

Bibliometric Study on Digital Education of Knowledge and Skill using VOS Viewer

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ABSTRACT

The bibliometric analysis of publications connected to nursing education methods and digital media is still restricted. Thus, there needs to be more understanding of practices and concepts. This study aims to determine the trend in publications and visualization of nursing learning techniques and digital media. The bibliometric method with policy-related scientific publication data from 2017 to 2024 uses a VOS viewer. The publications evaluated came from the Google Scholar database: 200 articles, 13 from Scopus, and 14 from PubMed. The literature search was conducted online in March 2024 using keywords: knowledge, skill, and digital education. The articles were downloaded in RIS format and processed with a VOS viewer to visualize and analyze patterns in bibliometrics. VOS viewer can generate network, overlay, and density visualization maps. Following analysis by the VOS viewer software, 8 clusters were identified in mapping all themes (light purple, brown, orange, Tosca, purple, yellow, blue, green, and red). The clusters demonstrated a link between one issue and another. The thickness of the connecting line indicated the strength of pairs of topic areas or keywords. The mapping results presented above reveal the number of terms and other term associations associated with digital education. Future academics can develop themes that have yet to be explored by considering the density of topics offered and paying regard to duty and ethics in education. This research contributes to providing information on the use and implementation of technology in nursing education in the digital era.

Keywords: Digital Education, Nursing Education, Education Methods, Digital Media, Knowledge, Students Skill



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1. INTRODUCTION

Nursing education is a rapidly developing field of health science. Various educational methods are developed to improve skills and reduce errors in students. Some studies, for example, Öz & Ordu (2021), Kurt & Öztürk (2021), Westman et al. (2024) and Y.-Y. Chang et al. (2024) mention that the skills of students who make the most mistakes are administering drugs or injections. This effort is carried out with virtual and manual approaches that can make it easier for students to access nursing material easily and effectively. According to Tsekhmister (2023) and Pruitt et al. (2023), research references related to effective and efficient drug administration teaching methods are needed so that the development of educational methods and media can be targeted more effectively and efficiently.

Efforts to improve knowledge and skills related to nursing have become a necessity that requires changes in the education system (Kavanagh & Sharpnack, 2021; Koukourikos et al., 2021). Some nursing

skills must be taught during the educational period at the academic level. This requires the development of media and methods so that the achievement of competence can be continuously improved (Lall et al., 2019).

Educational methods and media approaches have become options for developing nursing knowledge and skills around the world. In this case, various efforts have been made to improve the quality of education in various countries (Effendi et al., 2021), including the development of learning media and methods. The development of these media and methods of nursing learning in various fields has been widely carried out but needs to be analyzed to determine their distribution and usefulness (O'Connor et al., 2021).

In the era of digital education, there are several studies on the application of technology media in teaching and learning. Vizcaya-Moreno & Pérez-Cañaveras (2020)'s research examines social media in teaching in nursing clinics on 120 Spanish students using a cross-sectional survey method. Aydın Doğan & Yazıcı (2024) researched the technology of virtual media in midwife education using a quasi-experimental method. Yildiz & Demiray (2022) researched the technology of virtual reality in nursing education using experimental methods. Bibliometric analysis of publications related to nursing education methods and technology media is still limited, so there are gaps in understanding practices and concepts.

The need for bibliometric analysis in order to focus on mapping and keywords to see trend topics in the field of nursing education to become opportunities and trends in research or publications indexed by the Scopus, Google Scholar, and Pubmed databases. In addition, it is also a reference to improve the development of nursing education in the future. For this reason, a comprehensive study is needed to assist other researchers in planning steps to improve the quality of nursing education (Kleib et al., 2023). This study aims to determine the trend in publications and visualization of nursing learning techniques and digital media, especially knowledge and nursing skills through bibliometric analysis. This article may also reveal the topic areas that are the subject of most publications and research opportunities related to the digitalization of nursing education.

