

REVIEW

Mapping the link between graduating nursing students' professional competence and educational components: a scoping review

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Abstract

Aim: To explore the link between nurse professional competence and various educational components within nursing education based on empirical evidence. **Design:** A scoping review. **Methods:** A comprehensive literature search was conducted from 1999 to 2024 using the Academic Search Premier, Business Source Complete, CINAHL, Education Research Complete, ERIC, and PubMed databases. Data were analysed using thematic analysis. **Results:** Thirty relevant studies met the inclusion criteria. The identified competencies were grouped into three main categories: management, nursing intervention, and societal and social competencies. Educational components were divided into two main categories: directive-regulated curricula and optional educational components. Most nurse competencies were linked to one or more educational components. **Conclusion:** This review found that competencies such as patient care initiation, interprofessional teamwork and nurse leadership received more research attention than others. The most frequently studied educational components were study modules / training in nursing curricula and clinical placements. However, no clear link was found between nurse competence and educational components for graduate nurses.

Keywords: competence, educational component, graduating nursing students, nursing education, scoping review.

Introduction

Nurse competence is important for ensuring the functionality and efficiency of healthcare systems worldwide (Fukada, 2018). Nurse competence, defined as “functional adequacy and the capacity to integrate knowledge, skills, attitudes and values” (Meretoja et al., 2004, p. 330), is essential for providing high-quality care, ensuring patient safety, and achieving positive health outcomes (Zaitoun et al., 2023). Nursing education is fundamental to the development and enhancement of nurse competence, equipping students with the necessary knowledge, skills, and professional values to meet modern healthcare demands (Poorchangizi et al., 2019). Strategic documents, such as the National Academy of Medicine's report The Future of Nursing 2020–2030 and the World Health Organization's Human Resources 2030 Strategy, emphasize investing in nursing education to strengthen healthcare systems and address global

health challenges. By equipping nurses with the required competencies, nursing education plays a critical role in ensuring the sustainability and resilience of healthcare systems worldwide (Hassmiller & Wakefield, 2022; World Health Organization, 2021). Therefore, assessing the competence of graduating nursing students (GNS) is essential for establishing a foundation of professional skills and knowledge, enabling nurses to monitor their development throughout their careers (Kajander-Unkuri et al., 2014; Lindfors et al., 2022).

Nursing education comprises a variety of educational components, which can be defined as key parts of the educational process that contribute to students' learning (Darling-Hammond et al., 2020; Hoidn & Kärkkäinen, 2014). Nursing education is regulated by national and international laws and directives, such as those of the European Commission (Doherty, 2009; European Commission, 2005, 2013). Additionally, the World Health Organization has emphasized standardized training for the development of qualified nurses (World Health

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Organization, 2021). These standards and guidelines form the foundation of essential educational components that must be incorporated into nursing education programmes to ensure the competence of nurses (European Commission, 2005, 2013; Flinkman et al., 2017; Newman & Lattouf, 2020). Nevertheless, nursing curricula must continuously evolve to keep up with global health trends and advances in nursing. Curricula outline the essential knowledge and skills that nurses need to acquire and specify what must be taught and learned (Fukada, 2018). Teaching methods, which encompass educators' strategies and techniques, are crucial for effective learning, student engagement, and understanding of the curriculum content (Guerriero, 2013). Encouraging independent learning, critical thinking, and problem solving is equally vital for nurses to adapt and learn throughout their careers (Hoidn & Kärkkäinen, 2014). Practical experiences, such as clinical practice and seminars, allow theoretical knowledge application in real-life scenarios, bridging the gap between classroom learning and practical skills, and enhancing nurses' ability to apply concepts in diverse healthcare settings (Ghasemi et al., 2020). Additionally, reflection prompts students to analyse their experiences, enhancing their self-awareness and nursing knowledge to better understand the complexity of the profession (Grech, 2021). Finally, various tasks and assessments provide opportunities to apply and evaluate acquired knowledge and skills, reinforcing learning objectives and structuring understanding of the nursing curriculum (Darling-Hammond et al., 2020).

Educational components vary, as outlined above, but all play a crucial role in shaping the competence of nursing graduates (Chen et al., 2021; Opoku et al., 2020; World Health Organization. Dept. Human Resources for Health, 2009). This competence-based approach aims to produce nursing professionals able to deliver high-quality patient care (Humar & Sansoni, 2017; Kajander-Unkuri et al., 2021; Kiekkas et al., 2019). Comprehensive standards for nursing education can help identify the most effective forms of education and understand their link to nurse competence (Kajander-Unkuri et al., 2014; Newman & Lattouf, 2020). Therefore, a thorough analysis of existing literature and research can provide valuable insights into the educational components of nursing education.

Aim

This review aimed to explore empirical studies examining the potential links between nurses' professional competence and the educational components of nursing education. The following research questions were addressed:

- (1) Which nursing competencies have been investigated among graduating nursing students?
- (2) Which educational components have been investigated in nursing education for graduating nursing students?
- (3) Is there a link between nurse competence and the educational components in nursing education for graduating nursing students?

Methods

Design

A scoping review was chosen to identify the key nurse competencies and educational components, and their interrelationships. It was conducted to explore and summarize the existing literature on nurse competence (Gray, 2019). This approach facilitated the identification of key concepts related to nurse competence and provided an overview of the research area. This review helped to clarify the terminology used and define educational components in nursing education. Thematic analysis was used to synthesize competencies and educational components by applying an inductive, data-driven approach to identify possible links. The PRISMA flow diagram was used to report the literature search (Castleberry & Nolen, 2018).

Eligibility criteria

A scoping review was conducted to identify relevant literature published between 1999 and 2024. The year 1999 was selected as the starting point because it marked the initiation of the Bologna Process in Europe, aimed at reforming higher education standards (Humar & Sansoni, 2017; Lahtinen et al., 2014). The search was limited to peer-reviewed articles with English abstracts.

