Review

Diffusion of social media in nursing education: A scoping review

Xabi Cathala [a,*], Calvin Moorley [b]

[a] School of Health and Psychological Sciences, City University of London, 1 Myddelton Street, London EC1R 1UW, United Kingdom
[b] Institute of Health & Social Care, London South Bank University, Borough Rd, SE1 0AA, United Kingdom

A B S T R A C T

Objectives:

– To undertake a literature search for articles related to the diffusion of SoMe in nursing education
– To analyse and synthesise the scope of literature, including types of articles, methods and sources, geographical origin, and chronology
– To draw conclusions about SoMe diffusion in nursing education from the literature reviewed

Design: Scoping review using Arksey and O'Malley framework to synthesise the data.
Settings: A global scoping review was undertaken to investigate SoMe diffusion in pre-registration nursing education.
Participants: Pre-registration student nurses.
Methods: A protocol was created and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews Checklist. 10 data bases were searched: Academic Search Ultimate; CINAHL Complete; CINAHL Ultimate; eBook Collection (EBSCOhost); eBook Nursing Collection; E-Journals; MEDLINE Complete; Teacher Reference Center and Google Scholar.
Results: 1651 articles were derived from the search and 27 articles were included in this review. Timeline, geographical origin, methodology and findings of evidence are presented.
Conclusions: SoMe is an innovation with relatively high perceived attributes, especially from students' perspectives. There is a difference between SoMe adoption in learning by nursing students and universities and the dichotomy between curriculum and nursing students' learning needs. The adoption process is not yet completed for universities. To be able to support learning, nurse educators and university systems should find ways of diffusing SoMe innovation in learning.

1. Introduction

The term social media (SoMe) appeared in the early 2000s and several definitions since then (Zahay et al., 2022). SoMe are user-driven platforms that support the diffusion of content, dialogue, and communication. They offer an environment that is encouraging interactions and networking at different levels (personal, professional, business, marketing, political, and societal) (Kapoor et al., 2018). SoMe have changed peoples' personal and professional behaviours. Organisations use SoMe for communication, research and advertising, news, updates, professional information, real-time discussions and conference activities are widely accessed via SoMe (Susanto et al., 2021). SoMe are omnipresent in daily life (Ratheeswari, 2018) and the interest in SoMe innovation in nursing education is increasing. Literature reviews have been undertaken in related areas: web 2.0 and social media in nursing education (Arrigoni and Alvaro, 2016), social networking in nursing education (Kakushi and Évora, 2016), social media in education (Ross and Myers, 2017), social media in teaching (Hernandez and Munyan, 2020). However, further research and investigation are recommended (Cathala et al., 2021a; Cathala et al., 2021b; Lefebvre et al., 2020; Scott and Goode, 2020; Terzi et al., 2019).

2. Background

The literature demonstrates that SoMe are embedded in student nurses' learning (Hay et al., 2017), that country, generation and year of

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* Corresponding author.
E-mail addresses: xabi.cathala@city.ac.uk (X. Cathala), Moorleyc@lsbu.ac.uk (C. Moorley).

nursing programme have an influence on the use of SoMe (Cathala et al., 2021a), and that SoMe support formal and informal learning, complementing traditional teaching and learning delivery (Giroux and Moreau, 2022). Recommendations include implementation of SoMe into the nursing curriculum; training and guidance to use SoMe for learning and professional development (Cathala et al., 2021a; Lopez and Cleary, 2018). SoMe are considered learning tools and learning theories were linked with their use in teaching and learning (Cathala et al., 2021b; Tubaishat, 2018; Giroux and Moreau, 2022).

From the authors' knowledge, SoMe innovation diffusion in nursing education has never been investigated. The diffusion of innovation theory was developed by Everett Rogers in 1962 (Rogers, 2003) to understand how innovations were communicated over time among participants of a social system. This theory has been applied in different fields to investigate the diffusion of new technology, ideas, and invention. Rogers' theory defines and develops the diffusion process with four elements: the innovation; the innovation's communication channels; time; and the social system (Rogers, 2003). SoMe innovation in nursing education is still finding its place within the field. To add knowledge and understanding to this phenomenon, the authors aimed to investigate the diffusion of SoMe in nursing education. Nursing education is delivered theoretically and practically. Students can have traditional lectures on a topic and then move to a laboratory to practice. For example, they can learn cardiopulmonary resuscitation and then practice performing resuscitation using simulation. Students can use various social media platforms (e.g., YouTube® or TikTok®) to augment their learning. Therefore, it is important to understand how diffusion of innovation works in nurse education. This review forms part of a larger study on pre-registration student nurses use of social media.

As recommended by Joanna Briggs Institute, the review question was developed following the Population/concept/ context (PCC) framework (Aromataris and Munn, 2020) (Table 1.1). This scoping literature review aims to answer the following research question:

How are social media diffusing in pre-registration nursing education?

The aim is supported by the following objectives

- To undertake a literature search for articles related to the diffusion of social media in nursing education
- To analyse and synthesise the scope of literature, including types of articles, methods and sources, geographical origin, and chronology
- To draw conclusions about SoMe diffusion in nursing education from the literature reviewed

3. Methods

3.1. Protocol and registration

A protocol was created based on Arksey and O'Malley (2005) framework and reported following the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist (Tricco et al., 2018). This ensured the quality, reliability and clarity of the review. The protocol was not published or made accessible publicly.

3.2. Eligibility criteria

The search followed inclusion and exclusion criteria (Table 2.1) to retrieve specific and relevant evidence. Only English articles were

Table 1.1.
PCC framework.

Population	Pre -reg student nurses
Concept	SoMe diffusion
Context	Nursing education

Table 2.1
Eligibility criteria.