2. METHOD

The articles analyzed were taken from the Google Scholar database: 200 articles, Scopus 13 articles, and PubMed 14 article. The literature search was conducted online in March 2024 with keywords, namely knowledge, skill, nursing and digital education. Policy-related scientific publication data from 2017 to 2024 and data analyzed using VOS viewer. The articles have been downloaded in RIS format for processing using VOS viewer to visualize and analyze trends in bibliometric form. VOS viewer can create network visualization, overlay visualization, and density visualization maps.

3. RESULTS AND DISCUSSION

3.1. Results

The visualization of the topic area "Digital Education in Nursing Knowledge and Skills" using VOSviewer In bibliometric research, topic mapping is important. All the topic areas regarding the keywords of digital education in nursing knowledge and skills, in general, can be seen in Figure 1. VOS viewer may present three distinct mapping visualizations in bibliometric analysis: 1) Network visualization is shown in Figure 1; 2) Overlay visualization is shown in Figure 2; 3) Density visualization is shown in Figure 3.

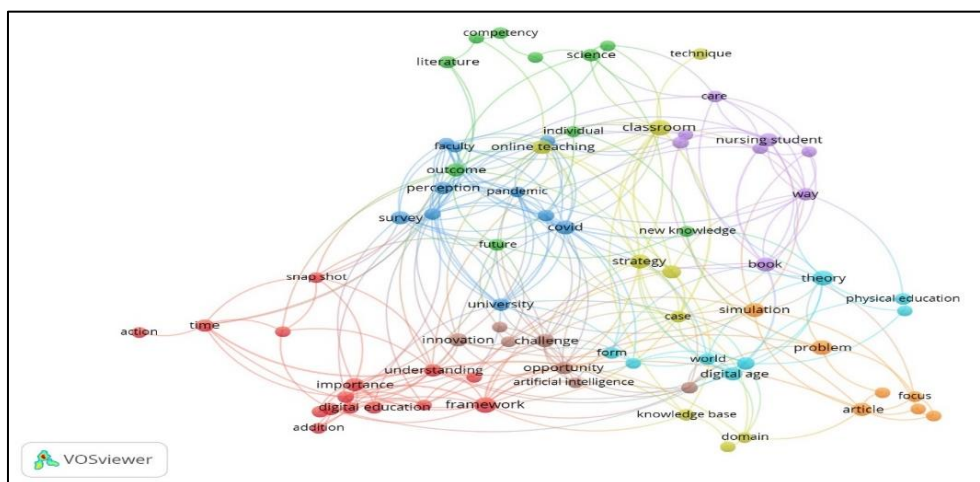


Figure 1. The Network Visualization of Digital Education in Knowledge and Skill Topic Areas

Upon analysis using the VOS viewer program, a total of 8 clusters were identified in the mapping of all themes. These clusters were labelled as light purple, brown, orange, Tosca, purple, yellow, blue, green, and red. The clusters demonstrated a correlation between one issue and another. The connecting line's thickness indicated the strength level between pairs of topic areas or keywords. In addition to clusters and

lines, the size of the nodes represents the frequency with which the keyword or topic appears. Figure 1 illustrates the prominent subjects or phrases, which include shot, blended, digital age, network, and prior knowledge. During the period from 2017 to 2024, researchers extensively examined these themes.