The inclusion criteria were as follows:

- the study focused on nurse competence,
- the study focused on educational components in nursing education,
- the study participants were GNS,
- the article reported on an empirical, reference-based study.

The exclusion criteria were as follows:

- the study did not focus on competencies other than nursing,

- the study participants were registered nurses or graduated nurses in postgraduate programmes (master's or doctoral degree), nursing students in an earlier phase of their studies, or students in other health professions,
- the article reported results solely concerning instrument construction and validation, or described international exchange programmes,
- the article was a literature review, commentary, or editorial.

Search strategy

Two researchers conducted a literature search using six databases: Academic Search Premier, Business

Source Complete, CINAHL, Education Research Complete, ERIC, and PubMed. They used combinations of key search terms such as “graduating nursing student(s)” and “competence” to identify eligible studies. Library informatics expertise was used to develop the search strategy and identify key search terms and free terms. The researchers used appropriate subject headings and truncated words depending on the database. The study concepts were deliberately broad to make the overview as comprehensive as possible. Additionally, the researchers manually reviewed the reference lists of articles to supplement database searches (Figure 1).

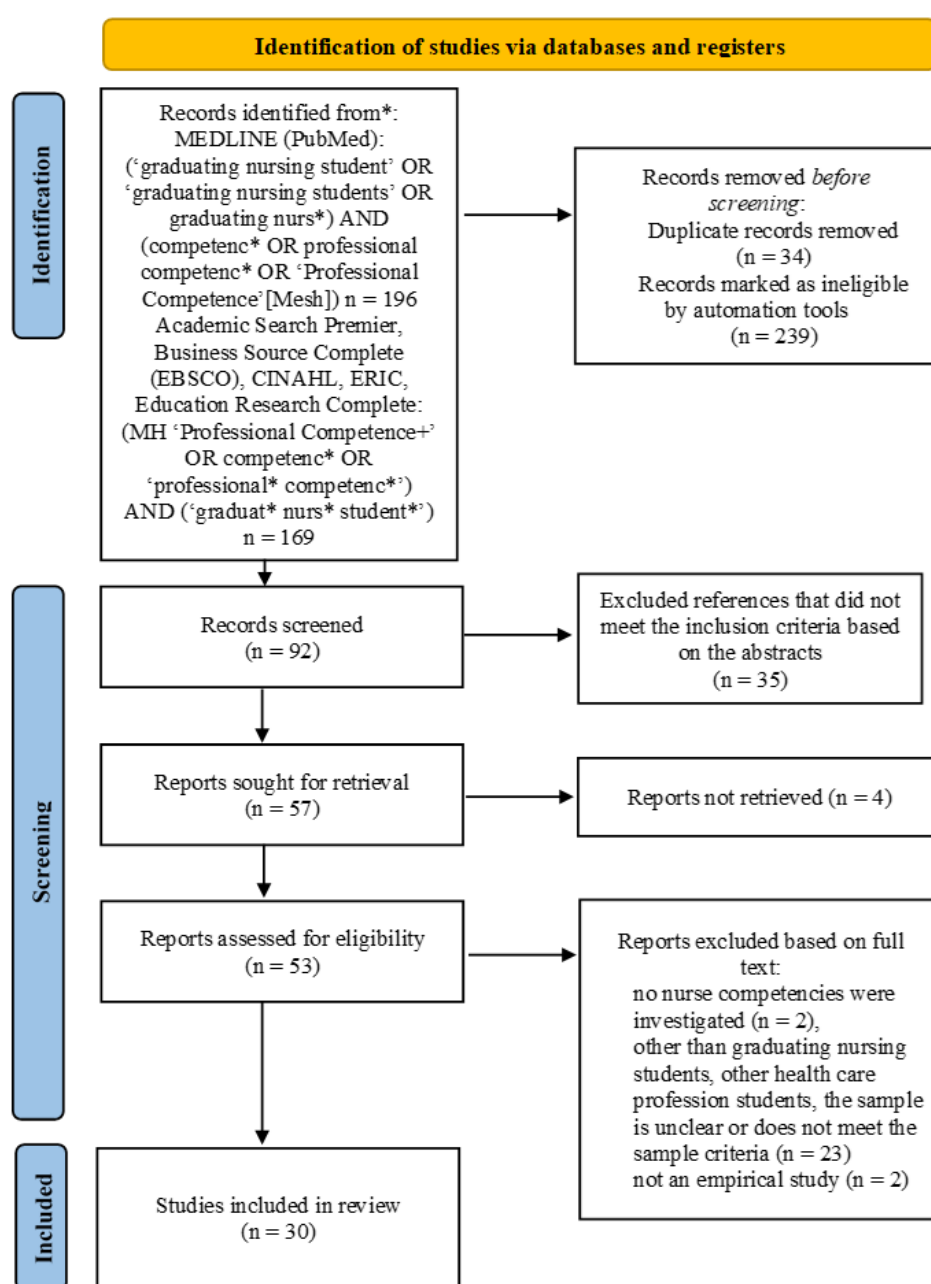


Figure 1 Flow chart of the search process

Study selection inc. PRISMA flow diagram

The initial database search identified 365 records (Figure 1). Two researchers independently checked the titles and abstracts of the selected articles for eligibility. Selection decisions were reviewed by other authors, with disagreements resolved through discussion. After the initial screening, 57 full-text assessments were conducted after rejecting 308 studies. Finally, 30 articles were selected for analysis (Table 1).

Evaluation of quality of articles

To assess the quality of the included studies, two separate Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields checklists were used, one for quantitative studies and one for qualitative studies (Kmet et al., 2004). These checklists consist of tools to assess quantitative and qualitative studies separately, as it is challenging to assess the quality of a qualitative and a quantitative study identically (Kmet et al., 2004). Quantitative studies were assessed using 14 items, while qualitative studies were assessed using 10 items. Scores were based on how well criteria were met, with “yes” receiving 2 points, “partially” receiving 1 point, and “no” receiving 0 points. Items not applicable to the study design were excluded and labelled “n / a”. The total score for each paper was calculated by adding the scores of the relevant items and dividing by the total possible score. For quantitative studies, the total possible score was 28 minus the number of “n / a” items multiplied by two. For qualitative studies, the total possible score was 20. The aim of the quality assessment was to identify the strengths and weaknesses of the studies, not merely to exclude them. Nevertheless, the quality ratings of the selected studies ranged from good to moderate. The evaluation was carried out jointly by the two authors (VK, MT) and subsequently deliberated with the research team to reach consensus.