Inclusion criteria	Exclusion criteria
Full text article	Non full text article
Academic journal and peer reviewed	Not peer reviewed journal
English	Any other language
University Nursing education	Any other context.

searched to ensure understanding and relevance. Only journals that are academic or peer-reviewed were included, to enhance the quality and trustworthiness of the evidence. No restrictions regarding publication date were applied as the purpose was to investigate the body of literature through time. Nursing education was an inclusion criterion due to the focus of the review on this topic.

3.3. Information sources

The last search was on the 14th of August 2022. Searched databases were: Academic Search Ultimate; CINAHL Complete; CINAHL Ultimate; eBook Collection (EBSCOhost); eBook Nursing Collection; *E*-Journals; MEDLINE Complete; Teacher Reference Center. Those databases were selected as they were the most appropriate based on the topic and keywords. Google Scholar was also searched to identify any additional literature not populated through the selected databases.

3.4. Search

All databases were searched using EBSCOhost following the same search strategy. Search terms were identified from the research question: How are social media diffusing in pre-registration nursing education? (Fig. 2.1).

Inclusion and exclusion criteria were applied: Full text, Academic journal, Peer reviewed, English, Duplicate removed. After applying filters, the returned articles were screened by title and abstract. After discarding irrelevant literature, the remaining articles were fully read, and additional articles were retrieved from the references. Those additional articles were screened by title and abstract and selected articles fully read.

An additional search on Google Scholar was undertaken to identify additional articles using: "social media education student nurses". The results were filtered by most relevant and the first 10 pages were screened by title and abstract. The screened articles were fully read before being selected.

3.5. Data charting process

An extraction tool was developed to summarise findings and relevant information to answer the research question. The extraction tool was inspired by the JBI Manual for Evidence Synthesis (Aromataris and Munn, 2020) and included: Authors, Date, Country, Methods, Concept, Context, and Findings (Table 3.1).

3.6. Data items

The variables for which data were sought are social media, education, and usage in their broad meaning. The definition used in this review for each variable can be found in Table 2.2.

3.7. Synthesis of results

After the first read of the selection process, the articles were re-read to chart the data. Charting data was undertaken by two authors independently. After completing the data charting process, the authors met to compare results and agreed on their synthesis. Results were agreed and charted in Table 3.1.

"Social media"	OR	"Social platform"	OR	"Social network "	OR	"Social-media"
AND						
"Use"		OR	"Usage"		OR	Utilis*
AND						

learn*	OR	teach*	OR	study*	OR	develop*	OR	education*
AND								

"nursing"	OR	"nurse"	OR	"Student nurses"	OR	"pre-registered nurses"	OR	"Nursing students"

Fig. 2.1. Search terms.

4. Results

4.1. Selection of sources of evidence

The sources of evidence were selected by following the search process developed in the method (Section 3). 1651 articles were selected from the search using search terms in Fig. 2.1 and after applying the inclusion and exclusion criteria. Duplicates were removed reducing the number of articles to 1177. Screening by title and abstract was undertaken, removing 1159 articles, reducing the selected articles to 18. All 18 full-text articles were accessible, and a full-text screen was completed. Only 3 articles were excluded, due to setting, finalising the first step of the search with 15 selected articles. During the full-text article screen, an additional 9 articles were identified from the reference list and selected after full-text screening making the total 24. A Google Scholar®, search using the terms in section 3.4 was undertaken and a further 3 articles were identified, bringing the total articles included in this review to 27 articles. (Fig. 3.1).

4.2. Characteristics of sources of evidence

All 27 articles context was nursing education. The early interest of SoMe in nursing education was highlighted with the first publication by Skiba (2008), less than ten years after the creation of SoMe. From early on, SoMe has generated interest in its potential as an educational tool, with Twitter® and YouTube® attracting interest. During the last 14 years, 27 articles related to SoMe in pre-registration nursing education were identified resulting in an average of 1.9 articles per year, but with many variations. In 2015, there were no relevant publications but 2016 had 6 and 2017 had 4 (Fig. 3.2). The low number of publications within the last 14 years demonstrates that this topic needs further investigation, and much is to be discovered regarding the diffusion of SoMe in preregistration nursing education.

The 27 articles included in this review demonstrate that the phenomenon is international, led by the United States of America (USA) with 37 % of the outputs, United Kingdom (UK) and Australia with 19 % each. But there are also publications from Canada, Brazil, Jordan, Israel, Iraq, Oman, Philippines, Italy, Turkey, Caribbean, Iran and Ghana (Fig. 3.3).

As with the geographical location, study types also differed (Fig. 3.4). From 2008 and 2013, only commentary articles were published on the topic. The first empirical article on SoMe in pre-registration nursing education was published in 2013 and used quantitative methods. After 2013, more empirical research were published, mainly quantitative followed by a few review papers and qualitative articles. However, the research designs used in those publications are not the strongest designs (e.g., Randomised Controlled Trials) to demonstrate SoMe efficacy or compare SoMe to a more traditional teaching strategy.

The first three articles were commentary, Skiba in 2008 (USA) discussing Twitter® use in the context of nursing education, Agazio and Buckley in 2009 (USA) presented YouTube® as a teaching tool in nursing education and Hansen and Erdley (2009) on web 2.0 in nursing education. In 2010, Bristol (USA) wrote a column discussing Twitter® in nursing education, followed by Clifton and Mann (2011) (UK) commentary on YouTube® as a teaching tool in nursing education. In 2012, USA and UK collaboration produced another commentary discussing SoMe in nursing education. Tower et al. (2014) (Australia) published one of the first empirical studies on SoMe in nursing education looking at Facebook® as a study tool.

