Collaborative Approaches in Online Nurse Education: A Systematic Literature Review

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Abstract: According to the socio-constructivist theories of learning, collaborative learning allows negotiation of shared meanings and co-construction of new knowledge among peers. This approach fits particularly well with healthcare professional education needs, as these professionals often face challenging issues that require the ability to fully understand the complexity of the patients' health conditions through working with others. However, while collaborative learning approaches are widely used in face-to-face nurse education contexts, their online equivalent still seem to be understudied, in spite of their great potential for the field. This systematic literature review investigates: (1) to what extent are online collaborative learning activities being adopted and investigated in formal nurse education, (2) What kind of online collaborative learning activities/techniques are proposed and what team structures are employed, (3) what technologies are used to run these learning activities, and (4) what methods are used to evaluate the impact of these activities. Studies were included if they presented online collaborative learning activities proposed by Universities or VET (Vocational Education and Training) providers. Articles published in 2015 or later were collected in November 2022 from Scopus, Web of Science and Medline. A total of 1059 records were retrieved, selected and analysed by four coders, resulting in a final dataset of 75 papers that were coded for type of collaborative approach, study characteristics, research methodology used, strength of evidence, and relevance to the research questions. Most of them described the use of activities like Discussions, Case Studies and Peer Reviews, sometimes in association with Role Play. In terms of technologies, Learning Managements Systems, forums and social media were already common pre-pandemic, but during the lockdown synchronous communication tools – often used to support simulations – took over. Data collection was carried out quantitatively, qualitatively or using mixed methods, but in many cases data reporting is weak or absent at all. The majority of the retrieved papers illustrate activities where collaboration was not structured in any way and there was no joint assignment or common objective/artefact that learners needed to reach/produce. In case of blended interventions, often collaboration is limited to the face-to-face sessions, while the digital setting is used for individual work. In terms of social structure, most of the time small groups or plenaries are used. In summary, the review reveals that studies on online collaborative learning for nurses are limited, especially in Europe, and the design of online collaborative activities often clashes with the principles put forward by the Computer Supported Collaborative Learning (CSCL) research community. Based on the results of the review we put forth some key recommendations, such as ensuring that online collaboration involves the creation of a shared artefact and striving to make virtual simulations actually collaborative, rather than limited to envisage student interactions in the debriefing phase. The paper also proposes a number of research areas seldom investigated and that would deserve further attention in the future.

Keywords: Computer supported collaborative learning, Nurse training, Nurse education, Systematic literature review

1. Introduction

In recent years, a number of transformations have taken place in healthcare systems in Europe and beyond. In particular, efforts have been made to follow the World Health Organization's recommendations to provide more first-contact, continued and coordinated care to patients, forming a gateway between the community and health systems (World Health Organization, 1978; 1988; 2005; 2006; Jurgens, 2004). As a consequence, health care personnel are being called on to follow new ways of working (Kekki, 2004; World Health Organization, 2006). Specifically, in order to be able to deliver patient-centred care, they need to become members of interdisciplinary teams, be able to work in groups, have ongoing access to up-to-date evidence-based medical knowledge, understand patients' health conditions and needs, as well as make decisions and solve complex problems. With the emergence of these new and pressing demands, roles in the health professions have been subject to substantial changes, including the introduction of new categories of health professionals (Goldfield, 2017; Sasso et al., 2018).

These changes call for healthcare professionals to develop new competences, enhancing their ability to work in close collaboration with others and to share practices with colleagues (Koles et al., 2010). As a result, the curricula adopted to train nurses have started to embrace active and collaborative learning approaches (Zhang and Cui, 2018). These approaches, unlike more transmissive and teacher-led methods, are focused on negotiation of shared meanings and co-construction of new knowledge among peers (Anderson, 2008;

Wenger, 1998). In addition, since 2020, the COVID-19 pandemic has forced many institutions to deliver all or part of the educational programs through online environments, requiring a thorough re-design of the educational approaches adopted to face the many challenges of the new circumstances.

Nonetheless, some researchers (Breen, 2013; Breen and Jones, 2015; Zhang and Cui, 2018) claim collaborative learning is not yet a very common approach in the field of online education for nurses. This is somehow confirmed by Männistö et al. (2020), in a literature review investigating the effectiveness of digital collaborative learning as opposed to traditional teaching in nursing education. This review was carried out before the pandemic and selected only randomized controlled trials, which resulted in a dataset of 5 papers only. The results support claims concerning the scarce maturity of this research field but do not shed light on state of the art practice or on the effects of the online shift caused by the pandemic. Hence, a less selective and more up to date study is needed to identify research gaps and recommendations for the future.

The importance of adopting collaborative approaches is mostly supported by studies concerning 'inter-professional learning' (i.e. learning across professions, for example in groups of nurses and doctors) (Boyd, Baliko and Polyakova-Norwood, 2015; Breen and Jones, 2015; Reis, Faser and Davis, 2015; Smith and Jones, 2016; Wright and Leahey, 2009; Zook et al., 2018). Other studies advocate the use of online collaborative learning in the context of "Collaborative Online International Learning" (de Castro et al., 2019) and of "Globally Networked Learning" (Limoges et al., 2019), approaches aimed at fostering the creation of international communities of professionals and exchanging know-how across countries.

The Covid-19 pandemic brought to further attention the challenges of online education, as many courses had to be moved online in order to comply with social distancing measures (Cameron-Standerford et al., 2020). The experience of Emergency Remote Education highlighted that online settings – when not properly designed and managed – hinder the socialization of students, especially of those with low social intelligence and sociability (Swan, 2002; Savci, Cil Akinci and Keles, 2022). As argued by Garrison and Cleveland-Innes (2005), simply offering students possibilities for online interaction is not enough to ensure authentic learning: rather, there is a need for carefully designed activities that require proper collaboration. During the pandemic, further efforts were made to adopt online collaborative approaches in practicing clinical reasoning, decision making, leadership, interprofessional communication and other important skills of modern-day nursing.

This makes it crucial to better understand whether collaborative learning in nursing education is properly designed for online settings and in line with learning theories, as done by Dolan, Amidon and Gephart (2021) limited to the case of virtual simulations.

In an effort to contribute to this debate, made all the more urgent by the Covid-19 pandemic, and following other researchers' recommendations (Breen, 2013; 2015; Zhang and Cui, 2018), this study investigates the use of online collaborative learning in the context of nurse education or advanced training through a systematic literature review. The review's aims are to shed light on whether, to what extent, and with what modalities online collaborative learning is currently proposed in nursing professional development. Specifically, we focus on the following research questions:

1. To what extent are online collaborative learning activities being adopted and investigated in formal nurse education?
2. What kind of online collaborative learning activities/techniques are proposed? What team structures are employed?
3. What technologies are being used to run these learning activities?
4. What methods are being used to evaluate the impact of these activities?

The above questions should allow us to identify possible room for improvement of current practice and further investigation areas to ultimately take full advantage of online collaborative learning approaches in nurse education.

2. Theoretical Background

When we speak of online collaborative learning, we refer to the research field known as "Computer Supported Collaborative Learning" (CSCL). CSCL research is rooted in socio-constructivist theories of learning, according to which knowledge can be constructed through social negotiation (Garrison, Anderson and Archer, 1999; Stahl, Koschmann and Suthers, 2021). In this approach, discussion with other individuals is treated as a primary way to learn, because it encourages critical thinking, understanding, and group meaning-making (Scardamalia and

Bereiter, 1994; Kanuka and Anderson, 1999; Palloff and Pratt, 2001; Dillenbourg, 2002; Cognition and Technology Group at Vanderbilt, 2013).

However, "truly collaborative" learning processes are not easy to achieve and it is widely acknowledged by the CSCL research community that learners might fail to spontaneously engage in collaborative learning activities (Bell, 2013; Persico & Pozzi, 2011; Weinberger, Reiserer, Ertl, Fischer, & Mandl, 2005). The debate about ways of fostering collaboration has been intense and touched upon several aspects: how to scaffold collaboration, what technologies are most useful, what criteria should be adopted to make pedagogically sound design decisions, and how to collect and interpret evidence of CSCL's impact. In the following, we briefly summarise the state of the art in these areas.

2.1 Ways to Scaffold Collaboration

One of the most hotly debated aspects is the extent to which online collaborative learning activities need to be structured and interactions guided. Back in 2002, Dillenbourg pointed out that unguided collaboration does not necessarily result in collaborative learning (Dillenbourg, 2002). Similarly, other researchers have reported that an excess of freedom in a collaborative task may lead to low engagement on the part of team members (Hewitt, 2005; Liu and Tsai, 2008; Demetriadis et al., 2009; Bell, 2013; Heimbuch, Ollesch and Bodemer, 2018; Radkowitsch, Vogel and Fischer, 2020). On this issue, two recent meta-analyses have provided evidence for the effectiveness of "scripts" – that is, highly structured activities – in collaborative learning processes (Vogel et al., 2017; Radkowitsch, Vogel and Fischer, 2020).

Along with scripts, which are fine-grained scaffolds, research in learning design and collaborative learning has come up with the term collaborative "techniques" (Aronson, 2021), i.e. structured methods aimed at scaffolding group interactions at a higher level than scripts. These techniques have their origins in face-to-face education and are now also applied in virtual learning contexts. Kagan (1990), for example, proposed "(competitive or cooperative) structures" as "ways of organizing social interaction in the classroom". These techniques are also referred to as "instructional methods" (Kanuka and Anderson, 1999), whereas Hernández-Leo et al. (2005) use "Collaborative Learning Flow Patterns as a way of capturing good practices in the "organization of collaboration and activity structure".

Some of the most commonly adopted techniques are Peer Review, Case Study, Jigsaw, Role Play, Pyramid and Discussion (Persico & Pozzi, 2011). These are chosen and implemented on the basis of course objectives and content, the characteristics of the target population and contextual constraints. According to Pozzi, Ceregini, & Persico (2016), these techniques can be classified according to four main aspects: the task that learners are to accomplish (which usually envisages the production of a final output, often called 'artefact' in the CSCL field); the teams that learners are divided into; the timing of the activities; and the technologies employed for communication and artefact production.

Building on this research thread, to answer our second research question, we analyse the online collaborative activities used in online nurse education and investigate the way collaboration is structured by looking at these main features.