Data extraction

A thorough review of all selected studies was performed. Competencies and educational components were identified by analysing the descriptive headings, research questions, and findings of the studies. Relevant content was grouped into categories, resulting in 87 individual competency categories and 46 individual educational component categories. We reviewed, checked, and revised each category to ensure that it accurately corresponded with the content. We then grouped these single categories into main competency and educational component areas, resulting in nine subcategories and three main areas of nurse competence, along with 10 subcategories and two

main areas of educational components (Arksey & O'Malley, 2005; Castleberry & Nolen, 2018).

All studies, regardless of their design, were included in the analysis to identify possible links between professional nurse competence and educational components (Snyder, 2019). One investigator was well acquainted with the data obtained to maintain study integrity. The association was identified in the articles and its significance was examined in each study. In the quantitative studies, the positive association was identified based on statements of statistical significance (e.g. link, impact, correlation, connection, relationship) and the absence of an association was indicated by the phrases negatively connected or link cannot be found. In the qualitative studies, the association was identified based on statements such as revealed the value, helped to understand, and had an impact.

Results

Study characteristics

A total of 28 quantitative and two qualitative studies were included. The quantitative studies were of various designs, including comparative, exploratory descriptive, cross-sectional, pilot, quasi-experimental, and mixed studies. All studies involved GNS, with sample sizes ranging from 43 to 2019 (mean 224). Data were collected using both paper and electronic questionnaires based on GNS and / or faculty perceptions of nursing education. The two qualitative studies explored GNS experiences and perspectives through focus groups and semi-structured face-to-face interviews, with sample sizes ranging from 10 to 39 participants (Table 1).

Which nursing competencies have been investigated among GNS? (RQ1)

The selected studies investigated three categories of nurse competence: management, nursing intervention, and societal and social competencies, encompassing nine subcategories out of 87 single competencies (Table 2).

The analysis revealed that three subcategories of nurse competence were most frequently studied: initiating and implementing patient care (n = 17), interprofessional teamwork and communication (n = 8), and nursing leadership (n = 7). The least studied were medical informatics and documentation (n = 5) (Table 3).

Which educational components have been investigated in nursing education for GNS? (RQ2)

Two main categories of educational components were identified and investigated in the selected studies: EU

Table 1 Selected articles for analysis (in alphabetical order by first author, n = 30) (Part 1)

Author (s), year, country	Sample (N)	Design	Data collection method	Nurse competence (A)	Educational component in nursing education (B)	The link between nurse competence and educational component (A + B)
Ääri et al., 2004, Finland	graduating nursing students (130)	a descriptive survey	questionnaire	(1) Basic knowledge of biology and physiology. (2) Intensive (critical) care competence.	Educational factors studied: (1) basic education before nursing education; (2) university education; (3) free elective modules in nursing curricula; (4) nursing experience; (5) module of intensive care and intensive care practice.	(1) A positive link between perioperative nursing modules and critical care competence was found. (2). Students who studied a critical care module demonstrated better critical care competency skills.
Amre et al., 2008, Jordan	graduating nursing students (85)	a cross-sectional study	questionnaire	Health promotion competence.	(1) Community nursing practice. (2) A required community health nursing course.	(1) The results showed that GNS have a limited amount of knowledge in health promotion and disease prevention competencies. (2) These results showed a weak positive link between the competence and educational elements.
Blackman & Giles, 2017, Australia	completing undergraduate nursing students (375)	a nonexperimental descriptive study	self-report tool	Evidence-based practice self- efficacy competence.	Providing evidence-based topics in experimental clinical placement: (1) pose a focused clinical question; (2) search; (3) critically appraising evidence; (4) integrating the evidence; (5) evaluating the outcome; (6) disseminating the outcome.	A positive relationship was found between evidence-based practice during clinical placement and students' subsequent confidence engaging with EBP.
Brajtman et al., 2007, Canada	graduating nursing students (58)	a cross-sectional survey	questionnaire	End-of-life care competence.	(1) Coordination between theoretical and clinical training in two nursing programmes at the same university, but different campuses. (2) Education on death and dying during the nursing studies.	(1) Teaching about death and dying has been shown to have a positive link with students' level of competence. (2) A lack of coordination between theoretical and clinical teaching and learning experiences has been identified as having a positive link with acquired competence.

Table 1 Selected articles for analysis (in alphabetical order by first author, n = 30) (Part 2)