In 2014, Green, Wyllie and Jackson (Australia) published a commentary presenting social networking and education in nursing education. Two years later in 2016, Arrigoni et al. (Italy) published the first literature review on web 2.0 and social media in nursing education. In the same year, five articles were published, using varied designs. Ferguson et al. (Australia) published a qualitative focus group study on SoMe and nursing higher education; Jones et al. (UK), a case study on Twitter® as an assessment in nursing education; Kakushi and Martinez Evora (Brazil) an integrative review about social networking in nursing education; Quansah, Fiadzawoo and Kuunaangmen (Ghana) published the first cross-sectional survey on SoMe in nursing education; and Stephens and Gunther (USA) a multisite experimental study investigating Twitter® as a delivery method in nursing education. In 2017, Duke et al. (Canada) undertook a descriptive study on student nurses' utilisation of social media in the context of nursing education. During the same year, Hay et al. (Australia) published a quantitative descriptive survey on SoMe in learning and education in nursing; Higginson (UK) wrote a commentary on SoMe in nursing education, and Ross and Myers (USA) a review of literature on SoMe in nursing education. In 2018, Lopez and Cleary (Australia) published a commentary on SoMe in nursing education and Tubaishat (2018) in Jordan published a pre/post-test design investigating SoMe in nursing education. In 2019, Ross, Beckmann and Goumas (USA) published a case study on SoMe in nursing education. The next year (2020), Hernandez and Munyan (USA) had an integrative review on SoMe in nursing education teaching. Valdez et al. (2020) published a quantitative cross-sectional study on SoMe in study habits in nursing education, which was an international collaboration between Israel, Iraq, Oman, the Philippines, and Turkey. Cathala et al. (2021b) in a collaboration between the UK and the Caribbean, published a cross-sectional survey investigating the use of SoMe in learning in nursing education, and Hame-Morad et al. (2021) (Iran) a cross-sectional descriptive study on social network use among student in nursing education. Giroux and Moreau (2022) (Canada) published a qualitative case study on SoMe use in learning in nursing education.

Table 3.1
Summary of evidence.

	Authors	Date	Country	Methods	Concept	Aim	Findings
1.	Skiba	2008	United States of America	Commentary article	Twitter in education	Discussing the use of Twitter® in nursing education	Twitter can be used to facilitate active, interactive, and reflective learning. Reflecting on one's learning and sharing those reflections.
2.	Agazio and Buckley	2009	USA	Commentary article	YouTube as teaching tool	Discussing the use of YouTube® in nursing education	Undergraduates and graduate nursing students, YouTube can provide flexibility and depth to learning.
3.	Hansen and Erdley	2009	United States of America	Commentary article	Web 2.0	To explain Web 2.0 applications and the impact on healthcare students' education, social networking, collaboration, needs, and wants in today's busy learning and working environments	Online videos (YouTube) can be an alternative to delivery and perception from lectures that are appropriate for generation X and Y and in developing important thinking and learning skills for safe nursing practice.
4.	Bristol	2010	United States of America	Column	Twitter and education	To explore this growing social media tool and its use in health care and education.	Using Twitter to engage your audience, encourage consideration of new topics, or solicit ideas for improvement.
5.	Clifton and Mann	2011	United Kingdom	Commentary article	YouTube as teaching tool	To explore if YouTube® can enhance student nurse learning	YouTube can be used for teaching and learning and can increase engagement, leading to deeper learning and the development of critical thinking.
6.	Schmitt, Sims-Giddens and Booth	2012	United States of America / United Kingdom	Commentary article	Social media in education	To discusses the background and significance of social media tools as pedagogy, and provides a brief review of literature.	Social media can enhance students' education and knowledge base. It may assist nurses in building professional identity and connect with the profession. Social media in nursing has possible breaches in patient information and unprofessional conduct by nursing students. Nurse educators must play an active role in teaching students to engage in safe and professional communication.
7.	May, Wedgeworth and Bigham	2013	United States of America	Commentary article	YouTube in teaching	To discuss YouTube® as a teaching strategy.	Technology can augment the classroom experience and enhance clinical experience. YouTube can provide the innovation students desire while strengthening the education experience.
8.	Tower, Latimer and Hewitt	2013	Australia	Descriptive online survey	Facebook as a tool for study	To examine students' perceptions of using Facebook as a tool to support study.	Using social media platforms such as Facebook promotes academic–student. Social media facilitates peer learning. This may lead to enhanced self-efficacy, and a powerful predictor of student success.
9.	Green, Wyllie and Jackson	2014	Australia	Commentary article	Social networking and education	To consider the potential and implications of using social networking sites such as Facebook® in nurse education	Web 2.0 technologies are challenging traditional notions of teaching and learning. Facebook and social networking tools have advantages and disadvantages that should be addressed before considering their adoption into education. Social networking tools can facilitate and expand discussions beyond the traditional classroom and provide collaborative ways for student and teacher interaction.
10.	Arrigoni, Alvaro, Vellone and Vanzetta	2016	Italy	Integrative review of literature	Web 2.0 and Social media in education	To describe the use of social media by teachers and students on training courses through an integrative review of the literature.	The use of Web 2.0 tools in general and social media is no longer debatable. Two areas for further investigation: evaluating the level of moral awareness in nursing education regarding using Web 2.0 communication tools and implementing teaching methods to promote the construction and development of moral reasoning in professionals.
11.	Ferguson et al.	2016	Australia	Qualitative focus groups	Social media and higher education	To explore first year Bachelor of Nursing student nurses' experience with social media in supporting student	Facebook supports informal peer–peer learning and building professional nurse identify. Privacy is an issue for some students, and they

Table 3.1 (*continued*)