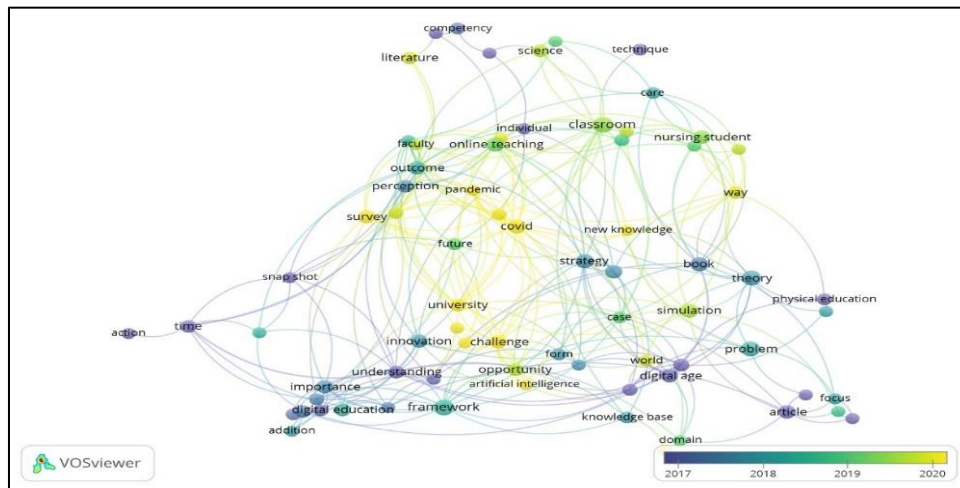


Figure 2. Depicts the Year-to-Year Trends for the Study Topic Area or Keyword. The Colored Keywords Reflect the Research Period.

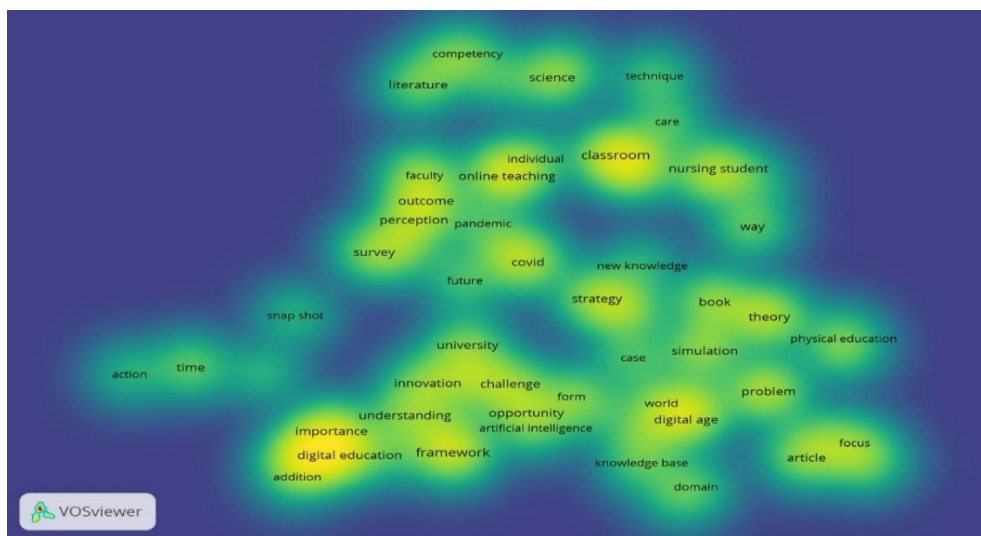


Figure 3. The Density Visualization of the Digital Education in Knowledge and Skill Topic Areas

Figure 3 depicts the depth of research on the topic area. Concentrated colors indicate increased study activity in a specific issue area. The subjects of shot, blended, digital age, network, and prior knowledge are frequently discussed.

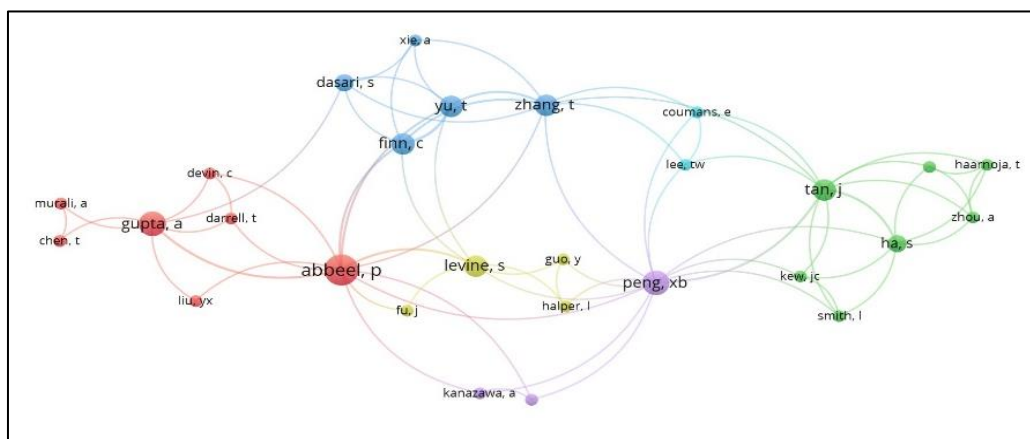


Figure 4. The Author Visualization of the Digital Education in Knowledge and Skill Topic Areas