Author (s), year, country	Sample (N)	Design	Data collection method	Nurse competence (A)	Educational component in nursing education (B)	The link between nurse competence and educational component (A + B)
Chiu et al., 2003, Philippines Australia	graduating nursing students (150: 81 in australia and 69 in the philippines)	an exploratory study	questionnaire	Pain management competence.	Comparing pain management education for nursing students in Australia and the Philippines.	Significant differences were detected in the positive link between groups and training or practice in both countries.
Choi & De Martinis, 2013 USA	undergraduate (131) and graduate nursing students (158)	a descriptive survey	questionnaire	Informatics competencies (clinical informatics role, and clinical informatics attitudes).	Comparing different nursing programmes and their informatics courses.	The study revealed the value of information technology for graduating nursing students’ competence and its positive impact on nursing practice.
Collins & Stiles, 2011 USA	graduating nursing students (562)	a predictive correlational study	questionnaires	Competence in identifying patients with a family history of genetic risk.	Inclusion of genetics as a required course in the nursing curriculum.	A negative link between the genetics course in the curriculum and perceived competence was detected.
Dever et al., 2015 USA	senior year nursing students (89)	mixed-methods	questionnaires	Nursing leadership, patient-centred care and cultural competence.	The evaluation of three existing nursing leadership and patient-centred care courses and biweekly supervision in small-group seminars.	(1) Nursing graduates showed that the educational components used helped them understand the importance of socialization in practice. (2) The analysis revealed that the nursing leadership and patient-centred care intervention had a positive impact.
Dilles et al., 2011 Belgium	graduating nursing students (613: 404 bachelor programme and 209 diploma programme)	a descriptive cross-sectional survey	questionnaire, medication calculation test	Competence in medication administration: (1) basic nursing responsibilities, (2) the overall responsibilities of nurses, doctors and / or pharmacists.	Training linked with medication administration in the different nursing degree programmes (theory and practice).	(1) Bachelor’s degree students had a better knowledge of pharmacotherapy and their mean score on the medication calculations was higher. (2) More practice training in a diploma nursing curriculum had a positive link in creating confidence. (3) Pharmacological knowledge and calculation skills depend on the level of nurse education and that these competencies differ between schools.

Table 1 Selected articles for analysis (in alphabetical order by first author, n = 30) (Part 3)

Author (s), year, country	Sample (N)	Design	Data collection method	Nurse competence (A)	Educational component in nursing education (B)	The link between nurse competence and educational component (A + B)
Douglas et al., 2015, Australia	final semester nursing students (208)	a cross-sectional survey	questionnaire	Physical assessment skills.	An existing clinical placement to find evidence on what students learn and practise.	(1) Two-thirds of the skills of final-semester nursing students were not learned or performed across the university and clinical settings. (2) Almost half of the skills were learned but not practised. A link cannot be found between competence and the educational element because of the lack of confidence of the students in performing the procedures.
Edwards et al., 2004, Australia	graduating nursing students (137 pre- test and 121 post- test)	a quasi- experimental study	questionnaire	General nurse competencies.	Influence of location (urban or rural) on clinical practice.	(1) All students, regardless of their clinical placement location, gained more competence. (2) Rural students expressed greater confidence and competence.
Fetter, 2009, USA	graduating nursing students (42)	a pilot study	questionnaire	Informatics competencies.	The integration of informatics technologies into all nursing courses.	(1) The majority of graduates reported a moderate level of standardized competencies in nursing. (2) The integration of information technology in all nursing modules had a positive impact on nurse competence and programme evaluation.
Flood & Commendador, 2016, USA	graduating senior nursing students (56)	a cross-sectional survey	questionnaire	Cross-cultural competence (attitudes, preparedness, and skills).	An obligatory transcultural nursing course in the nursing curriculum and additional training.	(1) The additional training had a positive impact on participants' readiness to care for culturally diverse patients. (2) The knowledge gained increased students' understanding of the importance of role modelling for nurses and teachers.
Halcomb et al., 2012, Australia	graduating nursing students (357)	a cross sectional survey	questionnaire	Critical care competence .	Critical care subject and clinical placement.	(1) A positive link between internship duration and critical care competence was confirmed. (2) Male participants with more than one week of practice were significantly more confident in finding a job in critical care.

Table 1 Selected articles for analysis (in alphabetical order by first author, n = 30) (Part 4)

Author (s), year, country	Sample (N)	Design	Data collection method	Nurse competence (A)	Educational component in nursing education (B)	The link between nurse competence and educational component (A + B)
Henderson et al., 2016, Australia	graduating bachelor of nursing science students (10)	a qualitative study	semi-structured face-to-face interviews	(1) Effective communication with individual responses to loss and grief. (2) Assessing a person's individual clinical needs. (3) The possibility for reflection and self-evaluation.	Added palliative care themes to learn by studying in existing study programmes of nursing.	The results revealed factors that had a negative impact on graduating nursing students' preparation for practice.
Kajander- Unkuri et al., 2014, Finland	graduating nursing students (154)	a cross-sectional survey	questionnaire	Nurse competence Scale generic competencies.	(1) Student mentoring, supervising in a clinical placement. (2) Evaluating graduating nursing students clinical experience during final clinical placement.	(1) The competencies studied were positively related to the pedagogical climate and the qualifications provided by education. (2) Supervision of students during clinical practice contributed to the development of their competencies. The nurse-student relationship was positively correlated with a helping role and managing of situations.
Kalam-Salminen et al., 2013, Finland	undergraduat e nursing students (390: 195 finnish and 195 estonian)	a comparative descriptive survey	questionnaire	(1) Patient-centred care. (2) Requirements for personal actions. (3) Client-centred atmosphere. (4) Student / patient relationships.	Educational support for students during theoretical teaching and clinical practice.	(1) Cultural differences between students in both countries influenced their assessment of patient- centeredness. (2) Educational support for patient-centred care had a stronger link in Estonia. (3) In both countries, the clearest relationship was found between theoretical and clinical support and value frameworks.

Table 1 Selected articles for analysis (in alphabetical order by first author, n = 30) (Part 5)

Author (s), year, country	Sample (N)	Design	Data collection method	Nurse competence (A)	Educational component in nursing education (B)	The link between nurse competence and educational component (A + B)
Kaplan et al., 2011, USA	senior baccalaureate nursing students (43) and emergency nurse practitioners (12)	a comparative descriptive survey	questionnaire	Core competencies: (1) patient / family- centred care; (2) multidisciplinary teamwork; (3) evidence-based practice; (4) clinical reasoning; (5) patient safety.	Evaluation of educational methodology.	(1) The generalization of the multidisciplinary team encouraged interactive communication between students and staff. (2) The use of multidisciplinary simulation was effective in engaging core competencies.
Kardong-Edgren & Campinha- Bacote, 2008, USA	graduating nursing students (218)	a pilot study	questionnaire	Cultural competence.	A model developed by recognised experts in intercultural nursing used in two programmes: (1) one programme using no specific model; (2) one offering a two- credit cultural competence course.	No significant differences or links were found between the different nursing programmes.
Kiekkas et al., 2019, Greece	graduating nursing students (285)	a cross sectional survey	questionnaire	(1) Nursing care. (2) Value-based nursing care. (3) Technical care. (4) Teaching / learning and support. (5) Documentation and information technology. (6) Legislation in nursing. (7) Leadership and supervision of staff and students.	Evaluating the link with the achieved competence of clinical, nursing science courses of curricula, and types of assessments.	(1) Significant difference was detected with background factors and clinical courses in a group of students with and without experience in nursing. (2) No significant difference was detected with background factors and nursing science courses as well as background factors and individual or group assignments.