2.2 The Role of Technology in CSCL

Researchers in CSCL have pointed out that the type of computer support provided in collaborative learning may vary depending on whether learners collaborate face-to-face or, alternatively, synchronously online or asynchronously online (Jeong, Hmelo-Silver and Jo, 2019). In 2010, a meta-analysis by Jeong and Hmelo-Silver (2010) revealed the diversity of technological applications in CSCL and pointed out that the most commonly adopted tools are communication tools, in particular discussion forums and chats.

Wiki environments are also mentioned in the literature; however, their usefulness for supporting collaborative learning is under question (Biasutti, 2017; Heimbuch, Ollesch and Bodemer, 2018). Additionally, social media sites such as Twitter or Facebook have started to attract researchers' attention, with the lingering criticism that, not being intrinsically education-oriented applications, the use of these tools for learning is problematic (Stahl, Koschmann and Suthers, 2021).

Simulation environments are another interesting technology that can be used in online collaborative learning contexts: some researchers state "[the] simulation system enhances collaboration and performance of the students" (Zulfiqar et al., 2018). More specifically, "CSCLs and virtual reality (VR) afford a number of possibilities for collaborative learning: record keeping which enables asynchronous collaboration, opportunities to access the same data/information for joint analysis, and collective interactions and dynamic

reconfigurations" (Chavez and Romero, 2012; Adefila et al., 2020). As for nursing education programs, given that the US National guidelines, before the pandemic, recommended for simulations to substitute up to 50% of in-person clinical time (Dolan, Amidon, & Gephart, 2021), there was considerable interest in US institution for virtual simulations, interest that significantly increased with the pandemic.

In the light of these standpoints, to answer the third research question, this review will investigate which technologies are used in the context of nurse education.

2.3   Methods to Evaluate the Impact of CSCL

Measuring the impact/effectiveness of CSCL is another prominent topic in the research literature. The focus of evaluation can vary from study to study: in some cases, the focus is the impact of one specific technology on the learning process; other studies are more interested in evaluating the pedagogical models underpinning online collaboration. Additionally, some studies are oriented to measuring students' learning outcomes; yet others aim to demonstrate how CSCL affects students' motivation or develops transversal skills (Jeong, Hmelo-Silver and Jo, 2019).

Over time, several methods and proposals have been put forward to observe, capture, analyse and ultimately evaluate the interactions occurring in a group, including both quantitative and qualitative approaches. Mixed methods are quite common in this field and – more recently- Learning Analytics have been studied as a way to evaluate the design of CSCL pedagogies and technologies (De Wever, Schellens, Valcke, & Van Keer, 2006; Martínez et al., 2006; Persico, Pozzi, & Sarti, 2010; Rodríguez-Triana, Martínez-Monés, Asensio-Pérez, & Dimitriadis, 2015; Saqr, Viberg, & Vartiainen, 2020; Stahl et al., 2021; Wise et al., 2015).

In order to answer our fourth research question, we will also focus on the way the impact of online collaborative activities is evaluated.

3.   Materials and Methods

The review is reported according to the PRISMA guidelines, where applicable. However, since our focus is on the characteristics of the studies and educational interventions themselves rather than the outcomes being measured, bias and confidence assessment were not applicable to the review. The review was not registered, as it does not have a direct impact on human health. Data are accessible at https://docs.google.com/spreadsheets/d/1ay4fR1E5icq8f47fInPsM8CHcw5I7GQs/edit?usp=sharing&ouid=107045214489711020674&rtpof=true&sd=true.

Articles were collected in November 2022 from the following databases: Web of Science, Scopus and Medline. The following search keywords were applied in the title, abstract, and keywords fields:

- "Nurs*";
- At least one out of "education", "training", "professional development", "universit*" or learning;
- At least one out of "collaborative learning", "cooperative learning", "Computer Supported Collaborative Learning", "cscl", "problem-based learning", "pbl", "critical incident", "case stud*" or "role play", "jigsaw", "pyramid", "peer review", "debate", "gamification", "game based learning", "GBL", or "simulation";
- At least one out of "blended learning", "blended training", "blended teaching", "online learning", "online training", "online teaching", "distance" (only if near "teaching", "learning", or "training"), "e-learning", "virtual" (only if near "learning" or "education"), or "web-based learning"

The search was limited to papers in English published in 2015-2022, specifically peer reviewed studies of primary or secondary research (systematic reviews, meta-analyses). Commentaries, editorials, conference papers, grey literature and letters were excluded.

Figure 1 illustrates the selection steps, as well as the inclusion criteria adopted.
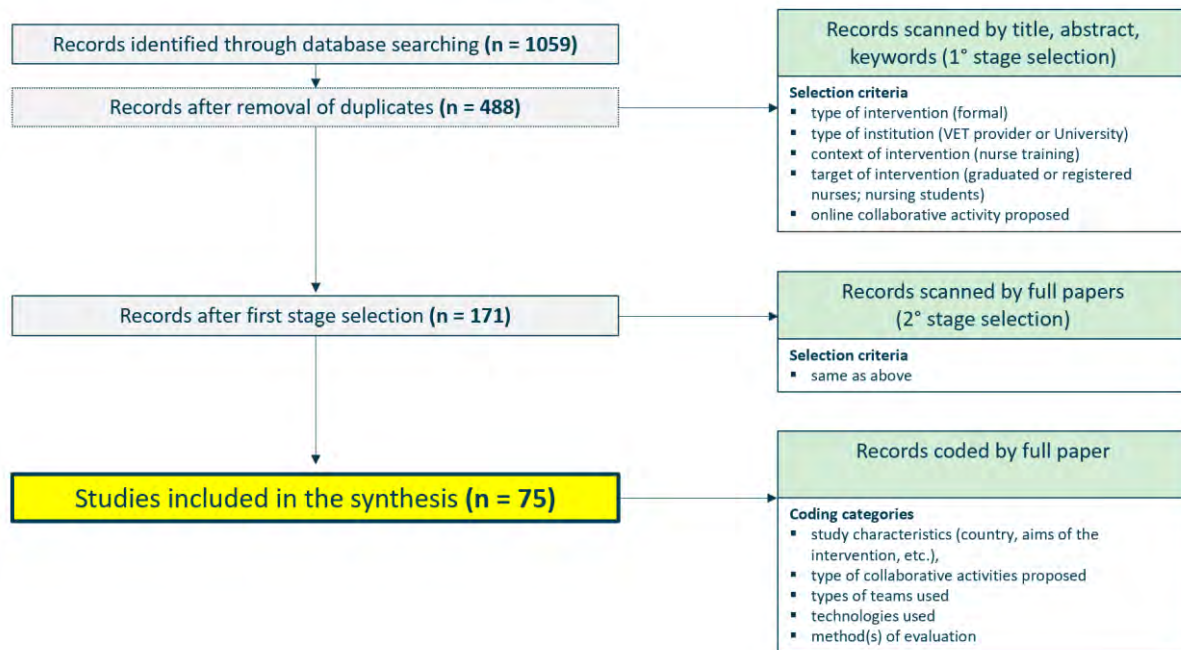
Figure 1: Selection and Coding Process and Criteria

A total of 1059 records (488 after duplicate removal) were retrieved. Titles, abstracts and keywords were read and filtered by four coders against the following inclusion criteria (first selection stage): studies must describe formal interventions run by accredited institutions (universities or Vocational Education and Training / VET providers); studies must focus on nursing education in which online or blended collaborative learning approaches were adopted; studies must describe interventions targeting student nurses, or graduate/registered nurses.

The resulting dataset contained 171 items, whose full texts were read and filtered against the same criteria as above, yielding a final corpus of 75 studies. These were coded for study characteristics (country of origin, aims of the intervention, etc.), type of collaborative activities proposed, team structure used, technologies used, and method of evaluation. No assumptions were made where information was missing, and all articles that met the inclusion criteria were included in the analysis.

Initially, each coder separately coded a common sample subset of about 10% of the abstracts/papers, and then discussed all instances of coding divergence until they reached agreement on criteria interpretation/application. Once the four coders felt confident they had achieved an acceptable level of intercoder reliability, the remaining abstracts/papers were coded independently.

A deductive method was adopted for full paper analysis, using the coding categories reported in Fig.1. Codes were inserted in a shared spreadsheet by the four reviewers. Each article was coded by one reviewer, but periodical meetings were held to discuss cases of ambiguities of critical aspects.

4. Results

4.1 RQ1 - To What Extent are Online Collaborative Learning Activities Being Adopted and Investigated in Formal Nursing?

Firstly, we must acknowledge a certain paucity of papers addressing the application of collaborative learning in online (or blended) educational contexts for nurses, at least as far as the pre-pandemic period is concerned. This is in line with Smith and Jones (2016), who reported that teaching strategies receive limited coverage in the available nursing education literature, and with several others (Breen, 2013; 2015; Smith and Jones, 2016; Vogt and Schaffner, 2016; Zhang and Cui, 2018), who highlighted the need to conduct further research in the field.

Not surprisingly, we noted a flat trend in the number of relevant papers published in this area (see Figure 2) and then a spike in 2021 (the number of papers for 2022 is likely underestimated, due to the search being last

carried out at the beginning of November 2022). In any case, it will be interesting to see if the surge of interest will last past the pandemic.
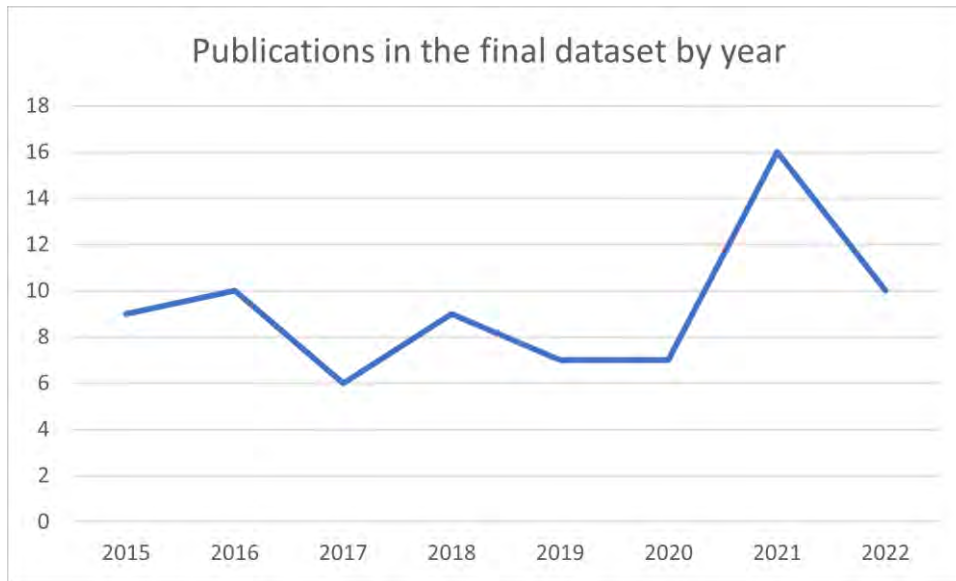

Figure 2: Papers per Year

Most of the studies were carried out in the USA (Table 1). It is also evident that Europe is hardly represented; this is true even if we consider the countries represented in studies involving 'multiple countries'.

