See Table 10.

Data Analysis

In this review, statistical analysis was used in all thirty-two quantitative studies and

quantitative aspects of the twelve mixed methods studies. In the twenty qualitative studies, a

variety of analysis approaches were used, with the content analysis being most common (n = 9),

followed by thematic analysis (n = 6), framework analysis (n = 4), and phenomenological

analysis (n = 2). Of the 12 mixed methods studies, the most common qualitative analysis

methods used were thematic analysis (n = 7), content analysis (n = 3), and hermeneutic analysis

(n = 1). Two mixed method studies did not describe the method of qualitative data analysis

(Kimzey *et al.*, 2016; Turrentine *et al.*, 2016). See Table 10.

Table 10

Sample Size, Data Collection and Data Analysis Methods, by Research Design

Citation (Author, year)	Nursing student participants	Data collection	Data analysis
		Qualitative study articles	
Boscart *et al.*, 2022	(n = 22)	Questionnaire; interview, individual and groups	Statistical analysis; thematic analysis
Brown & Bright, 2017	(n = 45)	Questionnaire; textual data	Thematic analysis
Cao *et al.*, 2021	(n = 27)	Interview, individual	Phenomenological analysis
Crownover *et al.*, 2022	(n = 18)	Interview, groups	Thematic analysis
Davies *et al.*, 2013	(n = 59)	Textual data	Modified framework analysis
Dobarrio-Sanz *et al.*, 2023	(n = 22)	Individual interviews	Thematic analysis
Eaton, 2015	(n = 12)	Textual data; observation; interview, group	Thematic analysis
Gipson *et al.*, 2021	(n = 18)	Textual data	Framework analysis
Indar *et al.*, 2018	(n = 6)	Observation; textual data	Content analysis
Iwasaki *et al.*, 2019	(n = 327)	Textual data	Qualitative content analysis
Lin *et al.*, 2016	(n = 20)	Interview, groups	Content analysis
Mattsson & Rosendahl, 2017	(n = 30)	Textual data	Qualitative content analysis
Olson *et al.*, 2018	(n = 47)	Textual data	Qualitative framework analysis
Pariseault *et al.,* 2023	(n = 12)	Students' written reflection assignments	Qualitative content analysis, thematic analysis
Sakamoto, 2022	(n = 13)	Interview, individual	Qualitative content analysis
Smyth *et al.*, 2023	(n = 10)	Interview, individual	Qualitative framework analysis

Citation (Author, year)	Nursing student participants	Data collection	Data analysis
Suikkala *et al.*, 2016	(n = 80)	Textual data	Qualitative content analysis
Trueman, 2017	(n = 46)	Textual data	Qualitative content analysis
Qualitative study articles			
Valaitis *et al.*, 2020	(n = 15)	Interview, groups; textual data	Qualitative content analysis
Walton & Blossom, 2013	(n = 96)	Textual data; interview, individual	Phenomenological analysis
Quantitative non-randomized study articles			
Abdelnasser *et al.*, 2022	(n = 531)	Questionnaire	Statistical analysis
Arrogante *et al.*, 2022	(n = 80)	Questionnaire	Statistical analysis
Beauvais *et al.*, 2015	(n = 66)	Questionnaire	Statistical analysis
Chen *et al.*, 2015	(n = 58)	Questionnaire	Statistical analysis
Cobbett *et al.*, 2016	(n = 196)	Questionnaire; interview, individual	Statistical analysis; qualitative data analysis not reported
Dahlke *et al.*, 2021	(n = 116)	Questionnaire	Statistical analysis
Demirtas & Basak, 2021	(n = 119)	Questionnaire; interview, individual	Statistical analysis; qualitative content analysis
Dukes *et al.*, 2022	(n = 207)	Questionnaire	Statistical analysis
Eccleston *et al.*, 2015	(n = 52)	Questionnaire	Statistical analysis
Hovey & Shropshire, 2021	(n = 99)	Questionnaire	Statistical analysis
Kalogirou *et al.*, 2022	(n = 166)	Questionnaire	Statistical analysis
Koehler *et al.*, 2016	(n = 266)	Questionnaire	Statistical analysis
Koskinen *et al.*, 2016	(n = 46)	Questionnaire	Statistical analysis
Love *et al.*, 2023	(n = 146)	Questionnaire	Statistical analysis
Ross *et al.*, 2020	(n = 119)	Questionnaire	Statistical analysis
Sanchez De Miguel *et al.*, 2022	(n = 60)	Questionnaire	Statistical analysis
Sarabia-Cobo & Castanedo Pfeiffer,	(n = 240)	Questionnaire	Statistical analysis

Citation (Author, year)	Nursing student participants	Data collection	Data analysis
2015			
Smith & Barry, 2013	(n = 36)	Questionnaire	Statistical analysis
Quantitative non-randomized study articles			
Torkshavand *et al.*, 2020	(n = 70) Simulation (n = 35) Lecture (n = 35)	Questionnaire	Statistical analysis
Wu *et al.*, 2022	(n = 64)	Questionnaire	Statistical analysis
Mixed methods study articles			
Arrogante *et al.*, 2023	(n = 80)	Observation; interview, groups	Statistical analysis; thematic analysis
Eaton & Donaldson, 2016	(n = 12)	Questionnaire	Statistical analysis; thematic analysis
Garbarino & Lewis, 2020	(n = 79)	Questionnaire	Statistical analysis; qualitative content analysis
Grealish *et al.*, 2013	(n = 35)	Questionnaire; textual data; interview, individual and groups	Statistical analysis; hermeneutic analysis; content analysis
Hsu *et al.*, 2022	(n = 87)	Questionnaire; interview, individual; textual data	Statistical analysis; thematic analysis
Kimzey *et al.*, 2016	(n = 67) Module (n = 34) Clinical (n = 33)	Questionnaire	Statistical analysis
Lea *et al.*, 2015	(n = 40)	Questionnaire	Statistical analysis; thematic analysis
Lea *et al.*, 2014	(n = 30)	Questionnaire; observation	Statistical analysis; thematic analysis
Mixed methods study articles			
Mattos *et al.*, 2015	(n = 132)	Questionnaire; textual data	Statistical analysis; qualitative content analysis
Pesut *et al.*, 2015	(n = 8)	Questionnaire;	Statistical analysis;

Citation (Author, year)	Nursing student participants	Data collection	Data analysis
		interview, individual	thematic analysis
Skinner, 2017	(n = 21)	Questionnaire	Statistical analysis; thematic analysis
Turrentine *et al.*, 2016	(n = 9)	Questionnaire; observation	Statistical analysis; analysis of observations not described
Quantitative descriptive study articles			
Fernandes *et al.*, 2019	(n = 45)	Questionnaire	Statistical analysis
Gray-Miceli & Morse, 2019	(n = 124)	Observation; questionnaire	Statistical analysis
Henrichs *et al.*, 2022	(n = 216)	Questionnaire	Statistical analysis
Hovey *et al.*, 2018	(n = 53)	Questionnaire	Statistical analysis
Jeong & Kwon, 2021	(n = 65)	Questionnaire	Statistical analysis
Parker *et al.*, 2021	(n = 46)	Questionnaire	Statistical analysis
Patton, 2018	(n = 52)	Questionnaire	Statistical analysis
Redfield *et al.*, 2016	(n = 63)	Questionnaire	Statistical analysis
Quantitative randomized control trial			
Cheng *et al.*, 2020	(n = 69)	Questionnaire	Statistical analysis
Fernandez-Gutierrez *et al.*, 2022	(n = 73)	Questionnaire	Statistical analysis
Gholamzadeh *et al.*, 2018	(n = 32)	Questionnaire	Statistical analysis
Glass *et al.*, 2021	(n = 169)	Questionnaire	Statistical analysis

Various standardized measures were utilized to measure quantitative outcomes in the quantitative studies and quantitative aspects of the mixed methods studies, which comprised a total of 45 of 65 included studies. The most common standardized measure of outcomes was Kogan's Attitudes toward Old People Scale, used in 10 studies, Facts of Aging Quiz, used in 8 studies, and Jefferson Scale of Empathy, used in four studies. Eight studies utilized measures that the researchers designed for that research project. See Table 11.