Table 1 Selected articles for analysis (in alphabetical order by first author, n = 30) (Part 6)

Author (s), year, country	Sample (N)	Design	Data collection method	Nurse competence (A)	Educational component in nursing education (B)	The link between nurse competence and educational component (A + B)
Kim, 2007, USA	senior baccalaureate nursing students (102)	a descriptive correlational study	questionnaire	(1) Organizing and prioritizing nursing tasks. (2) Collaborating. (3) Delegating tasks to others. (4) Initiating and implementing care. (5) Effective communication. (6) Seeking new knowledge. (7) Assessing one's own capabilities.	(1) Clinical preceptorship programme. (2) Preceptor interaction with students. (3) Trusting relationship between preceptors and students.	(1) Clinical practice increased students' competence. A positive correlation was found. (2) Students who formulated their goals with a mentor gained more nurse competence. (3) The trusting relationship between mentors and students influenced students' nurse competence.
Lakanmaa et al., 2014, Finland	graduating nursing students (139)	a cross- sectional survey	questionnaire	(1) Principles of nursing care. (2) Clinical guidelines. (3) Nursing interventions. (4) Ethical activity and familiarity with health care laws, (5) Decision-making, (6) Development work, (7) Collaboration, Cultural competence,	(1) Existing study subjects, completed emergency and intensive care studies. (2) Current clinical placement.	Previous education, similar clinical placements and personal experience were positively related to nurse competence.
Liu et al., 2008, USA	graduating baccalaureate nursing students (43)	a non- experimental, cross-sectional study	questionnaire	Cultural competence,	Students working with patients from different cultural groups along with their nursing studies and being taught cultural care.	(1) Increased confidence in cultural concepts and knowledge of cultural patterns resulted in increased emphasis on incorporating cultural competence. (2) This finding may further support the positive effects of cultural education on cultural competence.

Table 1 Selected articles for analysis (in alphabetical order by first author, n = 30) (Part 7)

Author (s), year, country	Sample (N)	Design	Data collection method	Nurse competence (A)	Educational component in nursing education (B)	The link between nurse competence and educational component (A + B)
May et al., 1999, USA	two graduating nursing classes (143)	an exploratory non- experimental study	questionnaire	(1) Applying theoretical knowledge. (2) Psychomotor intervention skills . (3) Critical thinking. (4) Competence and accountability. (5) Competence in communication. (6) Application of legal and ethical norms. (7) Respect for cultural diversity. (8) Evidence-based practice. (8) Self-assessment. (9) Decision-making. Ethical competence.	Five-week clinical rotation on students' choice at the end of nursing studies.	(1) There was no significant difference in the overall competencies acquired by the two groups. (2) The relationship between the level of clinical competence and the educational component is weak in the nursing schools studied so far.
Numminen et al., 2009, Finland	graduating nursing students (214)	a descriptive cross-sectional survey	questionnaire	Ethical competence.	(1) Ethics teaching implementation. (2) Independent learning. (3) Ethics study module integration to theory. Current curriculum assessment.	(1) Most students acquired ethical competence during their nursing studies. (2) Neither the ethics modules nor the integration of ethical competence into other modules were associated with acquired competence. Evidence-based education including a range of cultural diversity teaching strategies had a positive relationship with a cultural competence.
Reyes et al., 2013, USA	beginning nursing students (45) and graduating nursing students (53)	a comparative descriptive survey	questionnaire	Cultural competence.		

Table 1 Selected articles for analysis (in alphabetical order by first author, n = 30) (Part 8)

Author (s), year, country	Sample (N)	Design	Data collection method	Nurse competence (A)	Educational component in nursing education (B)	The link between nurse competence and educational component (A + B)
Repo et al., 2017, Finland	graduating nursing students (295)	a correlational descriptive study	questionnaire	Cultural competence.	Multicultural nursing element in education.	(1) No significant link between cultural competence and the cultural competence of study subjects was found. (2) A positive relationship was found in the categories of cultural awareness and cultural sensitivity.
Sullivan et al., 2009, USA	graduating students (565)	a descriptive study	electronic student evaluation survey	Quality and safety competencies.	Comparing four learning venues: (1) classroom; (2) course assignments; (3) clinical experiences; (4) skills simulations settings in different nursing schools.	(1) The most common competencies were teamwork, quality of care, and collaboration. 2) No interaction was found between the taught nursing curriculum and clinical experience competencies.
Theander et al., 2016, Sweden	newly graduated nursing students (119)	a descriptive comparative study	questionnaire	(1) Nursing care. (2) Value-based nursing care. (3) Technical care. (4) Teaching / learning and support. (5) Documentation and information technology. (6) Legislation in nursing. (7) Leadership and supervision of staff and students.	Comparing two nursing curricula: old (2011) and new (2014).	(1) Students who completed the new curricula reported significantly higher levels of competence in value-based nursing care. (2) No significant changes in other competencies were detected.
van Eps et al., 2006, Australia	graduating nursing students (39)	a descriptive exploratory study	focus group discussions and interviews, questionnaire	(1) Nursing actions (psychomotor and clinical competencies). (2) Nursing thinking (management of the nursing process, decision- making and self-criticism). (3) Being a nurse (teamwork and trust in the clinical environment).	(1) Student mentoring during a year-long programme. (2) Relationship between students and mentors.	(1) Positive link was found between mentoring and nursing programme. (2) There was a positive link between the modules studied and the integration of technical skills and theory into practice.

directive-regulated and optional educational components. In the case of other countries, such as the USA, Canada or Australia, each country has its own guidelines for nursing education and practice, which share commonalities with the EU directive. This category is referred to as EU directive-regulated because of the similarity found in the analysis.