	Authors	Date	Country	Methods	Concept	Aim	Findings
						transition and engagement into higher education.	are careful what they post. Student expressed worry about what employers think and the need for e-professionalism to safeguard employability. Students are inspired by the posts they read and engaged.
12.	Jones et al.	2016	United Kingdom	Case study	Twitter as an assessment	To ask: (i) is it feasible to include Twitter as an assessed element of the first-year nursing curriculum; (ii) how should it be introduced and assessed; and (iii) do students think it worthwhile and learn anything from its use?	Introducing assessed Twitter use is feasible, students think it is worthwhile and recommend that such an approach be adopted by other British nursing schools.
13.	Kakushi and Martinez Evora	2016	Brazil	Integrative review	Social networking in education	To identify the use of social networking in nursing education.	Social networking was used to transmit various contents in the nursing field. Its use in the face-to-face education, distance learning and hybrid education, both the professional and interprofessional learning.
14.	Quansah, Fiadzawoo and Kuunaangmen	2016	Ghana	Cross sectional survey	Social media in education	To look at students' engagement in social media and its significance for their academic performance.	Social media networks used by the students can be adopted to facilitate teaching and learning. Once most of the student population perceive social media as good, it will be easier to accept social networks that support teaching and learning. This can minimize any negative influence that the use of social media has on their study. Interactive social networks should be developed by Health Training Institutions and Ministry of Health for teaching and learning.
15.	Stephens and Gunther	2016	United States of America	multisite experimental research study.	Twitter as a delivery method	To reports the use of Twitter as an intervention delivery method in a multisite experimental nursing research study.	Twitter as a delivery method proved feasible for this population and an effective means of information delivery. Twitter may be an effective tool to increase engagement and contribute to a sense of community. Nurse educators and practice leaders can no longer assume these tools are limited to social communication among younger students. We must learn to utilize the methods used by our students and clients if we want to fully engage them and encourage open dialogue.
16.	Duke et al.	2017	Canada	Descriptive study	Student nurses utilization of social media and its professional implications	To explore faculty and student utilization of social media and its professional implications in nurse education.	Students spend significantly more time using social media compared to faculty, and twice as many students use it for educational purposes. A gap in awareness of e-professionalism with social media use was reported.
17.	Hay, Carr, Dawe and Clark-Burg	2017	Australia	Quantitative descriptive survey	Social media in learning and education	To identify in what way social media and mobile technology assist with learning and education of the undergraduate nurse	Nursing students are using mobile technology and social media as learning resources. The challenge for undergraduate nursing course designers will be to build on these findings to use social media and mobile technology. There exists a paucity of outcome studies regarding what influence and relationship mobile technologies and social media have on teaching and learning in undergraduate nursing.
18.	Higginson	2017	United Kingdom	Commentary article	Social media in education	To discuss the use of social media in nurse education	Modern nursing students are influenced by social media. The inclusion of social media platforms in 21st century nurse education would benefit students. Health educators should try to adjust their teaching methods to meet students' needs as new learners.

Table 3.1 (*continued*)

	Authors	Date	Country	Methods	Concept	Aim	Findings
19.	Ross and Myers	2017	United States of America	Review of literature	Social media in education	To provide an overview of social media use in undergraduate nursing education and a review of the existing research related to social media use in prelicensure nursing education.	Social media is beginning to be integrated into undergraduate nursing education increasing frequency as an innovative teaching strategy. It is imperative nurse educators formally explore the efficacy of various forms of social media on undergraduate nursing student outcomes.
20.	Lopez and Cleary	2018	Australia	Commentary article	Social media in education	To consider social media applications and implications for their use in nurse education.	Harnessing social media platforms for teaching and learning in nursing is necessary to engage millennial learners and enable flexible learning modes and deeper learning. Social media will continue to be used in nursing education and practice, nurse educators must develop a systematic approach and theoretical frameworks for integrating SoMe in the curriculum.
21.	Tubaishat	2018	Jordan	One group pretest-posttest design	Social media in education	To assess students' perceptions of using Facebook™ as an educational mean to support their study.	Facebook has ability to enhance and improve communication between students themselves and their tutors, it offers a comfortable environment in which one can access and share information anywhere and at anytime. This enhances students' performance during their learning and subsequently in their results. Social networks in general, have the potential for future use in nursing education as a highly convenient and cost-effective learning tool.
22.	Ross, Beckmann and Goumas	2019	United States of America	Case study	Social media in education	To understand baccalaureate nursing students' perceptions of the use of Facebook as a platform to present patient case study data	More empirical evidence is needed to describe this phenomenon thoroughly and support the use of social media as an evidence-based teaching strategy in undergraduate nursing education.
23.	Hernandez and Munyan	2020	United States of America	Integrative review	Social media in teaching	To conduct an integrative review of the available evidence regarding the utilization of social media in teaching graduate nursing students to offer nurse educators a summary of what is known on the topic.	The reviewed literature suggests the potential of this teaching methodology as an effective strategy to enhance nursing student learning.
24.	Valdez et al.	2020	Israel, Iraq, Oman, the Philippines, and Turkey	Quantitative cross-sectional study	Social media in study habits	To shed light on the potential of SNSs for improving the study habits of nursing students in these five countries.	Nursing students moderately perceived the utilization and benefits of SNSs, considering accessibility, usability, efficiency and reliability. The significant positive correlation between the study habits of students and the extent of SNS utilization means that the more students devote themselves to their study habits, the higher the level of SNS utilization.
25.	Cathala, Ocho, Watts, Moorley	2021	United Kingdom / Caribbean	Cross sectional survey	Use of social media in Learning	To Identify how student nurses in each country of study use social media for learning.	Country, generation and year of education are factors that influence the use of SoMe in learning and should be taken into consideration by educational institutions in curriculum development and teaching and learning delivery. SoMe should be incorporated into the nursing curriculum as a learning tool and guidance and support offered to student nurses on its use. A wider choice of teaching and learning approaches and a more individual learning experience by using SoMe can increase inclusivity and equity.
26.	Hame-Morad, Namdar-Areshtanab, Ebrahimi, Arshadi-Bostanabad	2021	Iran	Cross-Sectional Descriptive Study	Social network use among students	To determine social networks' use among nursing students of Tabriz University of Medical Sciences.	Proper planning for virtual space management is essential to enjoy the advantages of social networks and reduce their disadvantages. Students should be informed about appropriate methods of cyberspace usage to