Table 1: Distribution of Papers per Country

Country	Number of papers
USA	37
Australia	5
Canada	4
Taiwan	3
China	2
Brazil	2
UK	2
Singapore	2
Korea	2
Slovenia	1
Norway	1
Spain	1
Indonesia	1
Hong Kong	1
Multiple Countries	8
Missing	3
Total	75

In terms of setting, 85% of the studies described educational initiatives carried out in universities, while the rest were run by other VET providers. In terms of target populations addressed, Table 2 shows the distribution of the types of learners involved.

Table 2: Distribution of Papers per Target Population

Target	Number of papers
Nursing students	51
Family Community Nurses	1
Medical/ Healthcare students	1
Multiple target groups	19
Missing	3
Total	75

4.2 RQ2 - What Kind of Online Collaborative Learning Activities/Techniques are Proposed? What Team Structures are Used?

Table 3 shows the collaborative technique, the technology and the evaluation method as reported in each paper selected for this study.

Table 3: List of Full Papers Selected, With Collaborative Techniques, Technologies and Evaluation Methods Used

Paper	Collaborative technique	Technology	Evaluation methods
Avelino, Costa, Buchhorn, Nogueira, & Goyatá (2017)	Case Study	Learning Management System	Mixed
Baron, Rocha, & Anderson (2019)	Discussion	Forum	Qualitative
Boyd, Baliko, & Polyakova-Norwood (2015)	Discussion	Learning Management System	Qualitative
Breen & Jones (2015)	Discussion & Role Play	Forum	Qualitative
Breen (2015)	Case Study (unfolding) & Role Play	Forum	Qualitative
Chan, Chair, Sit, Wong, Lee, & Fung (2016)	Case Study	Learning Management System	Mixed
Chang, Chung, & Yang (2022)	Discussion	Simulation environment + Sync communication environment	Quantitative
Chua, Ooi, Chan, Lau, & Liaw (2022)	Case Study	Simulation environment + Sync communication environment	Mixed
Cowperthwait, Graber, Carlsen, Cowperthwait, & Mekulski (2021)	Case Study & Role Play	Sync communication environment	Qualitative
De Castro, Dyba, Cortez, & Pe Benito (2019)	Discussion	Learning Management System	Mixed
Dreifuerst, Bradley, & Johnson (2021)	Case Study	Simulation environment + Sync communication environment	No data
Duck & Stewart (2021)	Peer Review	Learning Management System	No data
Dugan (2016)	Discussion	Forum	Qualitative

Paper	Collaborative technique	Technology	Evaluation methods
Palancia Esposito & Sullivan (2020)	Case Study	Sync communication environment	Qualitative
Ferguson, DiGiacomo, Gholizadeh, Ferguson, & Hickman (2017)	Social networking	Social Network/Social Media	Qualitative
Flo, Byermoen, Egilsdottir, Eide, & Heyn (2021)	Case study	Simulation environment + Sync communication environment	Mixed
Fowler, Phillips, Patel, Ruggiero, Ragucci, Kern, & Stuart (2018)	Case Study	Simulation environment + Sync communication environment	Mixed
Fox (2017)	Case Study & Peer Review	Interactive lectures + Forum	Mixed
Fung, Zhang, Yeung, Pang, Lam, Chan, & Wong (2021)	Case Study	Simulation environment + Sync communication environment	Quantitative
Geng, Huang, & Huang (2021)	Peer Review	Video annotation software	Quantitative
George & DeCristofaro (2018)	Peer Review	Learning Management System	No data
Gordon (2017)	Discussion	Simulation environment + Sync communication environment	No data
Hardy, Mushore, & Goddard (2016)	Discussion	Sync communication environment	Qualitative
Hargreaves, Zickgraf, Paniagua, Evans, & Radesi (2021)	Case Study	Not specified	No data
Horowitz, Stone, Sibrian, DuPee, & Dang (2022)	Case study (unfolding), Role play	Learning Management System + Sync communication environment	No data
House, Nielsen, & Dowell (2022)	Discussion	Sync communication environment	Quantitative
Huber, Joseph, Halbmaier, Carlson, Crill, Krieger, Matthys, & Mundisev (2016)	Case study + Peer Review	Forum	Qualitative
Hudson, Clavel, Kilpatrick, & Lavoie-Tremblay (2021)	Case Study, Peer Review	Forum, Social Network/Social Media, and others	Review
Imamyartha, Wahjuningsih Puspa, Bilqis, & Hudori (2021)	Not specified	Social Network/ Social Media	Quantitative
Jones, Kelsey, Nelmes, Chinn, Chinn, & Proctor-Childs (2016)	Social networking	Social Network/Social Media	Mixed
Jung, de Gagne, Choi, & Lee (2022)	Discussion	Not specified	Quantitative
Kang, & Kim (2021)	Case Study	Not specified	Quantitative
Kubin, Fogg, & Trinka (2021)	Case Study (unfolding)	Simulation environment + Learning Management System	Mixed

Paper	Collaborative technique	Technology	Evaluation methods
Kuszajewski, Vaughn, Bowers, Smallheer, Hueckel, & Molloy (2021)	Case Study	Simulation environment + Sync communication environment	Quantitative
Leung, Wong, Kiteley, Ellis, & Esplen (2019)	Case Study & Discussion	Forum	Quantitative
Liang, Chen, Zhou, Wang, Liao, Lu, & Lin (2020)	Case study	Not specified	Quantitative
Liaw, Ooi, Rusli, Lau, Tam, & Chua (2020)	Case Study	Simulation environment	Quantitative
Limoges, Nielsen, MacMaster, & Kontni (2019)	Discussion	Not specified	Qualitative
Lin, Hwang, Chang, & Hsu (2021)	Peer Review	Peer review system	Mixed
Mackavey & Cron (2019)	Case Study	Learning Management System	Quantitative
McDaniel & Tornwall (2016)	Case Study	Social Network/Social media	Qualitative
McGarry, Theobald, Lewis, & Coyer (2015)	Social networking	Social Network/Social Media	Review
Morales (2017)	Social networking	Social Network/Social Media,	No data
New, Edwards, & Norris (2022)	Case study (evolving)	Learning Management System	Quantitative
O'Connor, Jolliffe, Stanmore, Renwick, & Booth (2018)	Social networking	Social Network/Social Media	Review
Packard, Iverson, Ryan-Haddad, Teply, Wize, & Qi (2019)	Simulation (f2f)	Synchronous communication environment	Mixed
Panepucci, Roe, Galbraith, & Thornton (2022)	Case Study	Learning Management System	No data
Pascon, Vaz, Peres, & Leonello (2022)	Discussion	Learning Management System + Sync communication environment	No data
Peddle, & Bearman, McKenna, & Nestel (2019)	Case Study	Simulation environment	Qualitative
Price, Devis, LeMoine, Crouch, South, & Hossain (2018)	Discussion	Social Network/Social Media	Mixed
Pullis & Hekel (2021)	Peer review, Discussion	Learning Management System + Sync communication environment	Quantitative
Reis, Faser, & Davis (2015)	Case Study	Simulation environment + Forum	Quantitative
Robb, & Spadaro (2022)	Not specified	Forum	Qualitative
Ropero-Padilla, Rodriguez-Arrastia, Martinez-Ortigosa, Salas-Medina, Folch Ayora, & Roman (2021)	Discussion	Sync communication environment + Forum	Qualitative

Paper	Collaborative technique	Technology	Evaluation methods
Rose, Jenkins, Astroth, Woith, & Jarvill (2020)	Case Study	Simulation environment + Sync communication environment	Mixed
Ross & Myers (2017)	Social networking	Social Network/Social Media	Review
Shaw, Sperber, & Cunningham (2016)	Discussion	Learning Management System + Social Network/Social Media	Quantitative
Smadi, Chamberlain, Shifaza, & Hamiduzzaman (2021)	Case study	Forum + Social Network/Social Media + Wiki	Qualitative
Smith & Jones (2016)	Discussion	Forum	Mixed
Stanley, Serratos, Matthew, Fernandez, & Dang (2018)	Case Study	Learning Management System + Interactive lectures	Qualitative
Stevenson, & Svoboda (2021)	Case study (unfolding) + Role play	Sync communication environment	Qualitative
Gawlik, Jeu, & Reisinger (2018)	Peer Review	Not specified	Qualitative
Thrane (2020)	Discussion, Role Play	Not specified	No data
Tracy, & McPherson (2020)	Case Study (unfolding)	Sync communication environment	No data
Trobec & Starcic (2015)	Role Slay	Learning Management System	Mixed
Van Hoover (2015)	Discussion	Learning Management System	Qualitative
Vogt & Schaffner (2016)	Case Study	Learning Management System	Mixed
Watson, Cooke, & Walker (2016)	Social networking	Social Network/Social Media	Qualitative
Wihlborg, Friberg, Rose, & Eastham (2018)	Discussion	Learning Management System	No data
Wikander & Bouchoucha (2018)	Peer Review	Not specified	Qualitative
Williams, Stephen, & Causton (2020)	Case Study	Simulation environment	Qualitative
Zehler, Cole, & Arter (2021)	Case Study	F2f simulation + Sync communication environment	Mixed
Zitzelsberger, Campbell, Service, & Sanchez (2015)	Case Study	Social Network/Social media	No data
Zook, Hulton, Dudding, Stewart, & Graham (2018)	Case Study (unfolding)	Simulation environment + Forum	Quantitative

About 25% of the retrieved papers described the adoption of simple Discussions, usually carried out in forums or via synchronous communication systems. Most of the time, though, these Discussions are not structured in any way and - apparently - there is no common artefact that learners need to produce. Only in a few cases (Breen and Jones, 2015; Limoges et al., 2019; Ropero-Padilla et al., 2021; Pascon et al., 2022) is the Discussion scaffolded by assigning learners a clear collaborative task and a common artefact to jointly develop. Sometimes the Discussion is associated with Role Play, where learners are asked to act according to assigned

roles (Breen, 2015; Breen and Jones, 2015; Schaffer and Munyer, 2015; Trobec and Starcic, 2015; Thrane, 2020).