Table 2 Main categories and subcategories of nurse competencies and educational components

Main areas	Subcategories
	Identified competencies
Management competencies	Cultural care. Interprofessional teamwork and communication. Nursing leadership.
Nursing intervention competencies	Initiating and implementing patient care. Evidence-based practice. Patient- / family- / person-centred care. Medical informatics and documentation.
Societal and social competencies	Learning from and teaching others. Ethical competence.
	Identified educational components
EU directive-regulated curricula	Basic education before nursing studies. Clinical placement in nursing curricula. Study modules / training in nursing curricula. Different nursing curricula.
Optional educational components	Changed / new nursing modules. Experimental modules in curricula. Course assignments / readings. New / experimental clinical placement. Simulation training of nursing situations. Student mentoring and support during studies.

The main categories comprised 10 subcategories, totalling 47 individual educational components (Table 2). The most frequently studied components were study modules / training in nursing curricula (n = 11) and clinical placements (n = 7). The least studied were basic education before nursing studies (n = 3), simulation training of nursing situations (n = 2), and course assignments / readings (n = 2) (Table 3).

Is there a link between nurse competence and educational components in nursing education for GNS? (RQ3)

No clear positive or negative links were found in any of the studies. However, a link between nurses’ professional competence and educational components exists and has been analysed.

Management competencies were frequently associated with educational components. Similarly, nursing intervention competencies, such as initiating and implementing patient care, were linked to basic education, clinical placements, study modules, and simulations (Table 4).

Social and societal competencies were also explored in relation to educational components, focusing on time-tested curricular content. While most educational components were connected to these competencies, some studies showed a lack of links with learning from and teaching others (Table 3).

Table 3 Nurse competencies and educational components investigated (in alphabetical order by author, n = 30) (Part 1)

	Ääri et al., 2004	Amre et al., 2008	Blackman & Giles, 2017	Brajtman et al., 2007	Chiu et al., 2003	Choi & De Martinis, 2013	Collins & Stiles, 2011	Dever et al., 2015	Dilles et al., 2011	Douglas et al., 2015	Edwards et al., 2004	Fetter, 2009	Flood & Commendador, 2016	Halcomb et al., 2012	Henderson et al., 2016	Kajander-Unkuri et al., 2014	Kalam-Salminen et al., 2013	Kaplan et al., 2011	Kardong-Edgren & Campinha-Bacote, 2008	Kiekkas et al., 2019	Kim, 2007	Lakanmaa et al., 2014	Liu et al., 2008	May et al., 1999	Numminen et al., 2009	Reyes et al., 2013	Repo et al., 2017	Sullivan et al., 2009	Theander et al., 2016	van Eps et al., 2006	
Identified competencies																															
Management competencies																															
Cultural care.								+					+						+				+			+	+				
Interprofessional teamwork and communication.															+		+	+		+	+	+		+				+		+	
Nursing leadership.		+						+								+				+	+	+							+		
Nursing intervention competencies																															
Initiating and implementing patient care.	+		+	+	+			+	+	+	+			+		+		+		+	+	+		+					+	+	
Evidence-based practice.			+												+			+					+					+			
Patient- / family- / person-centred care.				+													+	+				+		+				+			
Medical informatics and documentation.						+						+						+		+								+	+		
Societal and social competencies																															
Learning from and teaching others.							+								+	+				+	+									+	
Ethical competence.															+			+		+		+				+				+	

Table 3 Nurse competencies and educational components investigated (in alphabetical order by author, n = 30) (Part 2)

	Ääri et al., 2004	Amre et al., 2008	Blackman & Giles, 2017	Brajtman et al., 2007	Chiu et al., 2003	Choi & De Martinis, 2013	Collins & Stiles, 2011	Dever et al., 2015	Dilles et al., 2011	Douglas et al., 2015	Edwards et al., 2004	Fetter, 2009	Flood & Commendador, 2016	Halcomb et al., 2012	Henderson et al., 2016	Kajander-Unkuri et al., 2014	Kalam-Salminen et al., 2013	Kaplan et al., 2011	Kardong-Edgren & Campinha-Bacote, 2008	Kiekkas et al., 2019	Kim, 2007	Lakanmaa et al., 2014	Liu et al., 2008	May et al., 1999	Numminen et al., 2009	Reyes et al., 2013	Repo et al., 2017	Sullivan et al., 2009	Theander et al., 2016	van Eps et al., 2006	
Identified educational components																															
EU directive-regulated educational components																															
Basic education before nursing studies.	+																					+							+		
Clinical placement in nursing curricula.	+	+	+								+			+		+													+		
Study modules / training in nursing curricula.	+	+	+					+					+	+	+				+	+		+							+		
Different nursing curricula.			+			+																									
Optional educational components																															
Changed / new nursing modules.					+	+			+																						
Experimental modules in curricula.							+					+														+		+			
Course assignments / readings.																				+									+		
New / experimental clinical placement.			+							+							+					+									
Simulation training of nursing situations.																								+					+		
Student mentoring and support during studies.																		+		+	+										+

Table 4 Educational component links to competencies (in alphabetical order by author, n = 30) (Part 1)