Table 11

Assessment Measures

Name of measure	Attitude	Know-ledge	Skill	Studies utilizing measure
Aging Simulation Experience Survey (ASES) (Chen *et al.*, 2011)	x			Chen *et al.*, 2015
Ambivalent Ageism Scale (AAS) (Cary *et al.*, 2017)	x			Dukes *et al.*, 2022
Attitudes to Ageing Questionnaire (AAQ) (Laidlaw, Power Schmidt, & the WHOQOL-OLD Group, 2007)	x			Eaton & Donaldson, 2016
Attitudes Toward Working with the Elderly scale (Fox and Wold, 1996)	x			Koehler *et al.*, 2016
Behavior toward the elderly - instrument developed by Choi (2006) [no formal name]	x			Jeong & Kwon, 2021
Dementia Attitudes Scale (DAS; O'Connor and McFadden, 2010)	x			Kimzey *et al.*, 2016
* Elder abuse survey (Ross *et al.*, 2020)	x			Ross *et al.*, 2020
Geriatric Attitudes Scale (GAS), Los Angeles Geriatric Attitudes Scale (UCLA-GAS), Older Adults Attitude Scale (OAS) (Reuben *et al.*, 1998; Hsu, 2022)	x			Hsu *et al.*, 2022; Mattos *et al.*, 2015; Torkshavand *et al.*, 2020
Geropsychiatric psychological symptoms and health problem nursing attitude scale (GPN-A) (Wu *et al.*, 2021)	x			Wu *et al.*, 2022
* Invisible Care for Health Science Studies Questionnaire (Cuestionario de cuidado invisibles en ciencias de la salud) (CCI-U) (Sanchez De Miguel *et al.*, 2022)	x	x		Sanchez De Miguel *et al.*, 2022
Jefferson Scale of Empathy – Health Professions Students and Health Professions tools (JSE-HPS)	x			Arrogante *et al.*, 2022; Chen *et al.*, 2015; Fernandez-Gutierrez *et al.*, 2022; Gholamzadeh *et al.*, 2018
Kiersma-Chen Empathy Scale (KCES) (Davis, 1994)	x			Chen *et al.*, 2015
Kogan's Attitudes towards Old People scale (KAOP) (Kogan, 1961) including Spanish, Persian, and Portuguese version	x			Arrogante *et al.*, 2022; Beauvais *et al.*, 2015; Cheng *et al.*, 2020; Demirtas & Basak, 2021; Fernandez-Gutierrez *et*

Name of measure	Attitude	Know-ledge	Skill	Studies utilizing measure
				al., 2022; Fernandes *et al.*, 2019; Gholamzadeh *et al.*, 2018; Henrichs *et al.*, 2022; King *et al.*, 2013; Koskinen *et al.*, 2016
Negative Stereotypes Questionnaire about Aging (CENVE) (Blanca *et al.*, 2005; Palacios *et al.*, 2009)	x			Sarabia-Cobo & Castanedo Pfeiffer, 2015
* Older Adults Care Willingness Scale (OCWS) (Hsu, 2022)	x			Hsu *et al.*, 2022
Perspectives on Caring for Older Patients Scale (PCOP) (Burbank, McCool, & Burkholder, 2002)	x			Redfield *et al.*, 2016
Positive and Negative Ageism Scale (PNAS) (Yurttas and Sarıkoca, 2018)	x			Demirtas & Basak, 2021
Semantic Differential Scale (SDS, RASD) (Sanders *et al.* 1984; Polizzi, 2003; Jeong, 2012), Refined Aging Semantic Differential, Korean version	x			Hovey *et al.*, 2018; Hovey & Shropshire, 2021; Jeong & Kwon, 2021
Relating to Older Persons Evaluation (Cherry and Palmore, 2008)	x			Grealish *et al.*, 2013
Self-reflection and insight ability scale (SRIS-C) (Chen *et al.*, 2016)	x			Wu *et al.*, 2022
Senses Framework survey (Nolan *et al.*, 2006)	x			Garbarino & Lewis, 2020
Student Perceptions of Working with Older People (SPWOP) scale (Nolan *et al.*,2006)	x			Koehler *et al.*, 2016
Students' Interest in Nursing Older People Scale (SINOPS) (Koskinen *et al.*, 2012)	x			Koskinen *et al.*, 2016
Willingness To Care for Older People Scale (WCOP) (Zhang *et al.*, 2016)	x			Cheng *et al.*, 2020
Alzheimer's Disease Knowledge Scale (ADKS; Carpenter *et al.*, 2009)		x		Kimzey *et al.*, 2016
Basic Knowledge of Alzheimer's disease (BKAD) survey (Wiese *et al.*, 2017, 2020)		x		Love *et al.*, 2023
* COPD Elderly Patient Education - Knowledge Assessment Questionnaire and Checklist of Student's Skills (Torkshavand *et al*, 2020)		x	x	Torkshavand *et al.*, 2020

Name of measure	Attitude	Know-ledge	Skill	Studies utilizing measure
Dementia Knowledge Assessment Tool Version 2 (D-KAT2) (Toye *et al.* 2014)		x		Eccleston *et al.*, 2015; Lea *et al.*, 2014, 2015
* Elder abuse surveys (Ross *et al.*, 2020)		x	x	Ross *et al.*, 2020
* Falls knowledge test and care plan case study (Patton *et al.*, 2018)		x	x	Patton, 2018
Facts of Aging Quiz - FAQ 1, 2 or revised versions (Palmore, 1977,1988; Breytspraak and Badura, 2015)		x		Beauvais *et al.*, 2015; Cheng *et al.*, 2020; Koskinen *et al.*, 2016; Mattos *et al.*, 2015; Parker *et al.*, 2021; Redfield *et al.*, 2016; Skinner, 2017
* Geriatric knowledge test (Turrentine *et al.*, 2016)		x		Turrentine *et al.*, 2016
Geropsychiatric psychological symptoms and health problem nursing knowledge scale (GPN-K) (Wu *et al.*, 2021)		x		Wu *et al.*, 2022
Hartford Geriatric Nursing Education Consortium model (The Hartford Institute for Geriatric Nursing, n.d.)		x	x	Gray-Miceli & Morse, 2019
Knowledge About Older People Quiz (Dikken *et al.*, 2016)		x		Kalogirou *et al.*, 2022
* Knowledge of continence quiz (Hunter & Dahlke, accepted manuscript)		x		Dahlke *et al.*, 2021
Nursing Interventions Classification interventions (Butcher *et al.*, 2018)		x	x	Arrogante *et al.*, 2023
Palliative Care Nursing Self-Competence Scale (Desbiens, 2011; Desbiens and Fillion, 2011)		x	x	Pesut *et al.*, 2015
* Physical senses in the elderly tests on knowledge and reported practice (Abdelnasser *et al.*, 2022)		x	x	Abdelnasser *et al.*, 2022
Student Gerontological Knowledge Survey (Boscart *et al.*, 2020)		x		Boscart *et al.*, 2022
The Nurses Knowledge of Older Persons Quiz (Mellor, *et al.*, 2007)		x		Grealish *et al.*, 2013
Geropsychiatric psychological symptoms and health problem nursing practice scale (GPN-P) (Rong *et al.*, 2016)		x	x	Wu *et al.*, 2022