The metadata results in Figure 4, which were conducted based on the Scopus, PubMed, and Google Scholar databases based on top authors in indexed international journals (all countries), are presented in Table 1.

Table 1. Top Number Authors in Harzing ‘s Publish or Perish and VOS Viewer

Author(s)	Number of Article
Abbeel	6
Gupta, A	4
Peng, xb	4
Aydin, A	3
Finn	3

Table 1 show that the top number author is Abbeel with 6 articles, and the which has the fewest articles are Aydin and Fiin with 3 articles.

Table 2. Describes The Articles Related to The Digital Education in Knowledge, Skill on Nursing

Author(s)	Title	Citation
Rodríguez-Almagro et al. (2021)	“The Impact on Nursing Students of Creating Audiovisual Material through Digital Storytelling as a Teaching Method.”	11
Yu & Yang (2022)	“Effectiveness and Utility of Virtual Reality Infection Control Simulation for Children With COVID-19: Quasi-Experimental Study.”	10
Kayyali et al. (2021)	“Development and evaluation of a serious game to support learning among pharmacy and nursing students.”	9
Strand et al. (2017)	“Digital recording as a teaching and learning method in the skills laboratory.”	11
Chang et al., (2021)	“Clinical Virtual Simulation in Nursing Education: Randomized Controlled Trial.”	446

Table 2 describes the articles related to the digital education on knowledge, skill in nursing student in Harzing’s Publish or Perish application. The first research from Rodríguez-Almagro et al. (2021), discusses that creating educational movies using narrated digital stories is an effective teaching and learning approach for reinforcing the key topic units in nursing courses.

The second researcher, Yu & Yang (2022). The VR simulation training program for pediatric COVID-19 patients efficiently blended skill development with theoretical knowledge, respiratory care skills, and infectious illness readiness. Virtual reality (VR) simulation provides the benefit of learning in a safe environment with a sense of realism comparable to that of a real clinical setting, and it has been shown to improve student self-efficacy in infection control, safety performance, and learning satisfaction.

The third researcher, Kayyali et al. (2021). A pharmacy student reported that the serious game (SG) was playable and legitimate. Nursing students reported a considerable boost in confidence after utilizing the BNF, as well as a high acceptability of DOSE as an SG. DOSE was confirmed to be a valid SG model in both cohorts.

The fourth researcher, Strand et al. (2017). Digital recording helps students become more conscious when learning new things. The digital recorder provides students with direct and quick feedback on their performance during the numerous practical procedures, which may aid in the transition from theory to practice. Students’ performances reflected increased self-confidence and a sense of safety.

The fifth researcher, Chang et al. (2021). The use of clinical virtual simulation in nursing education has the potential to increase information retention and clinical reasoning in the beginning and over time. Nurse educators and researchers should collaborate to create virtual learning materials to support clinical nursing education. The mobile learning app improved knowledge and satisfaction scores, as well as skill performance, without increasing cognitive burden.

3.2. Discussion

Based on the visualization of research trends for all countries using VOS viewer analysis, the keyword that appears most in digital education knowledge skill is competency. The first cluster (in red) is related to

digital education, digital competency, digital literacy, framework, importance, action, addition, culture, prior knowledge, snapshot, systematic literature review, time, year, and understanding. This shows that digital education is a science that continues to grow and requires basic knowledge of technology, which is very important in developing digital media. This is in accordance with the research of Potter & McDougall (2017), which states that an emphasis on technology and media as part of material culture and lived experience is urgently needed in educational discussions, along with the criticality that is too often absent in discourse around technology and learning.