		EU directive-regulated educational components					Optional educational components				
Educational component / Competence		Basic education before nursing studies.	Clinical placement in nursing curricula.	Study modules / training in nursing curricula.	Different nursing curricula.	Experimental modules into curricula.	Changed / new nursing modules.	Course assignments / readings.	New / experimental clinical placement.	Simulation training of nursing situations.	Student mentoring and support during studies.
Management competencies	Cultural care.			(+) Flood & Commendador, 2016, Kardong-Edgren & Campinha-Bacote, 2008 Dever et al., 2015	(+) Reyes et al., 2013	(+) Repo et al., 2017			(+) Liu et al., 2008		
	Interprofessional teamwork and communication.	(+) Lakanmaa et al., 2014	(+) Sullivan et al., 2009	(+) Lakanmaa et al., 2014 Sullivan et al., 2009 (-) Henderson et al., 2016	(+) Lakanmaa et al., 2014			(+) Sullivan et al., 2009	(+) May et al., 1999	(+) Kaplan et al., 2011 Sullivan et al., 2009	(+) Kim, 2007 van Eps et al., 2006 Kalam-Salminen et al., 2013 (+) Kim, 2007
	Nursing leadership.	(+) Lakanmaa et al., 2014;	(+) Kajander-Unkuri et al., 2014 Amre et al., 2008	(+) Dever et al., 2015 Lakanmaa et al., 2014 Amre et al., 2008 Kiekkas et al., 2019	(+) Lakanmaa et al., 2014 Theander et al., 2016			(-) Kiekkas et al., 2019			
Nursing interventions competencies	Initiating and implementing patient care.	(+) Lakanmaa et al., 2014 Ääri et al., 2004	(+) Kajander-Unkuri et al., 2014 Ääri et al., 2004 Edwards et al., 2004 Brajtman et al., 2007 Halcomb et al., 2012	(+) Dever et al., 2015 Lakanmaa et al., 2014 Ääri et al., 2004 Brajtman et al., 2007 Halcomb et al., 2012 Kiekkas et al., 2019	(+) Lakanmaa et al., 2014 Brajtman et al., 2007 Theander et al., 2016		(+) Chiu et al., 2003 Dilles et al., 2011		(+) Blackman & Giles, 2017 May et al., 1999 Douglas et al., 2015	(+) Kaplan et al., 2011	(+) Kim, 2007 van Eps et al., 2006

(+) link identified; (-) link not identified

Table 4 Educational component links to competencies (in alphabetical order by author, n = 30) (Part 2)

		EU directive-regulated educational components						Optional educational components			
Educational component / Competence		Basic education before nursing studies.	Clinical placement in nursing curricula.	Study modules / training in nursing curricula.	Different nursing curricula.	Experimental modules into curricula.	Changed / new nursing modules.	Course assignments / readings.	New / experimental clinical placement.	Simulation training of nursing situations.	Student mentoring and support during studies.
		(+)	(+)	(+)				(+)	(+)	(+)	
Societal and social competences	Evidence-based practice.	Sullivan et al., 2009	Sullivan et al., 2009	Henderson et al., 2016 Sullivan et al., 2009				Sullivan et al., 2009	Blackman & Giles 2017 May et al., 1999	Kaplan et al., 2011	
	Patient- / family- / person-centred care.	Sullivan et al., 2009	Brajtman et al., 2007 Sullivan et al., 2009	Brajtman et al., 2007 Sullivan et al., 2009	Brajtman et al., 2007			Sullivan et al., 2009	May et al., 1999 (+) Brajtman et al., 2007	Kaplan et al., 2011 (+) Sullivan et al., 2009	Kalam-Salminen et al., 2013
	Medical informatics and documentation.		(+) Sullivan et al., 2009	(+) Sullivan et al., 2009 Kiekkas et al., 2019	(+) Choi & De Martinis, 2013 Theander et al., 2016	(+) Fetter, 2009	(+) Choi & De Martinis, 2013	(+) Sullivan et al., 2009		(+) Sullivan et al., 2009	
	Learning from and teaching others.		(+) Kajander-Unkuri et al., 2014	(-) Henderson et al., 2016	(+) Theander et al., 2016	(-) Collins & Stiles, 2011		(-) Kiekkas et al., 2019			(+) Kim, 2007
	Ethical competence.	(+) Lakanmaa et al., 2014		(-) Henderson et al., 2016 (+) Lakanmaa et al., 2014	(+) Lakanmaa et al., 2014 Theander et al., 2016	(+) Numminen et al., 2009		(-) Kiekkas et al., 2019		(+) Kaplan et al., 2011	

(+) link identified; (-) link not identified

Discussion

This review examined empirical studies focusing on the educational components and competencies of GNS. The objective was to explore potential links between nurse competence and educational components in nursing education. The selected studies identified and analysed the core professional competencies and the educational components used to develop these competencies. However, the review did not investigate the strength of the link between educational components and nurse competence, only whether the link existed.

Although the data analysis primarily centred on GNS and correlated the findings with graduation, four specific studies also concentrated on undergraduate students (Choi & De Martinis, 2013; Dilles et al., 2011; Henderson et al., 2016; Kalam-Salminen et al., 2013). This did not significantly influence the results, as younger students were being compared with GNS. However, it is important to emphasize the importance of GNS competence in ensuring their readiness for the nursing workload, thereby enhancing patient care and nursing education (Ghasemi et al., 2020).

The review has revealed that nursing management and nursing interventions are widely and frequently discussed in GNS studies (Ääri et al., 2004; Blackman & Giles, 2017; Kajander-Unkuri et al., 2014, 2021; Kiekkas et al., 2019). These competencies are likely to be frequently studied for several reasons. Firstly, nursing interventions and management have well-established standards and guidelines, making these areas easier to study and teach. Clear protocols and evidence-based practice enable comprehensive research and education (World Health Organization. Dept. Human Resources for Health, 2009). Additionally, nursing curricula are often guided by national and international legislation requiring a strong focus on clinical competencies to meet accreditation standards and prepare students for the nursing profession (European Commission, 2005, 2013). Moreover, according to the studies reviewed, researchers often do not consider the social and societal nurse competencies (Collins & Hewer, 2014; Kim, 2007; Theander et al., 2016). Hence, when analysing GNS competencies, failing to recognize these competencies may result in training programmes that do not adequately prepare nurses for real-world working conditions (Matlhaba & Nkoane, 2022).