* indicates tool was developed by researchers for the individual study

Outcomes measured

Outcomes reported as measured by researchers included knowledge, skill, and attitude, see below in Table 12. Of the articles, 45 (69.2%) measured attitude, 41 (63.1%) measured knowledge, and 21 (32.3%) measured skill. Thirty-five articles examined different combinations of all three, while about half reported only one outcome - attitude (n = 23) or knowledge (n = 8). No articles reported on skill alone.

Table 12

Type of Outcome Measured

Citation (Author, year)	Intervention	Outcome measured		
		Knowledge	Skill	Attitude
Abdelnasser *et al.*, 2022	Provide nursing guidelines education to first year nursing students on sensory impairment among the elderly	X	X	
Arrogante *et al.*, 2022	High-fidelity simulation training on working with older people, using standardized patients and MAES methodology			X
Arrogante *et al.*, 2023	High-fidelity simulation training on working with older people, using standardized patients and MAES methodology	X	X	
Beauvais *et al.*, 2015	Service learning with senior citizens at a community senior center	X		X
Boscart *et al.*, 2022	Guided Integrated Practicum in LTC homes	X	X	X
Brown & Bright, 2017	Service-learning experience	X	X	X
Cao *et al.*, 2021	Geriatric nursing course	X		X
Chen *et al.*, 2015	Participation in an aging simulation game to experience aging-related changes themselves	X		X
Cheng *et al.*, 2020	Senior Simulation Suit Programme (SSSP), which focused on mimicking the physiological experiences of an 80 year-old person			X

Citation (Author, year)	Intervention	Outcome measured		
		Knowledge	Skill	Attitude
Cobbett *et al.*, 2016	Alzheimer Disease and other Associated Dementias Care Course (ADODCC)	X		
Crownover *et al.*, 2022	Mask-Ed™ simulation			X
Dahlke *et al.*, 2021	E-learning activity on continence and mobility in older people	X		
Davies *et al.*, 2013	Practicum involving sequential visits with an older adult accompanied by reflective journaling	X		X
Demirtas & Basak, 2021	Daily life activities simulation			X
Dobarrio-Sanz *et al.*, 2023	Home visiting programme to community-dwelling older adults with chronic multimorbidity	X	X	X
Dukes *et al.*, 2022	E-learning activity on communication with older people			X
Eaton, 2015	Ethnodrama to highlight late-life potential			X
Eaton & Donaldson, 2016	Ethnodrama to highlight late-life potential			X
Eccleston *et al.*, 2015	Supported clinical placement in a residential aged care facility, with trained clinical mentors, a structured programme, training on dementia and facilitated debrief sessions	X		
Fernandez-Gutierrez *et al.*, 2022	Multimodal intervention using the NLN Jeffries Simulation Theory, which includes theoretical content, age simulation suits, and storytelling of older persons			X
Fernandes *et al.*, 2019	The simulation game "Aging Nursing Game" ® It is a board game that incorporates, through a ludic strategy, challenges inherent to aging, experiencing "areas of motor and/or sensory impairment that occur in the aging process, as well as main difficulties in performing daily activities.			X
Garbarino & Lewis, 2020	Course on gerontology, including a service-learning intervention entitled Aging is Very Personal.			X
Gholamzadeh *et al.*, 2018	Empathy skills training for working with older people			X

Citation (Author, year)	Intervention	Outcome measured		
		Knowledge	Skill	Attitude
Gipson *et al.*, 2021	Intergenerational service-learning embedded into a community health nursing course	X	X	X
Glass *et al.*, 2021	Evidence-based poster education on delirium	X		
Gray-Miceli & Morse, 2019	Series of six learning assignments on care of older adults in clinical practice	X	X	
Grealish *et al.*, 2013	Student Nurse Led Ward model: a student leadership model of clinical education, designed for the aged care context	X	X	
Henrichs *et al.*, 2022	Teaching techniques designed to positively shift nursing students' attitudes toward older adults in a gerontology course: Course content included lectures, videos, MaskEd™ simulation, group work, case studies and clinical experiences			X
Hovey & Shropshire, 2021	Intentional first clinical encounters as a nursing student with older people in acute care and long term care settings			X
Hovey *et al.*, 2018	Intentional first clinical encounters as a nursing student with older people in acute care and long term care settings			X
Hsu *et al.*, 2022	Narrative pedagogy: training students to conduct interviews, interview of older person in community, record the interview/retell the story, reflective writing, group discussion and project, presentation of project to older people and class			X
Indar *et al.*, 2018	Facilitated critical reflection workshops during clinical placement in long term care		X	X
Iwasaki *et al.*, 2019	Preventive home visiting practice to older people in the community	X	X	
Jeong & Kwon, 2021	Aging suit experience			X
Kalogirou *et al.*, 2022	E-learning on cognitive impairment	X		
Kimzey *et al.*, 2016	Clinical and online educational experiences on Alzheimer's' disease	X		X
Koehler *et al.*, 2016	Stand-alone course in gerontological nursing			X
Koskinen *et al.*, 2016	Learning with Older People Programme (LOPP) utilizing one week of classes solely devoted to	X		X

Citation (Author, year)	Intervention	Outcome measured		
		Knowledge	Skill	Attitude
	lessons where students and older people work together daily in small groups			
Lea *et al.*, 2015	Aged care clinical placements within a supportive framework with debriefing and critical reflection opportunities	X		X
Lea *et al.*, 2014	Aged care clinical placements within a supportive framework with debriefing and critical reflection opportunities	X		X
Lin *et al.*, 2016	Incorporation of music therapy into a geriatric nursing course at a nursing home		X	X
Love *et al.*, 2023	Self-directed learning activity as a means of providing the most current information regarding dementia	X		
Mattos *et al.*, 2015	Stand-alone geriatric course or interactions and interviews with community-dwelling older adults	X		X
Mattsson & Rosendahl, 2017	Participation by Thai nursing students in a gerontology course in Sweden			X
Olson *et al.*, 2018	Gerontological course, with practicum experience involving interviews of community-dwelling older adults and reflective journaling	X		
Pariseault *et al.,* 2023	Clinical placement in residential care home for older adults and reflective journaling	X		X
Parker *et al.*, 2021	Ten weeks of theoretical and practical content in a simulated ward environment prior to a two-week aged care clinical placement	X		
Patton, 2018	Online learning module and practical experience in fall risk assessment of an older adult	X	X	
Pesut *et al.*, 2015	Educational workshop on palliative approach and joint community clinical placement for RN and HCA students	X		X
Redfield *et al.*, 2016	Program of repeated and structured social interactions with community-dwelling older adults as part of a health promotion course	X		X
Ross *et al.*, 2020	Three-part learning strategy consisting of lecture, simulation using standardized patients, and debriefing on elder abuse	X	X	X