Table 3.1 (*continued*)

	Authors	Date	Country	Methods	Concept	Aim	Findings
27.	Giroux and Moreau	2022	Canada	Qualitative case study	Social media use in learning	To explore how nursing students use social media in their learning formally and informally.	ensure their safety and reduce the possible harmful effects. Nursing students used social media to support their formal and informal learning and as a space separate from the university. Participants merged their personal and academic discussions to collaborate, share resources, mentor one another, and connect with nursing experts and professional institutions. This use of social media has implications for teaching and learning in nursing education, regarding learning theory, scaffolding, and online course design.

Table 2.2

Variable definition.

Variable	Definition
Social media	SoMe are digital technologies emphasising user-generated content or interactions (Kaplan and Haenlein, 2010).
Education	The wealth of knowledge acquired by an individual after studying subject matters or experiencing life lessons that provide an understanding of something. Education requires instruction of some sort from an individual or composed literature (Byrne, 2013)
Usage	The way something is treated or used (Cambridge University Press & Assessment, 2023)

4.3. Results of individual sources of evidence

Sources of evidence characteristics were described with their chronology and origins. This section presents the relevant data to the review question.

Skiba (2008) argued that Twitter® can be useful to facilitate interactive and reflective learning by sharing reflections on learning. Agazio and Buckley (2009) claimed that YouTube® platform can offer flexibility and depth to learning. Hansen and Erdley (2009) discussed web 2.0 and YouTube® as a substitute for conventional delivery and perception, especially for generation X and Y students. Clifton and Mann (2011) and May et al. (2013), argued that YouTube® can support students to develop thinking and learning skills fundamental for safe practice. Bristol (2010), presented Twitter® as a tool to engage, encourage or solicit audience, new topics or ideas. Schmitt et al. (2012) presented SoMe as an enhancing tool for education and developing professional identity. They also raised concerns about breaches in patient confidentiality and unprofessional behaviour by student nurses and recommended nurse educators to teach students how to engage SoMe.

Tower et al. (2014) demonstrated that SoMe facilitates peer learning and can enhance self-efficacy. Green et al. (2014) discussed the
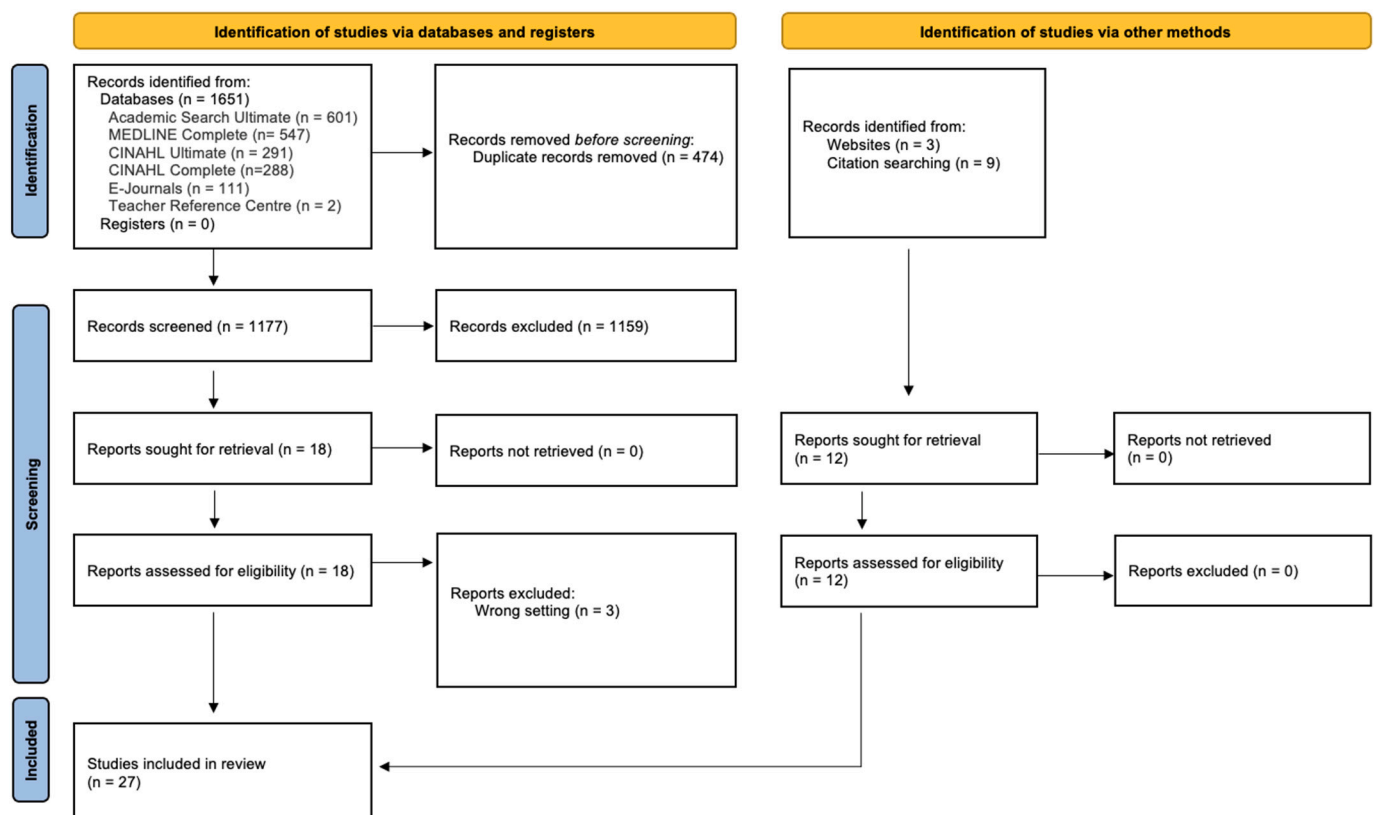