Defining the term “educational component” is challenging due to the lack of a precise definition in nursing education research. Based on the analysed literature, a new definition was established, where an educational component is defined as a coherent system encompassing various aspects of teaching

and learning, from theoretical understanding to practical application, reflective thinking, and continuous evaluation (Darling-Hammond et al., 2020; Grech, 2021; Guerriero, 2013; Hoidn & Kärkkäinen, 2014). Once a clear understanding of the concept was established, the structure of information provided by different authors on educational components for the development of nurse competence was analysed.

The review found that the most frequent educational components in GNS education focused on EU directive-regulated and optional educational components. The most commonly studied components were modules / training (Ääri et al., 2004; Amre et al., 2008; Blackman & Giles, 2017; Edwards et al., 2004; Henderson et al., 2016; Sullivan et al., 2009) and clinical placements (Ääri et al., 2004; Amre et al., 2008; Blackman & Giles, 2017; Edwards et al., 2004; Henderson et al., 2016; Sullivan et al., 2009), which are essential for providing theoretical knowledge and practical experiences. Consequently, they may have attracted research attention. Moreover, such kind of research helps to ensure that programmes meet all the standards and adequately prepare students for professional practice (European Commission, 2005, 2013).

Optional educational components such as simulation training (Liu et al., 2008; Sullivan et al., 2009) and course assignments / readings (Kiekkas et al., 2019; Sullivan et al., 2009) were among the least studied. This might be due to significant variations between programmes and institutions, making standardization and systematic testing challenging (Khalil et al., 2023). Additionally, the evidence base for the effectiveness of these educational components is still developing (Blum et al., 2005). Therefore, researchers are likely to focus on components with proven effects on nursing education outcomes, highlighting the need for further investigation into the less explored components to ensure a comprehensive understanding of their impact on nursing education and practice. Furthermore, compulsory educational components can be complemented by optional educational components that may enhance nurse competence (Brajtman et al., 2007; Fetter, 2009; Kiekkas et al., 2019). This situation provides an opportunity to integrate new educational components into traditional nursing education (Hassmiller & Wakefield, 2022).

The review identified several essential educational components that are important for nurses to achieve competence. However, there is limited analysis of the link between these components and nurse competence. To produce competent nurses,

educational standards should consider the scope of the subject, teaching and learning methods, assessment of knowledge, and practical experience in real working conditions (Brajtman et al., 2007; Darling-Hammond et al., 2020; Guerriero, 2013; Hoidn & Kärkkäinen, 2014; Manoochehri et al., 2015; Sullivan et al., 2009). The analysis of various studies showed a link between specific educational components and professional competence, frequently reported in the literature (Blackman & Giles, 2017; Fukada, 2018; Yamamoto et al., 2021). Furthermore, by conducting this research, we found similarities between the identified nursing curricula and optional educational components related to nurse competence acquisition. However, despite efforts to standardize nursing education (European Commission, 2005, 2013), significant differences still exist in nursing curricula between various institutions, both nationally and internationally (Buchanan et al., 2021; Lahtinen et al., 2014; Lira et al., 2020). Therefore, the analysed studies showed that the educational components relevant to nurse competence are still not consistently defined. Future research should explore how different educational components contribute to nurse competence.

Limitation of study

Firstly, the review included mostly quantitative studies (n = 28) with only two qualitative ones. The predominance of quantitative studies over qualitative studies leads to a potentially different understanding of nursing education as different methodologies provide different information that can be used to analyse the depth, context and nuanced insights of the research findings.

Secondly, this review highlights the need for a clear definition of “educational component” in nursing education. Further research is needed to better understand this concept. The proposed definition of “educational component” needs empirical validation. Therefore, it would be valuable to investigate the benefits of educational components in GNS education.

The data analysis focused only on GNS and the results are linked to graduation, which is a narrow objective that does not allow for other analysis possibilities. Therefore, a longitudinal study following nursing students from their first year of study to the completion of their nursing degree could be considered.

Although this review used thematic analysis, it did not explore the link between professional competence and educational components in detail. The studies only identified the presence or absence of the link, but did not analyse its strength, quality, or determining factors. Therefore, it would be appropriate to conduct

a study to investigate the benefits of educational components on nurse competence achieved by GNS. Further research should go beyond thematic analysis and investigate the link between these components and professional competence, analyse the strength of this link, and identify its determinants. This would require different research designs and collaboration with educational sciences researchers.

In summary, this review has highlighted key areas that need to be addressed when linking the components of nursing education to competencies. The findings suggest that further empirical research is needed to better understand how educational components and nurse competencies interact. Further exploration of this link would help to select the most appropriate educational component to achieve nurses’ professional competencies.

Conclusion

This scoping review of empirical studies on the competencies of GNS aimed to identify the key educational components linked to professional nurse competence.

The review found that competencies such as patient care initiation, interprofessional teamwork, and nurse leadership, have been researched more than others, suggesting that more attention is needed to ensure a comprehensive understanding of GNS competencies.

The most frequently studied educational components were study modules / training in nursing curricula and clinical placements, implying a need for greater research focus on the less studied educational components to ensure a well-rounded nursing education.

The analysis found no clear link between nurse competence and educational components in GNS education. However, management and nursing intervention competencies, particularly in initiating and implementing patient care, were often associated with educational components, such as basic education, clinical placements, study modules, and simulations. Social and societal competencies were also linked to educational components, although some aspects were less frequently associated.

Ethical aspects and conflict of interest

This study followed the general principles of good scientific practice. No direct involvement of participants occurred, and research ethics approval was not required for the scoping review (World Medical Association, 2001; Lithuanian Education Academy, 2012; Summers, 2009). The authors declare

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Author contributions

Conception and design (VK, SK, NI, HLK), data analysis and interpretation (VK, SK, NI, HLK, MT), manuscript draft (VK), critical revision of the manuscript (SK, NI, HLK), final approval of the manuscript (VK, SK, NI, HLK, MT).

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