Citation (Author, year)	Intervention	Outcome measured		
		Knowledge	Skill	Attitude
Sakamoto, 2022	Clinical experience at the Robust Aging Program clinic, a community wellness outpatient senior center	X		X
Sanchez De Miguel *et al.*, 2022	Active learning methodology based on a case study of a geriatric patient, to foster development of non-prejudiced, stereotype-free attitudes towards geriatric parents and interactions based on patients' individual characteristics and needs, in relation to their age, sex, emotional situation, and cultural origin, thereby enabling the practice of invisible care	X		X
Sarabia-Cobo & Castanedo Pfeiffer, 2015	Aging Nursing course, comprised of theoretical and practical material, with a combination of e-learning and "traditional" face-to-face lectures			X
Skinner, 2017	Simulation of health promotion and development of wellness plan with a standardized patient as an active community dwelling older adult with chronic disease			X
Smith & Barry, 2013	Geriatric home care clinical simulation	X	X	
Smyth *et al.*, 2023	Training on the Validation, Emotion, Reassure, Activity (VERA) framework during clinical placement (communication tool to communicate with people with conditions like dementia)	X	X	
Suikkala *et al.*, 2016	Collaborative learning in gerontological clinical settings where aged people are involved as age-experts, including a life history interview, choice of nursing intervention to improve well-being and participation of older people in case-based learning sessions	X	X	
Torkshavand *et al.*, 2020	Simulation involving students playing role as nurse as well as older person with sensory restrictions with focus on communication and education of older person with COPD	X	X	
Trueman, 2017	Fundamentals of Nursing course, which incorporated theoretical learning through a literature review exploring functional abilities and quality of life in the older adult, followed by clinical placement in long term care, and reflective paper			X
Turrentine *et al.*, 2016	Interprofessional preoperative geriatric assessment in nurse/physician pairs in	X	X	

Citation (Author, year)	Intervention	Outcome measured		
		Knowledge	Skill	Attitude
	classroom, in simulation on standardized patients, then independently in a clinic setting			
Valaitis *et al.*, 2020	Clinical placement in a primary care program. Health TAPESTRY involves an interprofessional primary care team, trained lay volunteers conducting home visits, system navigation, and an online software application	X	X	
Walton & Blossom, 2013	Training on older people and home visits, followed by series of home visits to an older person in a rural area, to conduct assessments and weekly assignments	X	X	X
Wu *et al.*, 2022	Problem-based geropsychiatric clinical internship program including active ongoing mentorship from clinical instructors, demonstrations of clinical skills, and explicit guidance to solve clinical problems	X	X	X
Number of articles measuring each concept:		(n = 41)	(n = 21)	(n = 45)

Discussion

The key findings of this study provide an updated understanding of research related to gerontological education in baccalaureate nursing education. We examined the patterns of publication, research methodologies, quality, education types, and types of outcomes used since Koskinen *et al.'s* (2015) review. We noted an increase in research in the past ten years examining gerontological education and an increase in the use of simulation, e-learning, and community clinical placements in the past ten years. Most studies were descriptive, with only four randomized controlled trials.

Characteristics of studies

Our study search resulted in 2,583 articles after removal of duplicates, and included a total of 65 in our review. We searched 6 databases (CINAHL n = 849, Education Research Complete n = 483, Scopus n = 461, MEDLINE n = 439, EMBASE n = 330, and ERIC n = 21). Included articles were from 16 different countries, with most from the USA, followed by Canada, Spain, Australia. In comparison, Koskinen *et al.'s* (2015) search used only 3 databases (MEDLINE n = 212, CINAHL n = 100 and ERIC n = 38), resulted in 350 articles, and after screening, included 66 articles. Distribution of the 17 countries in published articles differed from our review, as they were mostly from the USA, Europe, and Nordic countries. This highlights the proliferation of literature related to gerontological education, and increase in research in Australia, Asia, and the Middle East published in English.

In this review, all studies were single, isolated projects which were discussed in a single report, other than two which reported through two articles (Arrogante *et al.*, 2022, 2023; Eaton, 2015 and Eaton & Donaldson, 2016), and two cases in which authors completed one study, then

went on to continue research to examine the same concepts: Hovey *et al.*, (2018) and Hovey &
Shropshire, (2021), and Lea *et al.*, (2014, 2015). This indicates there is little evidence of spread
or scaling up of evidence-based educational strategies. Devkota *et al.* (2023) provide an example
of how educational interventions may be developed, tested, and refined, using the Analysis
Design Development Implementation Evaluation (ADDIE) model, which supports spread and
scaling up. Scholars also suggest that beyond the interest or capacity of educators to refine
interventions, there are greater systemic barriers to dissemination of knowledge, with a rise of
neoliberalist approach in universities with ownership of ideas, and a shift from public good to
commodity/private benefit, marketization, and academic capitalism (Croucher & Lacy, 2022). As
Anderson (2017) explains, knowledge creation in higher education has increasingly focused on
production of material at a cost to students or publication in high-impact academic journals
which are only available through academic libraries, rather than freely available for the
improvement of general practice and society. Openly sharing knowledge about nursing
education, including methods to evaluate and improve interventions offers greater potential to
support dissemination and refinement of effective strategies and disrupts the neoliberalist
approach.

Methodological Quality

This review has demonstrated improvement in methodological quality of studies
published over the past ten years, compared to Koskinen *et al.'s* (2015) findings of low quality in
validity, reporting, and evaluation. As identified in the findings above, of the sixty-five included
articles, there were eight articles that did not meet all criteria of methodological quality in this
review, primarily in clarity of research question, missing or unclear elements of research design,
and lack of integration of qualitative and quantitative outputs. Yet overall, the quality of articles

was good. The pattern of improvement is also reflected in a systematic review by Yan *et al.*
(2022), which found all included studies published between 2010 and 2020 demonstrated
adequate methodological rigour when evaluated with the MMAT. Similarly, a review by Hsieh
and Chen (2018), used the Critical Appraisal Skills Program (CASP) to assess research quality
with positive scores in all included articles (n = 18) in two areas; research addressed a clearly
focused issue, and all articles used an appropriate method to answer the question(s). Unlike the
current review, Hsieh and Chen (2018) identified gaps similar to Koskinen *et al.* (2015) and
stated none of their included studies published between 2004-2014 reported on methodological
challenges. The improvement in research quality observed in the present review provides a
contrast and comparison with other reviews on gerontological education research.

Educational approaches

Seven different education delivery method types were identified in this review, with
thirty-one, or almost half of the studies using at least two methods and nine using three or more.
In Koskinen *et al.* (2015) only fourteen studies were identified as combined methods to promote
students' learning and comprehension. Yan *et al.'s* (2022) review found only five of the nineteen
studies integrated theory and clinical. Moody *et al.'s* (2020) examination of how gerontological
concepts can be integrated into curriculum suggest that concepts are reinforced when covered
from both theoretical and practical clinical perspectives, and are more likely to be integrated and
applied by students, making a case for combined methods.