The second cluster (colored green) relates to competency, future, individual, literature, new knowledge, online community, outcome, and person. This shows that achieving competence in accordance with future needs requires the latest knowledge and prioritizes online competencies and processes. This is in accordance with research conducted by Caskurlu et al. (2021), Fabriz et al. (2021), and Yates et al. (2021), which states that online learning is needed and preferred by learners to share experiences and exchange knowledge to achieve the expected outcomes.

The third cluster (in blue) is related to COVID, pandemic, need, faculty, perception, role, satisfaction, term, survey, and university. This shows that during the COVID pandemic, digital education is most often used by lecturers to carry out learning. This online learning also increases student satisfaction at the university level. This is in accordance with the research of Junus et al. (2021), Saha et al. (2022), and Huriyah & Hidayat (2022), which states that lecturers were very ready to do online learning during the last pandemic.

The fourth yellow cluster relates to strategy, technique, online teaching, knowledge base, engagement, domain, classroom, and class. This shows that there are several techniques and strategies used in the use of digital education. This is in accordance with research conducted by Hamzah et al. (2022) and Letchumanan et al. (2020), which found that higher-order thinking skills (HOTS) should be an integral part of teaching and learning, especially at the higher education level. Thinking skills lessons must be part of the curriculum if students are to solve problems individually, cooperatively, and creatively (Albar & Southcott, 2021; Dilekçi & Karatay, 2023; Segundo Marcos et al., 2020).

The fifth purple cluster relates to blended learning, book, care, clinical skills, meta-analysis, nursing student, patient, and way. This shows the need for blended media in addition to digital education by using book media. This is in accordance with the research of Bieri et al. (2023), which states that student- and lecturer-based blended learning activities to train novice medical students in commonly performed procedural skills appear to be effective for increasing their confidence and cognitive knowledge and should be further integrated in the medical school curriculum. The blended learning instructional design increased students' satisfaction with the clinical competency activities (Qutieshat et al., 2020; Sarkar et al., 2021; Venkatesh et al., 2020). Future research should elucidate the impact of student- and faculty-designed and student-led educational activities.

The sixth toska-colored cluster relates to child, digital age, digital word, form, order, physical education, theory, and world. Research from, states that the digital world is both a challenge and an opportunity for technology developers and educators to use it in everyday learning (Mian et al., 2020).

The seventh cluster in orange is related to 21st century skills: article, focus, framing, problem, scope, and simulation (Gravel et al., 2023). In the research of Shorey & Ng (2021), it is stated that simulation, both virtually and manually, is very significant in increasing student knowledge. This means that simulation is an alternative method and medium that can be used in clinical learning ,

The eighth brown cluster is related to artificial intelligence, challenge, chatGPT, innovation, machine learning, opportunity, and power. This is in line with the research of Rudolph et al. (2023) and Kasneci et al. (2023), which states that opportunities and challenges are increasingly widespread, especially with technology that makes it easier for humans, such as chatbots and artificial intelligence (AI). The need for continuous human supervision and the potential for misuse are not unique to the application of AI in education (Lebo & Brown, 2024). But if handled wisely, these challenges can provide insights and opportunities in educational scenarios to introduce students early on to the potential social biases, criticality, and risks of AI applications (Caruso, 2018). Kasneci et al. (2023) also make recommendations on how to overcome these challenges and ensure that the models are used in a responsible and ethical manner in education.

4. CONCLUSION

The mapping results that have been displayed above show the number of terms and other term relationships related to digital education. This is an opportunity for future researchers to develop topics that have not been done much before by looking at the density of topics that have been presented and, of course, paying attention to responsibility and ethics in education. This research contributes to providing information on the use and implementation of technology in nursing education in the digital era. Technology has numerous advantages in enhancing nursing education and improving clinical practice skills and knowledge.

By utilizing technology, nursing education and clinical practice can become more efficient and flexible in response to the most recent requirements and advancements in the medical field.

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