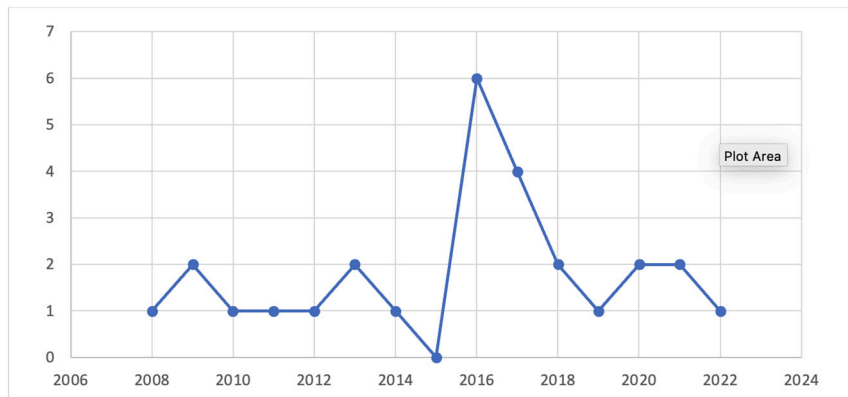**Fig. 3.1.** Flow chart source of evidence (Page et al., 2021).

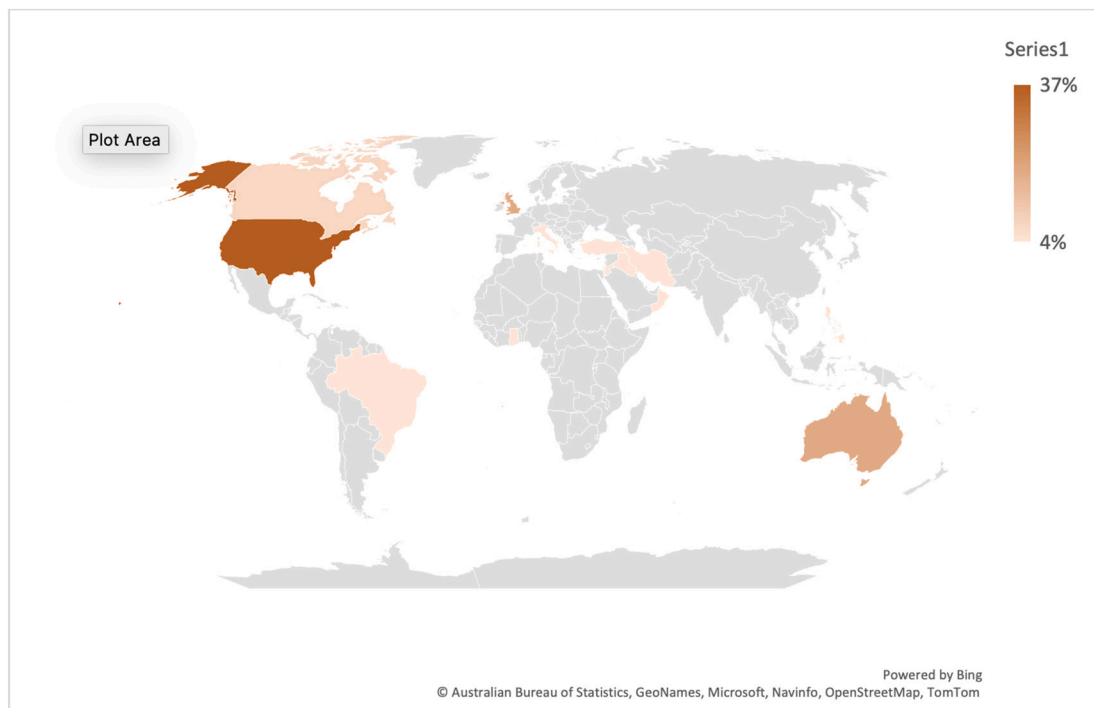**Fig. 3.2.** Article per year.

Fig. 3.3. Articles geographic origin.

advantages and challenges of SoMe in education and that these should be overcome before the adoption of SoMe into education. Arrigoni and Alvaro (2016) stated that the use of SoMe is confirmed but the level of its ethical use and implementation of teaching to support the development of ethical reasoning needs further research. Ferguson et al. (2016) found that Facebook® supports peer-to-peer learning and the development of professional identity and raised the issue of student privacy. Jones et al. (2016) found Twitter as an assessment method feasible and they received positive feedback from students and recommended its use to other nursing departments. Kakushi and Évora (2016) found that social networking by nursing students and educators was used to share different subjects. Quansah et al. (2016) stated that students are the main social media users, and this can be used to facilitate teaching and learning. A positive perception of SoMe can help in its adoption and interactive SoMe should be developed by institutions.