The most common delivery methods in this review were clinical placements (n = 39),
followed by classroom (n = 34), and teaching and simulation in clinical laboratory (n = 33).
Studies utilized online synchronous and asynchronous methods of delivery, as well as simulation

in the classroom. This is a change from Koskinen *et al.*'s review (2015) of four categories, including combined solutions of theory and clinical activity (n = 14), learning in nursing home setting (n = 4), education resources in clinical practice (n = 7), and classroom solutions (n = 5).

Many articles in our review utilized a combination of theory and clinical activities, with 39 of 65 (60%) employing more than one method of education delivery, an increase from Koskinen *et al.'s* (2015) review, which listed just 14 (21.5%). Moreover, our review illuminates a change in pattern in clinical placement settings, with 20 of the 39 articles utilizing older people's home or community seniors' centers, 12 in long term care / residential aged care, and three examining more than one setting. It is noteworthy that 17 articles of the 23 utilizing community settings were studies in the USA, although it is unclear why. Perhaps there is more access to community agencies than in other jurisdictions, or perhaps this reflects a culture in which students are exposed to the heterogeneity of older people. This contrasts with the studies in Koskinen *et al.'s* (2015) review which reported more traditional settings such as nursing home settings (n = 10), acute care (n = 3) or medical clinics (n = 3). Koskinen *et al.* (2015) note that it was not until after 2007 that studies involving clinical training were regularly published, and the increase in this review reveals a continued pattern. The use of virtual and simulated nursing education options is also becoming a more feasible option as many authors describe increasing numbers of students in programs, while clinical placement host agencies are decreasing (Horowitz *et al.*, 2022; Merriam *et al.*, 2019; Ross and Crusoe, 2014; Thomson *et al.*, 2021). Three studies in this review include education in acute care settings, which challenges the assumption that gerontological nursing clinical education should be set in long term care settings, an ageist assumption that reinforces that care of older people involves dependence and disability (Fetherstonhaugh *et al.*, 2022).

The duration of education in this review varied greatly, with the most common over one semester or "course". This is contrary to recommendations made by educators to have gerontological education throughout the curriculum to foster gerontological competencies (CASN, 2017; Fetherstonhaugh *et al.*, 2022; Garbrah *et al.*, 2017; McCleary *et al.*, 2017). This was similar to Yan *et al.'s* (2022) review of student nurses' knowledge, attitudes, and willingness to work with older people, where more than half of the studies focused on standalone geriatric courses or clinical placements, as compared to integrated forms of delivery or whole-program curricula. Scholars suggest the one of the challenges to incorporating gerontological competencies into nursing programs is a lack of faculty with interest and expertise in gerontology, and/or processes to select and train both theoretical and clinical instructors (Fetherstonhaugh *et al.*, 2022; Garbrah *et al.*, 2017). Negrin *et al.'s* (2022) study of gerontological educators suggests there is often limited time and opportunity for professional development of faculty in gerontology. Moreover, curriculum revision is complex and time consuming; stand-alone courses may allow for more flexibility and responsive ongoing revision (Risling, 2017). It has been suggested that increased development and testing of self-paced online learning activities may serve as a supplement when nursing education programs lack qualified educators (Maxwell & Wright, 2016). Perhaps that is one of the reasons this review found eight articles describing studies of e-learning.

The timing in the delivery of education in the included articles occurred most often in year two of a nursing program (n = 18), followed by year 3 and 4 (n = 11). Hsieh and Chen's (2018) review of geriatric and LTC courses on knowledge, competence and career intentions also reported this education was offered in the third and fourth year of the program. The frequency in which gerontological education is delivered later in nursing programs is a positive finding. Many

nursing education programs include geriatric clinical experiences in the first year of the program, and evidence shows this timing and type of exposure to older people does not lead to improvement in perceptions of older people (Dahlke *et al.*, 2019; Fetherstonhaugh *et al.*, 2022; Gallo, 2019; Kalogirou *et al.*, 2021).

Evaluation methods

This review identified the most common research methodology was quantitative (n = 32), with 20 qualitative, and 13 mixed methods. Unfortunately, Koskinen *et al.* (2015) did not report on methods in their review. Other systematic reviews, such as Hsieh and Chen (2018) included 16 quantitative and 2 qualitative studies, and Yan *et al.* (2022) included 11 quantitative, 5 qualitative and 3 mixed methods studies. This reflects an increase in the proportion of qualitative research in gerontological undergraduate nursing education.

Sample sizes described in this review were an average of 82 nursing students, an increase from Koskinen *et al.* (2015) which averaged 59 students. Data collection methods in studies in our review included questionnaires (n = 46), students written reports and journals (n = 16) , interviews (n = 13)), and observations (n = 5), noting that several used a combination of methods. Whereas in Koskinen *et al.'s* (2015) review, studies only used questionnaires (n = 49) and interviews (n = 22), suggesting more diverse data collection strategies are being used in recent years. In addition, digital distribution and collection of questionnaires and student submissions has increased the ability of researchers to access participants and textual data.

This review found 42 different instruments to measure quantitative learning outcomes, of which nine were designed for the individual study. Although Koskinen *et al.* (2015) reported 49 studies used questionnaires, they did not list the names or authorship. Yan *et al.*, (2022)

described a variety of outcome measures, with seven studies using Kogan's Attitude towards Old

People Scale to measure attitude (Kogan, 1961), Palmore's Facts on Aging Quiz to measure

knowledge (Palmore, 1977), and ten of the 19 included studies created a unique questionnaire to

measure their participants' intention to work with older people. Hsieh and Chen (2018) reported

the most used instrument was the Perception of Caring for Old People (Burbank, *et al.*, 2006).

In this review, statistical analysis was used to examine quantitative data, and qualitative

analysis approaches such as content analysis, thematic analysis and phenomenological analysis

were consistent with analysis methods reported in Koskinen *et al.* (2015). All but two of this

review's studies specified the type of qualitative analysis used, including a new type, framework

analysis, reflecting an improvement in the quality of reporting, since the last review by Koskinen

et al. (2015).

Learning Outcomes

Outcome types measured in this review were student knowledge, attitude, and skill.

Strong similarities are seen in other reviews, as the studies in Koskinen *et al.* (2015) examined

attitudes, knowledge, clinical performance, and career choices. In other systematic reviews,

Hsieh and Chen (2018) found a focus on student knowledge, care intention and competence in

geriatric nursing competence, and Yan *et al.* (2022) knowledge, attitude, and work intention

toward geriatric nursing.

Implications

As the studies in this review were heterogeneous, there were few patterns making it

challenging for nurse educators to know what to adapt for their course or curriculum, and how to

assess its success. Future systematic reviews of the literature examining the effectiveness of each of the three most researched education interventions is warranted: community gerontological clinical placement; gerontological simulation, and online synchronous and asynchronous online delivery of gerontological content. Moreover, longitudinal studies are needed to confirm retention of learning, and outcomes over time. Both Canada and the USA have developed gerontological entry to practice standards and competencies. Future systematic reviews of the literature could examine the emergence of new educational approaches using asynchronous and synchronous learning and/or community clinical placements with older people. Since scholars have suggested there is a dearth of nurse educators with gerontological expertise, it is a priority for faculty development in this area to enable student learning, as specialists in gerontology are needed as mentors and role models to teach courses (Allue-Sierra *et al.*, 2023; Garbrah *et al.*, 2017).