In other studies, collaborative learning is associated with problem-based learning approaches, which are quite common in healthcare learning contexts. Online Case Studies seem to be especially popular (about 50% of the studies). Sometimes Case Studies are "evolving" or "unfolding" (Breen, 2015; Fogg and Trinka, 2021; Horowitz et al., 2022; Kubin, Stevenson and Svoboda, 2021; New, Edwards and Norris, 2022; Tracy and McPherson, 2020; Vogt and Schaffner, 2016; Zook et al., 2018), i.e. information about the case is not given to learners "all at once" from the very beginning, but is collected gradually, at different stages of the activity. Some Case Studies are oriented to "route case analysis" (Fox, 2017; Fowler et al., 2018), a method for problem solving used for identifying the root causes of faults, problems, or diseases. In one case (McDaniel and Tornwall, 2016) the Case Study was not provided by the lecturer, but was developed by learners themselves, therefore representing the final artefact to be produced.

In most of the studies, the Case Study is the collaborative technique adopted within online simulation activities and these activities are often referred to by their authors as 'virtual simulations'. Simulations in the nurse education field are usually proposed to allow students practicing clinical competences and developing clinical reasoning skills. Some pre-pandemic studies already focused on online simulations as alternatives to traditional clinical experiences and manikin-based simulations (Fowler et al., 2018; Gordon, 2017; Liaw et al., 2020; Reis, Faser and Davis, 2015; Zook et al., 2018), but during the lockdown this became a necessity and in that period the number of reported digital simulations increased (Chua et al., 2022; Dreifuerst, Bradley and Johnson, 2021; Flo et al., 2021; Kubin, Fogg and Trinka, 2021; Kuszajewski et al., 2021; New, Edwards and Norris, 2022; Palancia Esposito and Sullivan, 2020; Panepucci et al., 2022; Rose et al., 2020; Williams, Stephen and Causton, 2020).

Sometimes simulation activities start from video clips presenting cases, that are then jointly commented and discussed through asynchronous or – more frequently. ®synchronous communication environments (New, Edwards and Norris, 2022; Palancia Esposito and Sullivan, 2020; Panepucci et al., 2022). Other simulations are based on the analysis and joint discussion of virtual patient cases proposed by simulation software (Flo et al., 2021; Kuszajewski et al., 2021; Rose et al., 2020; Williams, Stephen and Causton, 2020). Interestingly, often the pre- and de-briefing sessions preceding and following the 'actual' simulation, are conducted in plenary through open-ended discussions, while the simulation itself is conducted individually (Fung et al., 2021; Rose et al., 2020). As a matter of fact, in many of the studies presenting 'virtual simulations', a lot of emphasis is given to these phases of pre- and –de-briefing (Chua et al., 2022; Dreifuerst, Bradley and Johnson, 2021; Fung et al., 2021; Kang and Kim, 2021; Rose et al., 2020), as these are recommended steps in nursing simulation protocols (see for example INACSL; Gordon, 2017; Kuszajewski et al., 2021; Panepucci et al., 2022). However, these simulation phases seem to be oriented to sharing or decision making, rather than collaborating, as there is no common artefact that students need to produce.

Exceptions are those Case Studies where learners are explicitly asked to collaboratively write a report (New, Edwards and Norris, 2022) or formulate questions for patients (Hargreaves et al., 2021).

Interestingly, sometimes the Case Study technique is used in association with the Role Play (Cowperthwait et al., 2021; Horowitz et al., 2022; Stevenson and Svoboda, 2021): in these studies, students assume roles thus analysing cases from different perspectives (Horowitz et al., 2022) or putting themselves in the patient's (or patients') relatives' shoes (Cowperthwait et al., 2021).

Peer Review and/or peer assessment are sometimes adopted to foster online collaboration (15% of the studies). Examples are: Gawlik, Jeu and Reisinger (2018) and Pullis and Hekel (2021). In two studies (Wikander and Bouchoucha, 2018; Geng, Huang and Huang, 2021), the Objective Structured Clinical Assessment (OSCA) is mentioned. OSCA is quite a popular approach to students' assessment in medical education, where learners are asked to practise and demonstrate their clinical skills in a standardized medical scenario. In Wikander and Bouchoucha (2018) the method is adapted for peer assessment and implemented in an online setting, while in Geng, Huang and Huang study (2021), students are asked to comment on videos produced by their peers through a video annotation software. Finally, in Lin et al. (2021) the interaction between assessors and assessees is enriched by a final phase whereby the latter reply to the former, commenting on the feedback received in such a way that the prevalent one-way communication through which feedback is provided in peer review becomes two-way communication.

In terms of team structure, sometimes the task starts as an individual assignment (de Castro et al., 2019; Dugan, 2016; Fowler et al., 2018; Gordon, 2017; Huber et al., 2016; Mackavey and Cron, 2019; Reis, Faser and Davis, 2015; Van Hoover, 2015) and the results of individual work are then shared and discussed online with peers. This phase often takes place in small groups and the social structure tends to remain stable for the whole activity. Alternatively, especially in simulations, the task starts and ends in plenary (for the pre- and the post-simulation briefing) and the rest of the activity is conducted at individual level.

Importantly, in five studies (House, Nielsen and Dowell, 2022; Jung et al., 2022; Limoges et al., 2019; Morales, 2017; Wihlborg et al., 2018) online collaborative learning is used to support collaboration among learners living in different countries. Especially during the pandemic, allowing interaction and sharing with professionals of other countries served to replace mobility.

In seven studies (Chua et al., 2022; de Castro et al., 2019; Fowler et al., 2018; Packard et al., 2019; Reis, Faser and Davis, 2015; Williams, Stephen and Causton, 2020; Zook et al., 2018) online collaboration is used to foster inter-professional education.

In one case (Zeler, Cole & Arter, 2021), teams of two to three students took part in simulations with one quarantined team member connected remotely via Zoom and the other(s) interacting with a high fidelity mannequin in a simulation centre. This way, quarantined students were able to achieve the same learning objectives as their peers in terms of perceived critical thinking and clinical judgment, while for clinical skills and communication the results were significantly lower. The peculiarity of this study lies in the asymmetry between the capabilities of team members due to mandated quarantine.

4.3 RQ3 - What Technologies are Used to Run Online Collaborative Learning Activities?

In terms of technologies used (see Table 3), several papers mention Learning Management Systems (18 studies) and boards/forums (12 studies). Not surprisingly, synchronous communication environments that were limited to 3 studies in the pre-pandemic, are mentioned in almost all the studies based on quasi-experiments carried out during the lockdown, as synchronous communication was the immediate replacement for f2f communication.

Simulations – that were limited to 5 studies up to 2020 – increase to 10 during Emergency Remote Education. Simulations may be based on 3D learning environments where an immersive experience is allowed (like in Second Life – see for example Zook et al., 2018) or based on highly sophisticated programmed mannequins (Zeler, Cole & Arter, 2021). Alternatively, 2D learning environments may be used (see for example Williams, Stephen and Causton, 2020), or even mere discussion forums devoted to the analysis and discussion of specific cases, such as standardized patients (this type of simulation seems to have become increasingly popular with the pandemic).

In addition to the above, 14 studies mention the use of social media. This result is undoubtably skewed by the fact that 3 out of the 4 literature reviews retrieved for this study all focus on the use of social media in nursing education. Twitter is used in Ferguson et al. (2017) and Price et al. (2018) to develop an online journal club and promote discussion on the topic "What is nursing?", while blogs and wikis are used, respectively, in McDaniel and Tornwall (2016) and in Zitzelsberger et al. (2015) to propose case studies. However, in some cases (Watson, Cooke and Walker, 2016; Morales, 2017) the aim of social media use is to implement participatory approaches to learning, rather than to support fully fledged collaborative learning. In other cases (Jones et al., 2016; Shaw, Sperber and Cunningham, 2016), the development of pages on social media is used as a collaborative task, so we would claim in these cases social media are not used as a learning environment, but rather as the platform hosting the final artefact to be produced.

Interestingly, a couple of studies (Fox, 2017; Stanley et al., 2018) mention the use of VoiceThread as a technology to actively engage learners with contents and peers, by allowing them to comment on any digital media produced by others. In a similar vein, Geng, Huang and Huang (2021) use a video annotation software to allow what they call "Crowdsourcing Collaborative Learning Strategy".

Finally, in a couple of cases (Vogt and Schaffner, 2016; Limoges et al., 2019) technologies were not suggested by the lecturers; rather, learners (or groups) were free to choose the preferred technology to communicate.

4.4 RQ4 - What Methods are Used to Evaluate the Impact of Online Collaborative Learning Activities in Nurses' Professional Development?

Our data (see Table 3) show that, in order to assess the impact of the initiatives described, several studies (about 30% of the papers) applied qualitative approaches, using interviews, focus groups, or textual analysis of transcripts from activities based on asynchronous online communication.

In addition, about 23% of the studies applied mixed methods and another 23% of the studies adopted quantitative approaches. Four studies are literature reviews and the rest of the studies report no data at all, thus adding little new evidence in terms of research results.

Among the papers that report quantitative or mixed method data, most focus on the impact of different types of technology. For example, in Fox (2017) the authors evaluate the impact of VoiceThread by analysing student opinions. Similarly, in Fowler et al. (2018) the authors report data from a focus group, a pre-post-test questionnaire and a survey, and their object of investigation is the effectiveness of a newly developed platform. Jones et al. (2016) report interesting data about the use of Twitter, Liaw et al. (2020) and Zook et al. (2018) are based on data concerning Case Studies in simulation environments. Chan et al. (2016) compare case-based web learning in the context of F2F and web interactions. Lastly, Vogt and Schaffner (2016) compare the impact of different technologies used for an online Case Study. Needless to say, many of the recent studies were carried out in response to the pandemic and investigated the impact of some form of distance learning on nurse education.

Besides the above studies concerning impact of different technologies, a number of studies investigate evaluation of other aspects: for example, Shaw et al. (2016) evaluate teamwork, Avelino et al. (2017) measure the impact of a Case Study in terms of students' opinions, and Trobec and Starcic (2015) use a pre and post-test research design to measure students' performance in a collaborative activity. Lastly, Smith and Jones (2016) measure the impact of a family assessment activity based on movies.