Stephens and Gunther (2016) found that Twitter® was a possible way to deliver nurse education and concluded it can enhance engagement. Nurse educators should not assume that SoMe are only a communication tool and need to acknowledge the learning methods used by students and accommodate them in teaching and learning activities. Duke et al. (2017) found students spent more time on SoMe than faculty, with Facebook® being a popular learning tool for students compared to faculty. Hay et al. (2017) stated that one of the challenges is to integrate SoMe resources into the curriculum and Higginson (2017) discussed the place of SoMe in student life and the need to include them in nursing education. Ross and Myers (2017) stated that SoMe started to be integrated into nursing education, but further research is needed to formally demonstrate its effectiveness and comparison to more traditional teaching methods. Lopez and Cleary (2018) found that Facebook® can enhance communication, student performance, and offer a safe learning environment. Therefore, SoMe have the potential for future use in nursing education. Ross et al. (2019) stated the importance of more empirical evidence to support the use of SoMe in nursing education. Hernandez and Munyan (2020) found that there is limited literature available but there is a potential for SoMe to be an effective teaching methodology to enhance learning. Valdez et al. (2020) found that student nurses moderately perceived the utilisation and benefits of SoMe. They also identified a positive correlation between study
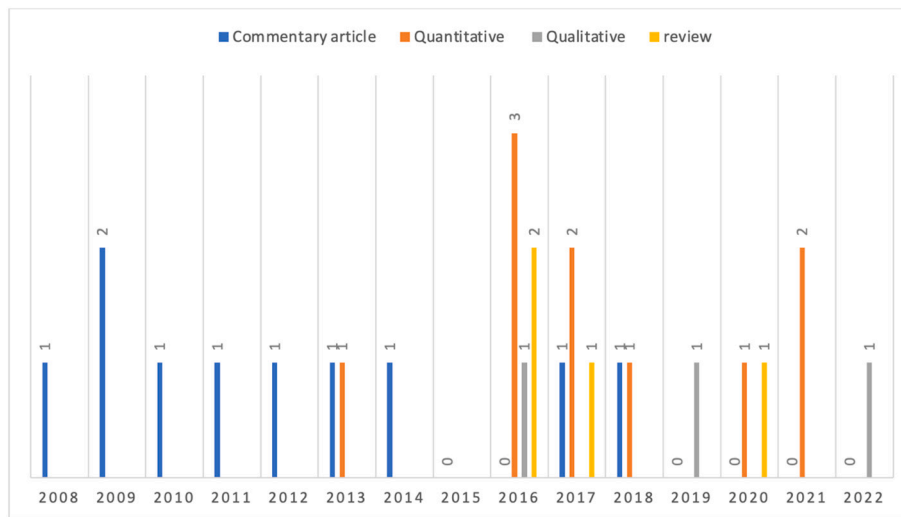
Fig. 3.4. Article type per year.

devotion and SoMe level of utilisation. Cathala et al. (2021b) demonstrated that understanding how student nurses use SoMe for learning is fundamental. They found that factors such as country, generation and year of education influence SoMe usage. They concluded SoMe should be integrated into the curriculum and guidance and support offered to students and that a broader choice of teaching and learning methods can increase inclusivity and equity. Hame-Morad et al. (2021) argued that appropriate management of virtual space is fundamental to fully appreciate their advantages and so officials and institutions should inform students about cyberspace usage. Giroux and Moreau (2022), from a qualitative case study, found that SoMe support students' formal and informal learning. Faculty members and nursing schools are aware of SoMe place in student learning which should be demonstrated in curriculum learning objectives and competencies. (Table 3.1).

5. Discussion

This scoping review aimed to investigate how SoMe is diffusing in pre-registration nursing education. To answer this question diffusion of innovation theory developed by Rogers (2003) was used. Rogers' theory defines and develops the diffusion process containing four elements: the innovation; the innovation's communication channels; time, and the social system (Rogers, 2003). Rogers' diffusion process was utilised to investigate SoMe diffusion in pre-registration nursing education, in this review.

5.1. The innovation

Rogers defines an innovation as: "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (2003, p12). In this review, the innovation investigated is SoMe in pre-registration nursing education. Not all innovation diffusions are equivalent, and the perceived attributes of an innovation influence its adoption rate. There are five perceived attributes (Rogers, 2003): 1. Relative advantages, 2. Compatibility, 3. Complexity, 4. Trialability, 5. Observability. Relative advantages of SoMe in nursing education were found in the literature such as facilitating active, interactive and reflective learning; providing flexibility and depth to learning; an alternative to delivery and perception from lectures; developing thinking and learning skills; increasing engagement and peer learning; improving communication; and possibly helping to build professional identity (Skiba, 2008; Agazio and Buckley, 2009; Hansen and Erdley, 2009; Bristol, 2010; Clifton and Mann, 2011; Schmitt et al., 2012; May et al., 2013; Tower et al., 2014; Ferguson et al., 2016; Stephens and Gunther, 2016;

Tubaishat, 2018; Hernandez and Munyan, 2020; Giroux and Moreau, 2022). Challenges were identified e.g., possible breach of confidentiality, student privacy and unprofessional behaviour (Schmitt et al., 2012; Green et al., 2014; Ferguson et al., 2016). These challenges were not only observed in university settings but also in practice (Ramage and Moorley, 2019).

All literature reviewed agreed with the compatibility of SoMe with nursing education. However, there is a degree of complexity expressed in the literature. The integration of SoMe into the curriculum faces challenges and different factors should be considered when integrating SoMe into the curriculum (Blinded). Information Technology (IT) literacy must be considered with the younger generation being more confident with the use of SoMe (Hansen and Erdley, 2009; Blinded). Appropriate support and guidance should be delivered in relation to students' IT literacy to ensure equity and inclusivity. In terms of trialability, an internet connection and a device (smartphone, tablet, or computer) are required to connect and try SoMe. Most SoMe are free to use. This accessibility and user-friendliness are part of the success of SoMe in general. The observability of SoMe seems to be seen through two different lenses. Students (younger generation) view SoMe as helpful, beneficial, supporting their learning, experience and their wellbeing (Blinded); however, they are also increasingly aware of its limitations (Blinded). Regarding university and faculty, the results of the innovation are clearly acknowledged, but there are similarly noticeable concerns (e.g., professionalism) and limitations that impact SoMe observability.