Recognition and support are needed for educators to develop gerontological expertise, through pursuit and maintenance of nationally recognized standards in gerontological nursing and specialty certification. The development of relationships between nurse educators and gerontological scholars is necessary to enable sharing of knowledge and development of research opportunities, which may be enabled through professional organizations, such as the Alberta Gerontological Nurses Association, Canadian Gerontological Nursing Association, Canadian Association of Schools of Nursing, and Canadian Nurses Association.

Study Strengths and Limitations

This review provides an update on the overview of research related to gerontological education in baccalaureate nursing programs. We highlight the quality of research has improved,

innovations utilizing technology have increased, and the emergence of gerontological community clinical settings.

This scoping review was limited to work published in the English language, and as such, could not reflect significant work in other languages and potentially resulted in over-representation of North American, Western European, Australian and New Zealand literature. The reviewers were not blinded to the identity of authors of articles reviewed and during critical appraisal, which is relevant when any of the reviewers' own work is identified in the literature review. As this was a scoping review, we did not examine the impact or effectiveness of the education delivery methods. Further research is needed, including systematic reviews and qualitative examination and synthesis of research on gerontological nursing education.

Conclusions

This review provides an expansion and update on Koskinen *et al.'s* (2015) review of gerontological education in baccalaureate nursing programs. We identified an improvement in the quality of research, that the use of digital technologies and simulation in education delivery has increased, and there is a proliferation in gerontological community clinical settings. We recommend longitudinal studies and research utilizing standardized methods for testing and refinement to allow for spread and scale of educational innovations. Future systematic reviews should be conducted to examine the effectiveness of simulation education, gerontology-focused community clinical placement and the delivery of education through digital technology.

Expected Outcomes

I plan to share the results of my study through written form in journals, briefing notes, newsletter articles, reports, and infographics, and through conferences, presentations, and webinars. I will draft a manuscript for one of the following journals: *Nurse Education Today, The Journal of Nursing Education, the Journal of Gerontological Nursing*, or *Perspectives*. I will provide a list of recommendations, in both written and infographic form, to the Canadian Association of Schools of Nursing (CASN), to be used as a companion to their document, Entry-to-Practice Gerontological Care Competencies for Baccalaureate Programs in Nursing (2017). Findings and recommendations will also be shared with the University of Alberta, Faculty of Nursing, for consideration during program design, review, and evaluation. Recommendations will be provided to the Canadian Nurses Association, as it relates to advocacy in Aging and Seniors Care, as well as development of health human resources. I will present my research findings at national conferences: the Canadian Association of Schools of Nursing, the Canadian Association on Gerontology, and the Canadian Gerontological Nurses Association. I will also share learnings locally with the Alberta Association of Nurses and Alberta Association on Gerontology. I will share my findings in a briefing note to Alberta Health, as they work to implement and evaluate the Continuing Care Act (Bill 11), health care education funding and standards, and policies on approval of clinical practicums for nursing students. Finally, I will share my findings and recommendations with undergraduate nursing students, through faculty of nursing newsletters at all Alberta post-secondary institutions providing baccalaureate and bridging programs.

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Appendix A

Koskinen et al. (2015) Review Criteria for Quality of Research and Ethics

Area of Focus	Criteria
Validity and Trustworthiness	Pilot study
	Internal consistency
	Stability, test -retest
	Power analysis
	Considerations of limitations
	Discussion on generalizability
	Face validity
	Content, use of experts
	Construct, EFA
	Analysis, participant validation
	Analysis, outsider validation
	Analysis, two or more researchers
	Research process documentation
	Reflexivity
	Saturation
	Transferability
	Stakeholder involvement
Ethics	Ethical principles addressed
	Ethical approval obtained
	Written informed consent

Appendix B

Koskinen et al. (2015) Scoping Review Search Strategy

Search component	Reported strategy
Research questions	- What are the main research areas related to nurses' education regarding nursing older people? - How have the researchers addressed the validity or trustworthiness of the studies?
Search terms	nurse student* OR nursing student* OR undergraduate AND educational OR education OR teaching OR learning AND gerontology OR geriatrics OR geriatric nursing OR gerontologic nursing OR gerontological nursing OR elder care OR elderly care OR aged care OR ageing OR aging OR older people OR older adults
Limits	Availability of an abstract, English language, years 1999-2012, the source type in CINAHL and the ERIC: academic journals, in the CINAHL: the function Exclude MEDLINE records

Appendix C

Search Strategy For Articles Examining Gerontological Nursing Education In Baccalaureate Nursing Programs

Database	Search terms					Number of Results
CINAHL	(MH "Geriatrics") or (MH "Aged, Hospitalized") or (MH "Aged+") or (MH "Senior Centers") or (MH "Gerontologic Care") or (MH "Geriatricians") OR (MH "Gerontologic Nursing+") OR (MH "Health Services for the Aged") or ("aging in place" or elders or elderly [a] or geriatric* or gerontolog* or gerodontic* or old age or (seniors not "high school") or "senior citizen*" or (older N3 (patient* or adult* or person* or people or man or men or woman or women)) or centenarian* or nonagenarian* or octogenarian* or septuagenarian* or sexagenarian* or dottering or decrepit or tottering or overaged or "oldest old")	AND	(undergrad* or baccalaureate or "pre-entry to practice" or "bachelor of science nursing" or BScN or "after degree")	AND	(nurs* N3 (educat* or learn* or teach* or program* or train* or student* or curricul* or syllab* or course* or practicum*))	849
Education Research Complete	(MH "Geriatrics") or (MH "Aged, Hospitalized") or (MH "Aged+") or (MH "Senior Centers") or (MH "Gerontologic Care") or (MH "Geriatricians") OR (MH "Gerontologic Nursing+") OR (MH "Health Services for the Aged") or ("aging in place" or elders or elderly [a] or geriatric* or gerontolog* or gerodontic* or old age or (seniors not "high school") or "senior citizen*" or (older N3 (patient* or adult* or person* or people or	AND	(undergrad* or baccalaureate or "pre-entry to practice" or "bachelor of science nursing" or BScN or "after degree")	AND	(nurs* N3 (educat* or learn* or teach* or program* or train* or student* or curricul* or syllab* or course* or practicum*))	483

	man or men or woman or women)) or centenarian* or nonagenarian* or octogenarian* or septuagenarian* or sexagenarian* or dottering or decrepit or tottering or overaged or "oldest old")					
Scopus	(elders or elderly or geriatric* or gerontolog* or "old age*" or ((old* or mature) w/3 (adult* or person* or people or patient or patients or man or men or woman or women)) or centenarian* or nonagenarian* or octogenarian* or septuagenarian* or sexagenarian* or dottering or decrepit or tottering or overaged or "oldest old" or supercentenarian*)	AND	(undergrad* or baccalaureate or "pre-entry to practice" or "bachelor of science nursing" or BScN or "after degree")	AND	(nurs* w/3 (educat* or learn* or teach* or program* or train* or student* or curricul* or syllab* or course* or practicum*))	461
Medline	exp Geriatrics/ or exp Aged/ or Health Services for the Aged/ or Senior Centers/ or (elders or elderly or geriatric* or gerontolog* or "old age" or "senior citizen*" or (seniors not "high school") or ((older or mature) adj3 (adult* or person* or people or patient or patients or man or men or woman or women)) or centenarian* or nonagenarian* or octogenarian* or septuagenarian* or sexagenarian* or dottering or decrepit or tottering or overaged or "oldest old" or supercentenarian*).mp. [b]	AND	Education, Nursing, Baccalaureate/	OR	((undergrad* or baccalaureate or "pre-entry to practice" or "bachelor of science nursing" or BScN or "after degree") and (nurs* adj3 (educat* or learn* or teach* or program* or train* or student* or curricul* or syllab* or course* or practicum*))).mp.	439
EMBASE	Exp geriatrics/ or aged/ or aged hospital patient/ or exp elderly care/ or frail elderly/ or gerontology/ or institutionalized elderly/ or very elderly/ or ("aging in place" or elders or elderly or geriatric* or gerodontic* or gerontol* or "old age" or senior citizen* or (older adj3 (adult* or person* or man or men or woman or women)) or centenarian* or nonagenarian* or octogenarian* or septuagenarian* or sexagenarian* or	AND	Education, Nursing, Baccalaureate/	OR	((undergrad* or baccalaureate or "pre-entry to practice" or "bachelor of science nursing" or BScN or "after degree") and (nurs* adj3 (educat* or learn* or teach* or program* or	330