Unfortunately, many of the studies provide insufficient information to determine the relevance of the contribution: for example, de Castro et al. (2019) do not mention the sample size, while in Packard et al. (2019), only 1 student out of 9 was online, thus limiting the possibility to derive evidence on the impact of online collaborative learning.

5. Discussion

The results of this systematic literature review confirm the limited number of studies at the intersection between CSCL and nurse education, especially as far as European countries are concerned, and show that existing studies tend to concentrate on consolidated approaches (e.g. peer reviews, open ended discussion, case study) while taking little advantage of the potential of collaboration for learning. This is in line with Smith and Jones (2016), who claim the available nursing education literature regarding online collaborative strategies is limited and with those authors (Breen, 2013; 2015; Smith and Jones, 2016; Vogt and Schaffner, 2016; Zhang and Cui, 2018) who highlight the need to conduct further research in the field. We believe further investigation in this area and more extensive adoption of a variety of approaches (starting from those that are consolidated in other areas) would benefit the nurse education field and – as a consequence – would help the current transition towards the new European healthcare systems that is taking place in many countries.

However, since 2021 there has been a surge of interest in this topic, which is likely due to the Covid-19 pandemic and the consequent necessity to move several nursing courses online. Such interest has triggered more creative approaches and it will be interesting to monitor long-term effects on the field.

Generally speaking, it seems the potential of online learning is underutilized for collaborative learning: even in blended interventions (before the pandemic), the collaborative component was often carried out during f2f sessions. Online environments were instead used mainly as repositories, tools for delivering transmissive lectures (e.g., webinars), or for running individual activities, simulations included (Hickman et al., 2018; Hogan et al., 2018; Pierce and Reuille, 2018; Shorey et al., 2018; Trollor et al., 2018). Then, during the pandemic, synchronous communication tools mainly replaced f2f communication, thus becoming pervasive, but in most cases, the activities proposed took the form of open-ended debates, rather than true collaborative activities. The very fact that synchronous tools were largely preferred to asynchronous ones, reveal a lack of trust in the latter, in spite of the evidence in favour.

Additionally, the proposed online collaborative activities appear relatively unstructured, with little scaffolding. In most cases, simple debates are proposed, with no clear objective or common artefact to be produced, as for

example during the pre- and de-briefing sessions in simulations. This is in contrast with most of the literature related to online collaborative learning (Hewitt and Scardamalia, 1998; Stahl, 2002; Stahl et al., 2014), which suggests that having a common goal or artefact to produce serves as a catalyst for negotiation and meaning-making.

Some of the studies adopt problem-based learning and peer-review approaches. Both the approaches fit particularly well with the needs of the educational context, but the design of these activities could be improved by: a) enriching the Case Studies with the collaborative production of common artefacts, for example in preparation or as a follow up of virtual simulations; b) empowering the Peer Reviews by allowing direct interactions between assessors and assesses and envisaging a revision of the original artefact by the assesses, so as to take the most from the exchanges.

In terms of team structure, in the retrieved studies interactions seem poorly scaffolded: individual work is usually proposed as the starting point for small-group work, with groups tending to remain stable throughout the online activities proposed. Alternatively, individual work is preceded or followed by plenaries. This suggests a poor use of the features offered by online platforms, which could support more dynamic team structures and interactions. As a matter of fact, only one of the retrieved papers (Breen and Jones, 2015) explicitly describes the rationale behind adopting small groups (instead of other social structures) and informing the choice of role-playing as a way to support interactions.

In terms of technologies, forums and synchronous communication environments are the most frequently used, in line with general CSCL literature (Jeong and Hmelo-Silver, 2010).

Surprisingly, the potentialities offered by online simulation environments seem to be underutilized; in most cases, virtual simulations are proposed as opportunities for individual tasks and with only the results (possibly) discussed in groups. Our suggestion would be to try to fully harness the potential of collaborative virtual simulations, rather than limiting interaction to the pre- and de-briefing phase.

As far as evaluation is concerned, most of the retrieved studies are weak in terms of data analysis: some provide no data at all, while others provide insufficient information to measure the impact of the proposed interventions. This is in line with Hudson et al. (2021), who claim the reporting of many healthcare educational interventions is suboptimal and point out that the Criteria for Describing and Evaluating Training Interventions in Healthcare Professions (CRe-DEPTH) tool (Van Hecke, Duprez, Pype, Beeckman, & Verhaeghe, 2020) should be used more extensively for planning and reporting nurse education interventions.

Considering this review's findings regarding the design of online collaborative learning activities in the specific field of reference, our suggestion is that there should be greater alignment with the main design principles suggested by the CSCL research community and wider use of the collaborative techniques they elaborated. This would call for stronger links between the CSCL research community and the community working in nursing education. In other terms, we suggest that, when designing online collaborative activities, nurses' teachers should draw on established techniques, such as Jigsaw (Aronson, 2021), pyramid and structured discussion (Persico & Pozzi, 2011) and make sure that the development of a joint artefact triggers actual negotiation and collaboration. Alternatively, interdisciplinary projects might lead to greater cross-pollination between the two fields and more robust educational designs.

From the point of view of evaluation, we recommend that, in the design of CSCL activities, sound and transparent evaluation methods (be they qualitative, quantitative or mixed) should be adopted so as to assess relevance and guarantee replicability of the studies.

6. Conclusions

In this paper we presented the results of a systematic literature review conducted to investigate the use of online collaborative learning approaches in nursing education.

One limitation of this study is that it concentrated exclusively on nurses, while it would be interesting to expand the scope to include other healthcare professionals as well. Additionally, the review did not account for publication bias. On the one hand, we could expect that many nurse trainers propose collaborative activities to their students but do not care for publishing them, as pedagogical research is not their core interest. On the other hand, for the interventions that do get published, we could expect that the quality of data collection and evaluation is higher than average.

Moreover, it would be interesting to see if, after the relaxation of social distancing measures taken due to the COVID-19 pandemic, the level of interest in online collaborative learning will return to pre-pandemic levels.

Lastly, since this review focused on the characteristics of the studies on online collaborative nurse education, it required a qualitative approach. Further research could assess the effectiveness of online collaboration for nurse training by carrying out a meta-analysis.

References

Adefila, A., Opie, J., Ball, S. and Bluteau, P., 2020. Students' engagement and learning experiences using virtual patient simulation in a computer supported collaborative learning environment. *Innovations in Education and Teaching International*, 57(1). https://doi.org/10.1080/14703297.2018.1541188.

Anderson, T., 2008. *The Theory and Practice of Online Learning*. *Language Learning Technology*. Athabasca, CA: Athabasca University Press.

Aronson, E., 2021. The Jigsaw Classroom. In: *Pioneering Perspectives in Cooperative Learning*. [online] Routledge.pp.146–164. https://doi.org/10.4324/9781003106760-7

Avelino, C.C.V., Costa, L.C.S. da, Buchhorn, S.M.M., Nogueira, D.A. and Goyatá, S.L.T., 2017. Teaching-learning evaluation on the ICNP® using virtual learning environment. *Revista Brasileira de Enfermagem*, [online] 70(3), pp.602–609. https://doi.org/10.1590/0034-7167-2016-0545.

Baron, K., Rocha, A. and Anderson, P., 2019. Ann's Story: An authentic learning experience for online nursing students. *Creative Nursing*, [online] 25(2), pp.144–147. https://doi.org/10.1891/1078-4535.25.2.144.

Bell, P., 2013. Promoting students' argument construction and collaborative debate in the science classroom. In: M.C. Linn, E.A. Davis and P. Bell, eds. *Internet Environments for Science Education*. [online] Abingdon-on-Thames, UK: Routledge.pp.115–143. https://doi.org/10.4324/9781410610393.

Biasutti, M., 2017. A comparative analysis of forums and wikis as tools for online collaborative learning. *Computers & Education*, [online] 111, pp.158–171. https://doi.org/10.1016/j.compedu.2017.04.006.

Boyd, M.R., Baliko, B. and Polyakova-Norwood, V., 2015. Using debates to teach evidence-based practice in large online courses. *Journal of Nursing Education*, [online] 54(10), pp.578–582. https://doi.org/10.3928/01484834-20150916-06.

Breen, H., 2013. Virtual collaboration in the online educational setting: A concept analysis. *Nursing Forum*, [online] 48(4), pp.262–270. https://doi.org/10.1111/nuf.12034.

Breen, H., 2015. Assessing online collaborative discourse. *Nursing Forum*, [online] 50(4), pp.218–227. https://doi.org/10.1111/nuf.12091.

Breen, H. and Jones, M., 2015. Experiential learning: Using virtual simulation in an online RN-to-BSN program. *The Journal of Continuing Education in Nursing*, [online] 46(1), pp.27–33. https://doi.org/10.3928/00220124-20141120-02.

Cameron-Standerford, A., Menard, K., Edge, C., Bergh, B., Shayter, A., Smith, K. and VandenAvond, L., 2020. The phenomenon of moving to online/distance delivery as a result of COVID-19: Exploring initial perceptions of Higher Education faculty at a rural Midwestern University. *Frontiers in Education*, [online] 5. https://doi.org/10.3389/feduc.2020.583881.

de Castro, A.B., Dyba, N., Cortez, E.D. and Pe Benito, G.G., 2019. Collaborative online international learning to prepare students for multicultural work environments. *Nurse Educator*, [online] 44(4), pp.E1–E5. https://doi.org/10.1097/NNE.0000000000000609.

Chan, A.W.-K., Chair, S.-Y., Sit, J.W.-H., Wong, E.M.-L., Lee, D.T.-F. and Fung, O.W.-M., 2016. Case-based web learning versus face-to-face learning. *Journal of Nursing Research*, [online] 24(1), pp.31–40. https://doi.org/10.1097/jnr.0000000000000104.

Chavez, J. and Romero, M., 2012. Group awareness, learning, and participation in computer supported collaborative learning (CSCL). *Procedia - Social and Behavioral Sciences*, [online] 46, pp.3068–3073. https://doi.org/10.1016/j.sbspro.2012.06.012.

Chua, W.L., Ooi, S.L., Chan, G.W.H., Lau, T.C. and Liaw, S.Y., 2022. The effect of a sepsis interprofessional education using virtual patient telesimulation on sepsis team care in clinical cractice: Mixed methods study. *Journal of Medical Internet Research*, [online] 24(4), p.e35058. https://doi.org/10.2196/35058.

Cognition and Technology Group at Vanderbilt, 2013. Some thoughts about constructivism and instructional design. In: T.M. Duffy and D.H. Jonassen, eds. *Constructivism and the Technology of Instruction: A Conversation*. [online] Abingdon-on-Thames, UK: Routledge.pp.115–119. https://doi.org/10.4324/9780203461976.

Cowperthwait, A., Graber, J., Carlsen, A., Cowperthwait, M. and Mekulski, H., 2021. Innovations in virtual education for clinical and simulation learning. *Journal of Professional Nursing*, [online] 37(5), pp.1011–1017. https://doi.org/10.1016/j.profnurs.2021.06.010.

Demetriadis, S., Dimitriadis, Y., Fischer, F., Calvo, R., Dillenbourg, P., Grigoriadou, M., Harrer, A., Retalis, S., Tchounikine, P., Tsiatsos, T. and Weinberger, A., 2009. Scripted vs. free CS collaboration: Alternatives and paths for adaptable and flexible CS scripted collaboration. In: *Computer Supported Collaborative Learning Practices, CSCL 2009 Community Events Proceedings - 9th International Conference*.

Dillenbourg, P., 2002. Over-scripting CSCL : The risks of blending collaborative learning with instructional design. In: P.A. Kirschner, ed. *Three worlds of CSCL. Can we support CSCL?* Heerlen, NL: Open Universiteit Nederland.pp.61–91.

Dolan, H., Amidon, B.J. and Gephart, S.M., 2021. Evidentiary and theoretical foundations for virtual simulation in nursing education. *Journal of Professional Nursing*, [online] 37(5), pp.810–815. https://doi.org/10.1016/j.profnurs.2021.06.001.

Dreifuerst, K.T., Bradley, C.S. and Johnson, B.K., 2021. Using debriefing for meaningful learning with screen-based simulation. *Nurse Educator*, [online] 46(4), pp.239–244. https://doi.org/10.1097/NNE.0000000000000930.

Dugan, M., 2016. Improving physical assessment observational skills in the community setting: An experiential exercise. *Creative Nursing*, [online] 22(1), pp.24–28. https://doi.org/10.1891/1078-4535.22.1.24.

Ferguson, C., DiGiacomo, M., Gholizadeh, L., Ferguson, L.E. and Hickman, L.D., 2017. The integration and evaluation of a social-media facilitated journal club to enhance the student learning experience of evidence-based practice: A case study. *Nurse Education Today*, [online] 48, pp.123–128. https://doi.org/10.1016/j.nedt.2016.10.002.

Flo, J., Byermoen, K.R., Egilsdottir, H.Ö., Eide, H. and Heyn, L.G., 2021. Nursing students' experiences of virtual simulation when using a video conferencing system – a mixed methods study. *International Journal of Nursing Education Scholarship*, [online] 18(1). https://doi.org/10.1515/ijnes-2021-0056.

Fowler, T., Phillips, S., Patel, S., Ruggiero, K., Ragucci, K., Kern, D. and Stuart, G., 2018. Virtual interprofessional learning. *Journal of Nursing Education*, [online] 57(11), pp.668–674. https://doi.org/10.3928/01484834-20181022-07.

Fox, O.H., 2017. Using VoiceThread to promote collaborative learning in on-line clinical nurse leader courses. *Journal of Professional Nursing*, [online] 33(1), pp.20–26. https://doi.org/10.1016/j.profnurs.2016.08.009.

Fung, J.T.C., Zhang, W., Yeung, M.N., Pang, M.T.H., Lam, V.S.F., Chan, B.K.Y. and Wong, J.Y., 2021. Evaluation of students' perceived clinical competence and learning needs following an online virtual simulation education programme with debriefing during the COVID-19 pandemic. *Nursing Open*, [online] 8(6), pp.3045–3054. https://doi.org/10.1002/nop2.1017.

Garrison, D.R., Anderson, T. and Archer, W., 1999. Critical inquiry in a text-based environment: Computer conferencing in Higher Education. *The Internet and Higher Education*, [online] 2(2–3), pp.87–105. https://doi.org/10.1016/S1096-7516(00)00016-6.

Garrison, D.R. and Cleveland-Innes, M., 2005. Facilitating cognitive presence in online learning: Interaction is not enough. *American Journal of Distance Education*, [online] 19(3), pp.133–148. https://doi.org/10.1207/s15389286ajde1903_2.

Gawlik, K.S., Jeu, G. and Reisinger, V., 2018. The I Will Help You mental health initiative: A pedagogy for nursing leadership and a call to action for nurses. *Journal of Professional Nursing*, [online] 34(5), pp.364–368. https://doi.org/10.1016/j.profnurs.2017.12.010.

Geng, Y., Huang, P.-S. and Huang, Y.-M., 2021. Crowdsourcing in nursing education: A possibility of creating a personalized online learning environment for student nurses in the post-COVID era. *Sustainability*, [online] 13(6), p.3413. https://doi.org/10.3390/su13063413.

George, T.P. and DeCristofaro, C., 2018. Use of service-learning to teach health literacy with online graduate nursing students. *Nursing Education Perspectives*, [online] 39(3), pp.187–189. https://doi.org/10.1097/01.NEP.0000000000000231.

Goldfield, N., 2017. Dramatic changes in health care professions in the past 40 years. *Journal of Ambulatory Care Management*, [online] 40(3), pp.169–175. https://doi.org/10.1097/JAC.0000000000000201.

Gordon, R.M., 2017. Debriefing virtual simulation using an online conferencing platform: Lessons learned. *Clinical Simulation in Nursing*, [online] 13(12), pp.668–674. https://doi.org/10.1016/j.ecns.2017.08.003.

Hardy, S., Mushore, M. and Goddard, L., 2016. Supporting student mental health nurses in clinical placement through virtual in-practice support (VIPS): Innovation uptake and the 'VIPS' project. *Nurse Education Today*, [online] 46, pp.133–138. https://doi.org/10.1016/j.nedt.2016.08.033.

Hargreaves, L., Zickgraf, P., Paniagua, N., Evans, T.L. and Radesi, L., 2021. COVID-19 pandemic impact on nursing student education: Telenursing with virtual clinical experiences. *SAGE Open Nursing*, [online] 7, p.237796082110446. https://doi.org/10.1177/23779608211044618.

Heimbuch, S., Ollesch, L. and Bodemer, D., 2018. Comparing effects of two collaboration scripts on learning activities for wiki-based environments. *International Journal of Computer-Supported Collaborative Learning*, [online] 13(3), pp.331–357. https://doi.org/10.1007/s11412-018-9283-0.

Hernández-Leo, D., Asensio-Pérez, J.I. and Dimitriadis, Y., 2005. Computational representation of collaborative learning flow patterns using IMS learning design. In: *Educational Technology and Society*. pp.75–89.

Hewitt, J., 2005. Toward an understanding of how threads die in asynchronous computer conferences. *Journal of the Learning Sciences*, [online] 14(4), pp.567–589. https://doi.org/10.1207/s15327809jls1404_4.

Hewitt, J. and Scardamalia, M., 1998. Design principles for distributed knowledge building processes. *Educational Psychology Review*, 10(1), pp.75–96. https://doi.org/10.1023/A:1022810231840.

Hickman, L.D., DiGiacomo, M., Phillips, J., Rao, A., Newton, P.J., Jackson, D. and Ferguson, C., 2018. Improving evidence based practice in postgraduate nursing programs: A systematic review. *Nurse Education Today*, [online] 63, pp.69–75. https://doi.org/10.1016/j.nedt.2018.01.015.

Hogan, R., Orr, F., Fox, D., Cummins, A. and Foureur, M., 2018. Developing nursing and midwifery students' capacity for coping with bullying and aggression in clinical settings: Students' evaluation of a learning resource. *Nurse Education in Practice*, [online] 29, pp.89–94. https://doi.org/10.1016/j.nepr.2017.12.002.

Van Hoover, C., 2015. Innovation in health policy education: Project-based service learning at a distance for graduate midwifery students. *Journal of Midwifery & Women's Health*, [online] 60(5), pp.554–560. https://doi.org/10.1111/jmwh.12264.

Horowitz, M.L., Stone, D.S., Sibrian, J., DuPee, C. and Dang, C., 2022. An innovative approach for graduate nursing student achievement of leadership, quality, and safety competencies. *Journal of Professional Nursing*, [online] 43, pp.134–139. https://doi.org/10.1016/j.profnurs.2022.10.004.

House, S.K., Nielsen, K. and Dowell, S., 2022. International collaboration using Collaborative Online International Learning (COIL)/Globally Networked Learning (GNL) model. *Teaching and Learning in Nursing*, [online] 17(4), pp.421–424. https://doi.org/10.1016/j.teln.2022.06.010.

Huber, D.L., Joseph, M.L., Halbmaier, K.A., Carlson, M., Crill, S., Krieger, K., Matthys, N. and Mundisev, A., 2016. Leadership for transitions of care: An active learning innovation. *The Journal of Continuing Education in Nursing*, [online] 47(2), pp.82–88. https://doi.org/10.3928/00220124-20160120-09.

Hudson, E., Clavel, N., Kilpatrick, K. and Lavoie-Tremblay, M., 2021. Effective online learning strategies for leadership and policy undergraduate courses for nursing students: a rapid review. *Journal of Professional Nursing*, [online] 37(6), pp.1079–1085. https://doi.org/10.1016/j.profnurs.2021.08.012.

Jeong, H. and Hmelo-Silver, C.E., 2010. Technology use in CSCL: A content meta-analysis. In: *2010 43rd Hawaii International Conference on System Sciences*. [online] IEEE.pp.1–10. https://doi.org/10.1109/HICSS.2010.364.

Jeong, H., Hmelo-Silver, C.E. and Jo, K., 2019. Ten years of Computer-Supported Collaborative Learning: A meta-analysis of CSCL in STEM education during 2005–2014. *Educational Research Review*, [online] 28, p.100284. https://doi.org/10.1016/j.edurev.2019.100284.

Jones, R., Kelsey, J., Nelmes, P., Chinn, N., Chinn, T. and Proctor-Childs, T., 2016. Introducing Twitter as an assessed component of the undergraduate nursing curriculum: case study. *Journal of Advanced Nursing*, [online] 72(7), pp.1638–1653. https://doi.org/10.1111/jan.12935.

Jung, D., De Gagne, J.C., Choi, E. and Lee, K., 2022. An online international collaborative learning program during the COVID-19 pandemic for nursing students: Mixed methods study. *JMIR Medical Education*, [online] 8(1), p.e34171. https://doi.org/10.2196/34171.