A score between 0 and 5 was allocated to each attribute to be able to assess the strength (5) and weaknesses (0) of the SoMe innovation. Compatibility, relative advantage, trialability and observability from students are the strength of this innovation. Complexity and observability from universities and educators constitute the challenges. SoMe's perceived attributes are summarised in Table 4.1.

Table 4.1
Perceived attributes.

		Score /5
Relative advantage		4
Compatibility		5
Complexity		3
Trialability		4
Observability	Student	4
	University/educators	2

5.2. Communication channels

The second element of the diffusion process is communication channels. Communication is how users share information with each other to network and learn (Ratheeswari, 2018). Communication channels include the means of that communication and have a direct impact on how the innovation will spread among the users. In these communication channels, the concepts of homophily and heterophily play an important role, which were first identified by Tarde (1903), and further developed by two sociologists Lazarsfeld and Merton (1954) and used by Rogers in his innovation diffusion theory. Homophily is people's affinity or interaction with people like themselves, whereas heterophily is people's affinity or interaction with people different to themselves (Lazarsfeld and Merton, 1954). In SoMe innovation, we can identify two homophily groups, students who have the same objectives of learning and experiencing education, and university/educators that aim to provide the best learning and education experience to students. Students and university/educators consist of two heterophily groups. Within the homophily groups, the means of communication and the similarities between members increase the efficiency of the communication. The student group is more likely to use SoMe and instantaneous messaging systems, and interpersonal channels to share the perceived attribute of SoMe (Aleksandrova and Parusheva, 2019). Those channels are fast, and the trust between students/friends regarding their experience and information is more likely to add weight to the acceptance of the information as true. On the other side, the university/educators group channels of communication are more official and rely on research, data and publications to inform decisions and practice. Those channels are much slower and the interpersonal channels between university/educators group members are more critical and less influenced by trust. Between the student and university/educators, group communication exists but is likely to be ineffective regarding innovation diffusion due to the differences in their channels. These communication channel differences and heterophily groups might help to understand why twice as many students use SoMe for educational purposes compared to faculty (Duke et al., 2017).

5.3. Time

The next element in innovation diffusion theory is time. Time is an important factor to understand the diffusion of innovation and the rate of adoption. Rogers classified users into five categories: 1. Innovator, 2. Early adopters, 3. Early majority 4. Late majority, 5. Laggards. Those categories refer to how early or late users are adopting an innovation. SoMe were first created in 1997, and 10 years later in 2008, Skiba published the first article demonstrating an interest in the use of SoMe in nursing education. Skiba and other authors that published in the early years of SoMe research can be seen as innovators and the first users of SoMe in education early adopters. It is difficult to identify the innovator and early adopters from nursing student groups as it was not identified and published in the literature. As SoMe innovation diffusion is not completed and is still ongoing, it is challenging to identify all categories of adopters as well as the adoption rate.

5.4. Social system

The social system identified is the educational social system. From the innovation-decision process (knowledge, persuasions, decision, implementation and confirmation) (Rogers, 2003) and the literature reviewed, it seems that the two groups (students and university/educators) are at different stages of the innovation-decision process of SoMe innovation. Arrigoni and Alvaro (2016), Quansah et al. (2016), Duke et al. (2017), Hay et al. (2017), Lopez and Cleary (2018), Valdez et al. (2020), Cathala et al. (2021b) and Giroux and Moreau (2022) demonstrated that the student group already made the decision and started the implementation of SoMe innovation in nursing education by using SoMe

for their learning. Ross and Myers (2017) found that SoMe were beginning to be integrated into pre-registration nursing education, however, no following publications confirmed that it has been integrated or implemented in the university social system. The decision to adopt SoMe into nursing education has not been made yet. The persuasion stage is still ongoing within the university/educator group.

Some early publications have identified concerns and limitations in the use of SoMe in nursing education. These early publications have an individual-blame approach holding students responsible for those concerns (Schmitt et al., 2012; Ferguson et al., 2016). This approach is challenging in overcoming concerns due to the difficulty of individual change and limits the understanding of the diffusion process. The later articles, however, changed from an individual-blame to a system-blame by suggesting policies change and training implementation to overcome the social challenge (Quansah et al., 2016; Lopez and Cleary, 2018; Blinded; Hame-Morad et al., 2021).

6. Limitations

The authors recognise limitations in this scoping review. Firstly, this review investigates nursing education at university and not the use of SoMe in clinical practice. The use of diffusion of innovation theory has some limitations such as pro-innovation bias which imply that the innovation should be adopted by all members of the social system. Authors recognise that SoMe will not be suitable for all members and traditional education must remain, but it should not prevent its evolution. Time is an important factor in innovation diffusion in terms of recalling information and data but also limiting the possible finding if the adoption of diffusion is not completed.

7. Conclusions

This review adds knowledge and understanding to the diffusion of SoMe in pre-registration nursing education. SoMe is an innovation with relatively high perceived attributes, especially from students' perspective. With complexity and observability being the weakest attributes, two social systems appear to coexist in the SoMe diffusion process. The student social system has faster and more efficient communication channels supporting SoMe innovation. However, the university/educator system's communication channels are much slower and inhibit the SoMe innovation to diffuse as fast as in the student social system. This could explain the difference between SoMe adoption in learning by students and universities but also the dichotomy between curriculum and student learning needs. The adoption process is not yet completed especially for universities which raises hope in finding how to integrate and support the appropriate use of a technology already used by most students. To be able to support learning, nurse educators and university systems should find ways of diffusing SoMe innovation in learning.

CRediT authorship contribution statement

Criteria	Author Initials
Made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data;	XC, CM
Involved in drafting the manuscript or revising it critically for important intellectual content;	XC, CM
Given final approval of the version to be published. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content;	XC, CM
Agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.	XC, CM

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Declaration of competing interest

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