	dottering or decrepit or tottering or overaged or "oldest old" or supercentenarian*).mp. [c]				train* or student* or curricul* or syllab* or course* or practicum*))).mp.	
ERIC	(MH "Geriatrics") or (MH "Aged, Hospitalized") or (MH "Aged+") or (MH "Senior Centers") or (MH "Gerontologic Care") or (MH "Geriatricians") OR (MH "Gerontologic Nursing+") OR (MH "Health Services for the Aged") or ("aging in place" or elders or elderly [a] or geriatric* or gerontolog* or gerodontic* or old age or (seniors not "high school") or "senior citizen*" or (older N3 (patient* or adult* or person* or people or man or men or woman or women)) or centenarian* or nonagenarian* or octogenarian* or septuagenarian* or sexagenarian* or dottering or decrepit or tottering or overaged or "oldest old")	AND	(undergrad* or baccalaureate or "pre-entry to practice" or "bachelor of science nursing" or BScN or "after degree")	AND	(nurs* N3 (educat* or learn* or teach* or program* or train* or student* or curricul* or syllab* or course* or practicum*))	21

[a] (Campbell, 2021a).

[b] (Campbell, 2021c).

[c] (Campbell, 2021b).

Appendix D

Screening Guide and Definitions

Instructions	Screening title and abstract of article :

Screening title and abstract of article :
- refer to inclusion and exclusion criteria when reviewing in Covidence

Screening full text
- include articles that meet all inclusion criteria [items 1-8]
  - of those, include articles that do not meet any exclusion criteria
- exclude articles that meet any exclusion criteria and specify primary reason in Covidence [items 9-11]
- exclude articles that do not meet all inclusion criteria [items 1-8]

Definitions: all key terms highlighted in yellow are defined in the following section

Inclusion Criteria

1. English Language:
   a. full text available in English

2. Peer reviewed primary research articles:
   a. research is empirical; involves a defined intervention, and the effects/outcomes are assessed using quantitative or qualitative approaches
   b. article is published in a peer-reviewed journal
   c. evaluation of the intervention is included

3. Date of publication:
   a. published between 2013 – 2023

4. Nursing education programs for entry to practice as a Registered Nurse:
   a. baccalaureate or equivalent, including after-degree programs

5. Intervention is education on target topic:
   a. education on people/population 60 years and older. Include even if not described as "older people"
   b. education on aging

6. Focus of the educational intervention or outcomes assessed in the study:
   a. includes content on knowledge of nursing students
   b. includes content on skills of nursing students
   c. includes content on attitude of nursing students

7. Primary topic:
   a. intervention involves curriculum
   b. intervention involves individual educational intervention(s)

8. Target population:
   a. focused on people who directly deliver or receive education in a baccalaureate nursing program. May include students, faculty, educators, nurses, or other people. Graduates of nursing programs may

be included, so long as the focus is on their experience prior to graduation of the program.

Exclusion Criteria	1. Article type:
	    a. review article, including scoping review, systematic review, realist review, literature review
	    b. opinion article
	    c. does not include ==primary research==, including secondary research, or uses results gathered by other research
	
	2. Nursing education program:
	    a. occurs independent, or outside of baccalaureate program (provided by independent organization or employer)
	    b. program for other scope or type of nurse (E.g., practical nurse, nursing attendant, psychiatric nurse)
	    c. program for non-nursing healthcare professionals
	    d. post-graduate nursing program (graduate degree program, internationally trained nurse, or for nurses already holding active designation as registered nurse)
	
	3. Intervention target audience:
	    a. ==nursing educators== or faculty
	    b. nurses after graduation from nursing education program
	    c. ==older person==/people

Definitions	After-degree programs: nursing education programs for people who have completed a degree in another discipline or field. Aging: an individual's development measured in terms of the years requisite for like development of an average individual (from https://www.merriam-webster.com/dictionary/ageing) Attitude: a mental position with regard to a fact or state; a feeling or emotion toward a fact or state (from https://www.merriam-webster.com/dictionary/attitude) Content: defined material delivered to students as part of program Curriculum: the courses offered by an educational institution; a set of courses constituting an area of specialization (from https://www.merriam-webster.com/dictionary/curriculum) Education: the action or process of educating or of being educated (https://www.merriam-webster.com/dictionary/education) Entry to practice: Reference to the period when a nurse graduates from a nursing program and transitions from student to actively licensed nurse Evaluation: measurement or assessment of the impact or desired effect of the educational intervention (E.g., pre- and post-test, survey, observation of behavior)

Full text: The version of the report which provides additional detail to what can be found in the title or abstract.

Intervention: also referred to as experimental manipulation. In an experiment, the manipulation of one or more independent variables in order to investigate their effect on a dependent variable. (from https://dictionary.apa.org/experimental-manipulation)

Knowledge: the fact or condition of being aware of something; the range of one's information or understanding (from https://www.merriam-webster.com/dictionary/knowledge)

Nursing educators: people delivering content as part of the program of baccalaureate nursing education. (E.g., faculty, instructors, clinical instructors)

Older person/people: Adults over 60 years of age, even if not referred to as 'older people' or another synonym by the study authors (WHO, 2022).

Peer reviewed: a process by which something proposed (as for research or publication) is evaluated by a group of experts in the appropriate field (from https://www.merriam-webster.com/dictionary/peer-reviewed)

Primary research: Techniques of original data collection or research direct from the target respondents. Primary research is different from secondary research in that secondary research uses data or research that has already been collected. Primary research includes qualitative and quantitative research and can include surveys, focus groups, questionnaires, and interviews. (from https://www.oxfordreference.com/display/10.1093/oi/authority.20110803100345447;jsessionid=92AD54EEBDA44E871BB991EFA4C0C334)

Registered Nurse: a graduate trained nurse who has been licensed by a state authority after qualifying for registration (from https://www.merriam-webster.com/dictionary/registered%20nurse)

Skills: the ability to use one's knowledge effectively and readily in execution or performance (from https://www.merriam-webster.com/dictionary/skill)

References   World Health Organization. (2022, October 1). Ageing and health. WHO. https://www.who.int/news-room/fact-sheets/detail/ageing-and-health

Appendix E

Data Extraction Guide

Instructions	If item is <u>not available</u> in any aspect of the article, but is a relevant item, then enter: Not Reported
	If item is <u>not relevant</u> to the article or research method, enter: N/A [not applicable]
	Definitions: all key terms <mark>highlighted in yellow</mark> are defined in the following section