Jurgens, E., 2004. *Priority Programmes: Synergy or antagonism?* [online] Available at: <www.share-net.nl/assets/images/Final_report_Priority_Programmes_6_dec_2004__15_jan_05_.doc>.

Kang, H.Y. and Kim, H.R., 2021. Impact of blended learning on learning outcomes in the public healthcare education course: A review of flipped classroom with team-based learning. *BMC Medical Education*, [online] 21(1), p.78. https://doi.org/10.1186/s12909-021-02508-y.

Kanuka, H. and Anderson, T., 1999. Using constructivism in technology-mediated learning: Constructing order …. *Radical Pedagogy*, 1(2).

Kekki, P., 2004. *Primary health care and the Millennium Development Goals: Issues for discussion*. [online] WHO. Available at: <http://www.worldfamilyorganization.org/wfs/Summit/wfs2006/BackgroundPapers/PHC_and_MDGs.pdf>.

Koles, P.G., Stolfi, A., Borges, N.J., Nelson, S. and Parmelee, D.X., 2010. The impact of team-based learning on medical students' academic performance. *Academic Medicine*, [online] 85(11), pp.1739–1745. https://doi.org/10.1097/ACM.0b013e3181f52bed.

Kubin, L., Fogg, N. and Trinka, M., 2021. Transitioning child health clinical content from direct care to online instruction. *Journal of Nursing Education*, [online] 60(3), pp.177–179. https://doi.org/10.3928/01484834-20210222-11.

Kuszajewski, M.L., Vaughn, J., Bowers, M.T., Smallheer, B., Hueckel, R.M. and Molloy, M.A., 2021. Embracing disruption: Measuring effectiveness of virtual simulations in advanced practice nurse curriculum. *Clinical Simulation in Nursing*, [online] 57, pp.41–47. https://doi.org/10.1016/j.ecns.2021.04.017.

Leung, Y.W., Wong, J., Kiteley, C., Ellis, J. and Esplen, M.J., 2019. Addressing educational needs in managing complex pain in cancer populations: Evaluation of APAM: An online educational intervention for nurses. *American Journal of Hospice and Palliative Medicine®*, [online] 36(7), pp.587–597. https://doi.org/10.1177/1049909119832819.

Liaw, S.Y., Ooi, S.W., Rusli, K.D. Bin, Lau, T.C., Tam, W.W.S. and Chua, W.L., 2020. Nurse-physician communication team training in virtual reality versus live simulations: Randomized controlled trial on team communication and teamwork attitudes. *Journal of Medical Internet Research*, [online] 22(4), p.e17279. https://doi.org/10.2196/17279.

Limoges, J., Nielsen, K., MacMaster, L. and Kontni, R., 2019. Globally networked learning: Deepening Canadian and Danish nursing students' understanding of nursing, culture and health. *Nurse Education Today*, [online] 76, pp.228–233. https://doi.org/10.1016/j.nedt.2019.02.006.

Lin, H.-C., Hwang, G.-J., Chang, S.-C. and Hsu, Y.-D., 2021. Facilitating critical thinking in decision making-based professional training: An online interactive peer-review approach in a flipped learning context. *Computers & Education*, [online] 173, p.104266. https://doi.org/10.1016/j.compedu.2021.104266.

Liu, C.-C. and Tsai, C.-C., 2008. An analysis of peer interaction patterns as discoursed by on-line small group problem-solving activity. *Computers & Education*, [online] 50(3), pp.627–639. https://doi.org/10.1016/j.compedu.2006.07.002.

Mackavey, C. and Cron, S., 2019. Innovative strategies: Increased engagement and synthesis in online advanced practice nursing education. *Nurse Education Today*, [online] 76, pp.85–88. https://doi.org/10.1016/j.nedt.2019.01.010.

Männistö, M., Mikkonen, K., Kuivila, H., Virtanen, M., Kyngäs, H. and Kääriäinen, M., 2020. Digital collaborative learning in nursing education: A systematic review. *Scandinavian Journal of Caring Sciences*, [online] 34(2), pp.280–292. https://doi.org/10.1111/scs.12743.

Martínez, A., Dimitriadis, Y., Gómez-Sánchez, E., Rubia-Avi, B., Jorrín-Abellán, I. and Marcos, J.A., 2006. Studying participation networks in collaboration using mixed methods. *International Journal of Computer-Supported Collaborative Learning*, [online] 1(3), pp.383–408. https://doi.org/10.1007/s11412-006-8705-6.

McDaniel, J. and Tornwall, J., 2016. Authentic engagement in high-enrollment graduate courses. *Nurse Educator*, [online] 41(3), pp.151–155. https://doi.org/10.1097/NNE.0000000000000223.

McGarry, B.J., Theobald, K., Lewis, P.A. and Coyer, F., 2015. Flexible learning design in curriculum delivery promotes student engagement and develops metacognitive learners: An integrated review. *Nurse Education Today*, [online] 35(9), pp.966–973. https://doi.org/10.1016/j.nedt.2015.06.009.

Morales, K.A., 2017. Active learning strategies to enhance nursing students' knowledge of pharmacology. *Nursing Education Perspectives*, [online] 38(2), pp.100–102. https://doi.org/10.1097/01.NEP.0000000000000085.

New, K., Edwards, C. and Norris, H., 2022. Meeting our students' educational needs during a global pandemic: Creating online clinical learning experiences. *Teaching and Learning in Nursing*, [online] 17(1), pp.126–129. https://doi.org/10.1016/j.teln.2021.07.006.

O'Connor, S., Jolliffe, S., Stanmore, E., Renwick, L. and Booth, R., 2018. Social media in nursing and midwifery education: A mixed study systematic review. *Journal of Advanced Nursing*, [online] 74(10), pp.2273–2289. https://doi.org/10.1111/jan.13799.

Packard, K., Iverson, L., Ryan-Haddad, A., Teply, R., Wize, A. and Qi, Y., 2019. A synchronous interprofessional patient safety simulation integrating distance health professions students. *Journal of Nursing Education*, [online] 58(10), pp.577–582. https://doi.org/10.3928/01484834-20190923-04.

Palancia Esposito, C. and Sullivan, K., 2020. Maintaining clinical continuity through virtual simulation during the COVID-19 pandemic. *Journal of Nursing Education*, [online] 59(9), pp.522–525. https://doi.org/10.3928/01484834-20200817-09.

Palloff, R.M. and Pratt, K., 2001. Learning lessons from the cyberspace classroom. In: *17th Annual Conference on Distance Teaching and Learning*. pp.1–5.

Panepucci, S., Roe, E., Galbraith, A. and Thornton, T., 2022. Learning with laughter: Implementing engaging virtual simulation during the COVID-19 pandemic. *Clinical Simulation in Nursing*, [online] 62, pp.92–98. https://doi.org/10.1016/j.ecns.2021.08.022.

Pascon, D.M., Vaz, D.R., Peres, H.H.C. and Leonello, V.M., 2022. Project-based learning in remote teaching for undergraduate nursing students. *Revista da Escola de Enfermagem da USP*, [online] 56. https://doi.org/10.1590/1980-220x-reeusp-2022-0058en.

Persico, D. and Pozzi, F., 2011. Task, Team and Time to structure online collaboration in learning environments. *World Journal on Educational Technology*, 3(1), pp.1–15.

Persico, D., Pozzi, F. and Sarti, L., 2010. Monitoring collaborative activities in computer supported collaborative learning. *Distance Education*, [online] 31(1), pp.5–22. https://doi.org/10.1080/01587911003724603.

Pierce, L.L. and Reuille, K.M., 2018. Instructor-created activities to engage undergraduate nursing research students. *Journal of Nursing Education*, [online] 57(3), pp.174–177. https://doi.org/10.3928/01484834-20180221-10.

Pozzi, F., Ceregini, A. and Persico, D., 2016. Designing networked learning with 4 Ts. In: S. Crammer, N.B. Dohn, M. de Laat, T. Ryberg and J.A. Sime, eds. *Proceedings of the 10th International Conference on Networked Learning 2016*. [online] pp.210–217. Available at: <http://www.networkedlearningconference.org.uk/abstracts/pdf/P15.pdf>.

Price, A.M., Devis, K., LeMoine, G., Crouch, S., South, N. and Hossain, R., 2018. First year nursing students use of social media within education: Results of a survey. *Nurse Education Today*, [online] 61, pp.70–76. https://doi.org/10.1016/j.nedt.2017.10.013.

Pullis, B.C. and Hekel, B.E., 2021. Adapting a community health nursing course to an online format. *Public Health Nursing*, [online] 38(3), pp.439–444. https://doi.org/10.1111/phn.12868.

Radkowitsch, A., Vogel, F. and Fischer, F., 2020. Good for learning, bad for motivation? A meta-analysis on the effects of computer-supported collaboration scripts. *International Journal of Computer-Supported Collaborative Learning*, [online] 15(1), pp.5–47. https://doi.org/10.1007/s11412-020-09316-4.

Reis, P.J., Faser, K. and Davis, M., 2015. A framework for web-based interprofessional education for midwifery and medical students. *Journal of Midwifery & Women's Health*, [online] 60(6), pp.713–717. https://doi.org/10.1111/jmwh.12331.

Rodríguez-Triana, M.J., Martínez-Monés, A., Asensio-Pérez, J.I. and Dimitriadis, Y., 2015. Scripting and monitoring meet each other: Aligning learning analytics and learning design to support teachers in orchestrating CSCL situations. *British Journal of Educational Technology*, [online] 46(2), pp.330–343. https://doi.org/10.1111/bjet.12198.

Ropero-Padilla, C., Rodriguez-Arrastia, M., Martinez-Ortigosa, A., Salas-Medina, P., Folch Ayora, A. and Roman, P., 2021. A gameful blended-learning experience in nursing: A qualitative focus group study. *Nurse Education Today*, [online] 106, p.105109. https://doi.org/10.1016/j.nedt.2021.105109.

Rose, K.A., Jenkins, S.D., Astroth, K.S., Woith, W. and Jarvill, M., 2020. Testing a web-based intervention to improve awareness of civility and incivility in baccalaureate nursing students. *Clinical Simulation in Nursing*, [online] 48, pp.46–54. https://doi.org/10.1016/j.ecns.2020.08.011.

Ross, J.G. and Myers, S.M., 2017. The current use of social media in undergraduate nursing: A review of the literature. *CIN: Computers, Informatics, Nursing*, [online] 35(7), pp.338–344. https://doi.org/10.1097/01.NCN.0000521790.62181.72.

Saqr, M., Viberg, O. and Vartiainen, H., 2020. Capturing the participation and social dimensions of computer-supported collaborative learning through social network analysis: which method and measures matter? *International Journal of Computer-Supported Collaborative Learning*, [online] 15(2), pp.227–248. https://doi.org/10.1007/s11412-020-09322-6.

Sasso, L., Bagnasco, A.M., Aleo, G., Zanini, M., Pozzi, F., Rodrigues, C., Alvino, S., Musian, D., Roba, I., Turunen, H., Popa, A., Vicente, M., Papathanasiou, I., Fradelos, E.C., Kastanidou, S., Kleisiaris, C., Evangelidou, E.S., Daglas, A. and

Stavropoulos, K., 2018. *ENhANCE project– D2.2 - Report on the definition of a Professional Profile for the Family and Community Nurse (FCN)*. [online] Available at: <https://www.enhance-fcn.eu/download/2602/>.

Savci, C., Cil Akinci, A. and Keles, F., 2022. The association of perceived sociability and social intelligence with loneliness in online learning among nursing students. *Nurse Education Today*, [online] 109, p.105226. https://doi.org/10.1016/j.nedt.2021.105226.

Scardamalia, M. and Bereiter, C., 1994. Computer support for knowledge-building communities. *Journal of the Learning Sciences*, [online] 3(3), pp.265–283. https://doi.org/10.1207/s15327809jls0303_3.

Schaffer, S.D. and Munyer, T.O., 2015. Online learning: Integrating interprofessional and patient safety competencies into Doctor of Nursing Practice and Doctor of Pharmacy Curricula. *The Journal for Nurse Practitioners*, [online] 11(2), pp.e11–e15. https://doi.org/10.1016/j.nurpra.2014.11.007.

Shaw, R.J., Sperber, M.A. and Cunningham, T., 2016. Online social media as a curation tool for teaching. *Nurse Educator*, [online] 41(1), pp.41–45. https://doi.org/10.1097/NNE.0000000000000178.

Shorey, S., Kowitlawakul, Y., Devi, M.K., Chen, H.-C., Soong, S.K.A. and Ang, E., 2018. Blended learning pedagogy designed for communication module among undergraduate nursing students: A quasi-experimental study. *Nurse Education Today*, [online] 61, pp.120–126. https://doi.org/10.1016/j.nedt.2017.11.011.

Smith, P.S. and Jones, M., 2016. Evaluating an online family assessment activity: A focus on diversity and health promotion. *Nursing Forum*, [online] 51(3), pp.204–210. https://doi.org/10.1111/nuf.12139.

Stahl, G., 2002. Contributions to a theoretical framework for CSCL. In: *Proceedings of the Conference on Computer Support for Collaborative Learning Foundations for a CSCL Community - CSCL '02*. [online] Morristown, NJ, USA: Association for Computational Linguistics.p.62. https://doi.org/10.3115/1658616.1658626.

Stahl, G., Koschmann, T. and Suthers, D., 2021. Computer-Supported Collaborative Learning. In: R.K. Sawyer, ed. *The Cambridge Handbook of the Learning Sciences*. [online] Cambridge, UK: Cambridge University Press.pp.479–500. https://doi.org/10.1017/CBO9781139519526.029.

Stahl, G., Ludvigsen, S., Law, N. and Cress, U., 2014. CSCL artifacts. *International Journal of Computer-Supported Collaborative Learning*, [online] 9(3), pp.237–245. https://doi.org/10.1007/s11412-014-9200-0.

Stanley, M.J., Serratos, J., Matthew, W., Fernandez, D. and Dang, M., 2018. Integrating video simulation scenarios into online nursing instruction. *Journal of Nursing Education*, [online] 57(4), pp.245–249. https://doi.org/10.3928/01484834-20180322-11.

Stevenson, S.M. and Svoboda, J.D., 2021. Transforming simulation into a virtual learning experience for undergraduate obstetrical nursing students. *Journal of Nursing Education*, [online] 60(7), pp.424–424. https://doi.org/10.3928/01484834-20210616-14.

Swan, K., 2002. Building learning communities in online courses: The importance of interaction. *Education, Communication & Information*, [online] 2(1), pp.23–49. https://doi.org/10.1080/1463631022000005016.

Thrane, S.E., 2020. Online palliative and end-of-life care education for undergraduate nurses. *Journal of Professional Nursing*, [online] 36(1), pp.42–46. https://doi.org/10.1016/j.profnurs.2019.07.002.

Tracy, S. and McPherson, S., 2020. Navigating COVID-19 through an unfolding case study for undergraduate nursing students. *Journal of Nursing Education*, [online] 59(8), pp.475–476. https://doi.org/10.3928/01484834-20200723-11.

Trobec, I. and Starcic, A.I., 2015. Developing nursing ethical competences online versus in the traditional classroom. *Nursing Ethics*, [online] 22(3), pp.352–366. https://doi.org/10.1177/0969733014533241.

Trollor, J.N., Eagleson, C., Turner, B., Salomon, C., Cashin, A., Iacono, T., Goddard, L. and Lennox, N., 2018. Intellectual disability content within pre-registration nursing curriculum: How is it taught? *Nurse Education Today*, [online] 69, pp.48–52. https://doi.org/10.1016/j.nedt.2018.07.002.

Vogel, F., Wecker, C., Kollar, I. and Fischer, F., 2017. Socio-cognitive scaffolding with Computer-Supported Collaboration Scripts: A meta-analysis. *Educational Psychology Review*, [online] 29(3), pp.477–511. https://doi.org/10.1007/s10648-016-9361-7.

Vogt, M.A. and Schaffner, B.H., 2016. Evaluating interactive technology for an evolving case study on learning and satisfaction of graduate nursing students. *Nurse Education in Practice*, [online] 19, pp.79–83. https://doi.org/10.1016/j.nepr.2016.05.006.

Watson, B., Cooke, M. and Walker, R., 2016. Using Facebook to enhance commencing student confidence in clinical skill development: A phenomenological hermeneutic study. *Nurse Education Today*, [online] 36, pp.64–69. https://doi.org/10.1016/j.nedt.2015.07.019.

Weinberger, A., Reiserer, M., Ertl, B., Fischer, F. and Mandl, H., 2005. Facilitating Collaborative Knowledge Construction in Computer-Mediated Learning Environments with Cooperation Scripts. In: *Barriers and Biases in Computer-Mediated Knowledge Communication*. [online] New York: Springer-Verlag.pp.15–37. https://doi.org/10.1007/0-387-24319-4_2.

Wenger, E., 1998. Communities of practice: Learning, meaning, and identity. *Systems thinker*, 9. https://doi.org/10.2277/0521663636.

De Wever, B., Schellens, T., Valcke, M. and Van Keer, H., 2006. Content analysis schemes to analyze transcripts of online asynchronous discussion groups: A review. *Computers & Education*, [online] 46(1), pp.6–28. https://doi.org/10.1016/j.compedu.2005.04.005.

Wihlborg, M., Friberg, E.E., Rose, K.M. and Eastham, L., 2018. Facilitating learning through an international virtual collaborative practice: A case study. *Nurse Education Today*, [online] 61, pp.3–8. https://doi.org/10.1016/j.nedt.2017.10.007.

Wikander, L. and Bouchoucha, S.L., 2018. Facilitating peer based learning through summative assessment – An adaptation of the Objective Structured Clinical Assessment tool for the blended learning environment. *Nurse Education in Practice*, [online] 28, pp.40–45. https://doi.org/10.1016/j.nepr.2017.09.011.

Williams, D., Stephen, L.-A. and Causton, P., 2020. Teaching interprofessional competencies using virtual simulation: A descriptive exploratory research study. *Nurse Education Today*, [online] 93, p.104535. https://doi.org/10.1016/j.nedt.2020.104535.

Wise, A.F., Azevedo, R., Stegmann, K., Malmberg, J., Rosé, C.P., Mudrick, N., Taub, M., Martin, S.A., Farnsworth, J., Mu, J., Järvenoja, H., Järvelä, S., Wen, M., Yang, D. and Fischer, F., 2015. CSCL and learning analytics: Opportunities to support social interaction, self-regulation and socially shared regulation. In: *Computer-Supported Collaborative Learning Conference, CSCL*.

World Health Organization, 1978. *Declaration of Alma Ata*. Available at: <https://www.euro.who.int/__data/assets/pdf_file/0009/113877/E93944.pdf>.

World Health Organization, 1988. *Vienna Declaration*. Available at: <https://www.euro.who.int/__data/assets/pdf_file/0018/114930/E93950.pdf>.

World Health Organization, 2005. *HEALTH21: Health for all in the 21st Century*. Available at: <https://www.euro.who.int/__data/assets/pdf_file/0003/88590/EHFA5-E.pdf>.

World Health Organization, 2006. *Report on the Evaluation of the WHO Multi-country Family Health Nurse Pilot Study*. Available at: <https://www.euro.who.int/__data/assets/pdf_file/0012/102243/E88841.pdf>.

Wright, L.M. and Leahey, M., 2009. *Nurses and families: A guide to family assessment and intervention*. Philadelphia, PA: F. A. Davis.

Zhang, J. and Cui, Q., 2018. Collaborative learning in Higher Nursing Education: A systematic review. *Journal of Professional Nursing*, [online] 34(5), pp.378–388. https://doi.org/10.1016/j.profnurs.2018.07.007.

Zitzelsberger, H., Campbell, K.A., Service, D. and Sanchez, O., 2015. Using wikis to stimulate collaborative learning in two online health sciences courses. *Journal of Nursing Education*, [online] 54(6), pp.352–355. https://doi.org/10.3928/01484834-20150515-08.

Zook, S.S., Hulton, L.J., Dudding, C.C., Stewart, A.L. and Graham, A.C., 2018. Scaffolding Interprofessional Education: Unfolding case studies, virtual world simulations, and patient-centered care. *Nurse Educator*, [online] 43(2), pp.87–91. https://doi.org/10.1097/NNE.0000000000000430.

Zulfiqar, S., Zhou, R., Asmi, F. and Yasin, A., 2018. Using simulation system for collaborative learning to enhance learner's performance. *Cogent Education*, [online] 5(1), p.1424678. https://doi.org/10.1080/2331186X.2018.1424678.