Extraction Part 1. Focus of the review	1. First Author: The last name of the first listed author
	2. Year: the year the study was published
	3. Covidence Ref#: The identification number assigned to the report in the review's Covidence account
	4. Article title: The title of the article
	5. Country: Country in which the study was conducted
	6. Study objective(s): Extract the authors' verbatim statement(s) of the purpose of the study (e.g., What is the effect of an education module on working with older people on the attitudes of nursing students?)
	7. Inclusion criteria: List all inclusion criteria, as stated by the authors
	8. Exclusion criteria: List all exclusion criteria, as stated by the authors
	9. PCC elements: These are often in the background section, or part of the inclusion criteria in the methods section
	    a. Population: One sentence or key terms describing the defining characteristics of the group of people targeted by the intervention. Include any demographic details and total numbers (e.g., 96 nursing students. The students were primarily female, ages 19 to 42 years, in their sophomore year at a small, private Catholic college in the northwestern United States)
	    b. Concept: State the specific theory or concept the authors are testing (E.g., nursing students learn more about working with older people when an interactive method is used)
	    c. Context: Key points the authors use to describe the setting, environment, or culture relevant to the study (e.g., clinical placement in primary care program in community)

Extraction Part 2. Methodological details of the review	1. Research method: Use the authors' terms to extract the approach. Choose from: <mark>qualitative</mark>, <mark>quantitative randomized control trial</mark>, <mark>quantitative non-randomized</mark>, <mark>quantitative descriptive</mark>, or <mark>mixed methods</mark>. If not specified, extract the key terms or description and use <mark>MMAT</mark> descriptions to assign to one of the defined categories. 2. Mode of Education: Include a brief description of the intervention that was used by the authors (e.g., lecture on aging, course on gerontology, a <mark>simulation</mark> of physical assessment of an older adult). If the authors use more than one name for the

	intervention, extract multiple names. Include any details related to the type of intervention (e.g., was a control group used?)
	3. Delivery method: Extract authors' verbatim description on how the intervention is delivered to participants.
	4. Timing of delivery: Extract details on at what year of the nursing program the intervention is delivered to participants. Choose from 1, 2, 3, 4 or 5. Include all the years in which the intervention is delivered. (E.g. "1" or "4, 5")
	5. Volume of intervention/dose described: Extract the described amount of time the intervention was delivered to participants, in hours. Does not include time spent on post-test, survey, or other evaluation, if this was performed separately. If not specified in hours, extract authors' verbatim description.
	6. Criteria used to measure outcome(s): Extract the name and description of any measurements that were used to evaluate the effect on participants (e.g., Likert-type survey developed by authors, Kogan's Attitudes toward Old People Scale).
	7. Informants: Extract description of persons who completed outcome measures (e.g., students, nurses, other discipline students, faculty).
	8. Data Collection method(s): Extract the name and description of any tools or assessments that were used to evaluate the effect on participants. Choose from: ==questionnaire==, ==observation==, ==textual data==, individual interview, group interview.
	9. Data Analysis method(s): Extract description of how the authors analysed the data collected on student knowledge, skill, and attitude outcomes. Choose from: ==statistical analysis==, quantitative ==content analysis==, ==qualitative analysis==, qualitative ==content analysis==, ==thematic analysis==, ==phenomenological== or hermeneutic analysis, ==framework analysis==.
Extraction Part 3. Reported findings of the study	• Focus of outcome: Extract what type of outcome was reported. Choose from knowledge, skill, attitude. Include all listed, if measuring more than one type (see definitions on screening guide). • Participants by outcome: extract description on similarities or differences in outcomes between participants (e.g., based on demographics, stage of program)
Definitions	1. Research method MMAT definitions[a]: • **Mixed methods** (MM) research involves combining qualitative (QUAL) and quantitative (QUAN) methods. In this tool, to be considered MM, studies have to meet the following criteria (Creswell and Plano Clark, 2017): (a) at least one QUAL method and one QUAN method are combined; (b) each method is used rigorously in accordance to the generally accepted criteria in the area (or tradition) of research invoked; and (c) the combination of the methods is carried out at the minimum through a MM design (defined a priori, or emerging) and the integration of the QUAL and QUAN phases, results, and data • **Quantitative non-randomized** studies are defined as any quantitative studies estimating the effectiveness of an intervention or studying other exposures that do not use randomization to allocate units to comparison groups.

- **Qualitative:** Qualitative research is an approach for exploring and understanding the meaning individuals or groups ascribe to a social or human problem
- **Quantitative descriptive** studies are "concerned with and designed only to describe the existing distribution of variables without much regard to causal relationships or other hypotheses" (Porta et al., 2014, p. 72). They are used to monitoring the population, planning, and generating hypothesis (Grimes and Schulz, 2002).
- **Randomized controlled clinical trial**: A clinical study in which individual participants are allocated to intervention or control groups by randomization (intervention assigned by researchers).

2. Mode of Education:
- **Simulation:** Simulation is defined as "the process by which we are trying to achieve results approximating clinical practice as closely as possible". It is a technique for replacing or completing real-life experiences with guided experiences, which area faithful imitation of the real world in a fully interactive way. It is a teaching method where, following a certain scenario, students experience the actual dimensions of their future professional roles, which helps them to be more quickly integrated into the workforce of the healthcare sector. [b]

8. Data collection and 9. analysis methods:
- **Content analysis**: the practice of categorizing and combining qualitative results to establish the materializing premises and perceptions [c]
- **Framework analysis:** The conceptual foundation of a study; sometimes classified as a theoretic framework, for projects centered on a theory, and as a conceptual framework, for projects with a connection to a definite conceptual model [c]
- **Observation**: inconspicuous surveillance of people as they engage in everyday activities [c]
- **Phenomenology**: a type of qualitative research in which the researcher endeavours to comprehend how individuals experience a phenomenon [c]
- **Qualitative analysis**: the numeric representation and manipulation of observations using statistical techniques for the express purpose of describing and explaining the outcomes of research as they pertain to the hypothesis [c]
- **Questionnaire**: self-report data collection tool completed by research participants [c]
- **Statistical analysis**: analysis of numeric data using calculations
- **Textual data**: information in written form, digital or on paper. (e.g. student journals, field notes, reflection assignments)
- **Thematic analysis**: Thematic analysis is a method for identifying, analysing and reporting patterns(themes) within data [d]

[a] MMAT: Mixed Methods Appraisal Tool
http://mixedmethodsappraisaltoolpublic.pbworks.com/w/file/fetch/127916259/MMAT_2018_criteria-manual_2018-08-01_ENG.pdf

[b] Koukourikos, K., Tsaloglidou, A., Kourkouta, L., Papathanasiou, I. V., Iliadis, C., Fratzana, A., & Panagiotou, A. (2021). Simulation in Clinical Nursing Education. *Acta informatica medica : AIM : journal of the Society for Medical Informatics of Bosnia & Herzegovina, 29*(1), 15–20. https://doi.org/10.5455/aim.2021.29.15-20

[c] Boswell, Carol, and Sharon Cannon. Introduction to Nursing Research: Incorporating Evidence-Based Practice : Incorporating Evidence-Based Practice, Jones & Bartlett Learning, LLC, 2018. ProQuest Ebook Central, http://ebookcentral.proquest.com/lib/ualberta/detail.action?docID=5566681

[d] Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa