

Utilizing grounded theory to explore the information-seeking behavior of senior nursing students

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Background: The ability to find and retrieve information efficiently is an important skill for undergraduate nursing students. Yet a number of studies reveal that nursing students are not confident in their library searching skills and encounter barriers to retrieving relevant information for assignments.

Objectives: This grounded theory study examined strategies used by students to locate information for class assignments and identified barriers to their success.

Methods: Purposive sampling was used to recruit eleven students, who were asked to record their searching processes while completing a class assignment, and semi-structured, open-ended, audiotaped interviews took place to discuss the


students' journals and solicit additional data. Methods of information seeking, strategies used to find information, and barriers to searching were identified.


Results: Students' main concern was frustration caused by the challenge of choosing appropriate words or phrases to query databases. The central theme that united all categories and explained most of the variation among the data was "discovering vocabulary."

Conclusions: Teaching strategies to identify possible words and phrases to use when querying information sources should be emphasized more in the information literacy training of undergraduate nursing students.

It is essential that nurses attain solid information literacy skills before they graduate and move into practice [1]. Ideally, these skills are introduced in the nursing education curricula and are expected to be retained throughout one's career in clinical and/or academic practice. Although information-seeking skills have been identified as critical, a number of studies reveal that nursing students, as well as practicing nurses, are not confident in their library-searching skills [2, 3]. Research has looked at the types of resources that nursing students access [4, 5], but little has been reported in the literature about how nursing students go about completing their searches, what difficulties they encounter, and how successful they are in locating information.

Research is needed to closely examine the searching process demonstrated by nursing students while they complete assignments and to attempt to identify the points in the process where they encounter difficulties or barriers. Identifying these barriers would provide opportunities for curriculum improvement for both nursing faculty and health sciences librarians tasked with teaching nurses information literacy skills. This study examines strategies used by students to locate resources and information for a class assignment. It looked for patterns in information-seeking behavior, barriers to accessing information, and strategies used by students when unsuccessful in their searches.

 This article has been approved for the Medical Library Association's Independent Reading Program <<http://www.mlanet.org/education/irp/>>.

 A supplemental appendix is available with the online version of this journal.

Highlights

- Although prior studies revealed students' frustration while searching the literature, this study revealed that frustration was primarily caused by the challenge of choosing of words or phrases to query information resources.

Implications

- More time is required to teach nursing students searching skills, especially the primary database in nursing, CINAHL.
- Health sciences librarians and nursing faculty could assist students in developing strategies to identify alternate vocabulary when querying information resources.

BACKGROUND

In Horton's report for the United Nations Educational, Scientific and Cultural Organization (UNESCO), "Understanding Information Literacy: A Primer," health care is identified as one of four "key sector domains," wherein "all citizens have a right to good health and to health care based on informed consent" [6]. Because of the importance of this fundamental right, Horton recommends that "those responsible for devising and delivering the initial training of health-care practitioners should give specific and explicit attention within the curriculum to the development, enhancement and demonstration of Information

Literacy attitudes, expertise and behaviors." However, it is not evident that students are graduating with confidence in their information literacy skills [6, 7]. Horton also recommends that "research should be undertaken into the information-seeking practices of different kinds of information users (such as health professionals or members of the public), to provide a basis for the design of Information Literacy interventions" [6].

To date, very few studies have focused on the information-seeking behavior of nursing students. There are two notable exceptions. The first is a study by Dee and Stanley, who administered a questionnaire to 25 nursing students to ascertain the frequency and type of information resources they consulted. Follow-up interviews clarified and expanded upon the students' responses. The researchers then observed the students while they completed training exercises in database searching. Although 92% of the students used online databases more than once a week, 20% felt that they "lacked the technological skills to search electronic databases" [5]. Most of the students used keyword searching in Google or Yahoo to find medical information on the Internet. The second is an exploratory study by Franks and McAlonan, who surveyed 43 nursing students about their perceived confidence in using library resources after having attended library training sessions. More than one-third of the students indicated that they were not very or not at all confident using "key library skills" [7]. These 2 studies indicate a need to explore the reasons for students' perceived lack of confidence in using key resources such as databases. A study that documents students' searching processes as they work their way through an assignment may shed light on specific difficulties and barriers encountered in that process, and reveal areas to be addressed more fully in information literacy training at the undergraduate level.

Studies examining the information-seeking behavior of clinical nurses reveal the same perceived lack of confidence in searching skills. Pravikoff and colleagues used a stratified random sample of 3,000 registered nurses (RNs) in the United States to find out their "perceptions of the information resources available to them and their skills in using those resources" [2]. The study found that "although 83% of respondents considered themselves at least somewhat successful when searching the Internet or World Wide Web, only 19% and 36%, respectively, were as confident in their ability to search CINAHL or MEDLINE" [2]. Pravikoff and colleagues concluded that "RNs in the United States aren't ready for evidence-based practice because of the gaps in their information literacy and computer skills" [2]. Dee and Stanley's study explored the information-seeking behavior of clinical nurses as well as student nurses and concluded that "the lack of overall computer skills was a bigger deterrent for clinical nurses, reported by 84% of respondents from that group" [5]. Secco and colleagues surveyed 113 pediatric nurses in Manitoba and found a "significant relation-

ship between nurse computer skill and use of computer-based information," leading to the conclusion that "increasing computer skills will likely improve level of information sources used" [3]. A recent survey by Hider and colleagues of 518 health professionals, including 290 nurses, revealed that "over 82% of staff wanted to receive further training in searching Internet-based resources" [8]. It is evident that additional training in information-seeking skills is essential for nursing students to engage in evidence-based clinical practice. What remains unclear, however, are the areas of information literacy training that need to be addressed. To identify these areas, one needs to identify the barriers that nursing students face while searching and accessing information.

The intention of this study was to document the information-seeking processes of senior nursing students' searches on a given topic. The specific aims of the study were to: (a) identify strategies used by students to locate resources and information, (b) identify barriers to accessing information, (c) discover the main concern and the basic social processes used by students when searching, and (d) identify ways to improve the information literacy training provided to students by faculty and librarians. If nursing students develop more efficient and effective skills at the undergraduate level, they are more likely to continue applying those skills in clinical practice to locate evidence-based information, engage in lifelong learning, and improve the care provided to their patients.

METHOD

Sample

The sample consisted of senior undergraduate nursing students from a Western Canadian university. These students complete their first two years at a technical institute before completing their second two years at the university. At the time of this study, nursing students received instruction on information literacy principles such as evaluating websites and different types of publications in their first year at the technical institute. CINAHL instruction was also provided, and keyword searching was presented as preferable. Subject heading searching was suggested if students were unsuccessful using keywords. A library orientation session in the students' third year at the university focused on familiarizing the students with the university's website and highlighted resources specific to nursing. The majority of the ninety-minute session was devoted to a review of CINAHL, since student feedback from previous years' orientation sessions indicated that they remained unclear how best to search this database after their initial instruction session. Health sciences librarians at the university taught how to use the subject heading approach.

All senior nursing students were eligible to participate in the study. Participants were recruited through presentations made to 290 students at 4 different

nursing classes offered between May 2009 and January 2010. A gift certificate for the university's bookstore was provided to thank the participants for their time.

Ethical considerations

This study was reviewed by and received approval from the university's research ethics board and the nursing college research committee. After the authors presented the study to the classes, potential participants were asked to contact the authors if they were interested in learning more about the study. Students who chose to participate met with the authors to review the aims and procedures of the study, and had an opportunity to ask questions. If they chose to participate, they completed a demographic form and a consent form. Procedures to protect the privacy and confidentiality of the participants were strictly followed.

Procedure

Although the ideal way to gather data about information seeking would be direct observation of the students, the discontinuous nature of the students' searching process would make direct observation challenging. Simply interviewing students about how they search for information would most likely result in simplified, scaled-down versions of their experiences, which would not serve the purpose of exploring the searching process. McKnight and Peet purport that there is "an over-dependence of self-reporting in surveys and interviews by small and often self-selected sample populations...this may create bias because the [health care professionals (HCPs)] might censor themselves instead of admitting an information need" [9]. Asking students to document the process as they worked through an assignment would provide a more detailed, accurate record of their searching experiences.

The students were asked to document their search process as they completed an assignment for a nursing class. Students were recruited from four different classes and completed four different assignments. One assignment required students to meet with a local nurse leader and research an issue for which the leader required evidence. The second assignment asked students to choose a "vulnerable population" and research health issues that nurses might encounter when working with this population. The third asked students to write about an issue related to rural nursing, while the fourth asked students to research and write about any issue in nursing.

An electronic template (Appendix, online only) was provided to assist in them in recording their searching process. The template consisted of prompts such as resource consulted, reason for choice, terms searched, outcome, comments, and sources consulted (people). The completed searching journal, based on the template, was emailed back to the authors. The completed journals ranged from one typewritten page

to three typewritten pages, all completed in point form within the template.

Once the searching journals were received and reviewed, the authors contacted the participants for in-depth, semi-structured interviews, which were audiotaped with the participants' permission. Follow-up interviews were used to help confirm and detail the entries made in the journals, enabling data triangulation and allowing the authors to clarify the steps that the participants took in locating information. The interviews took place in either a vacant office in the library or an interview room of a qualitative research facility at the university. Length of interviews ranged from twelve minutes (five transcribed pages) to fifty-seven minutes (twenty-five transcribed pages). The interviews increased in duration as more data were gathered and additional questions arose. The authors made field notes about additional significant information not captured in the interviews, such as context and nonverbal behavior. The process of reviewing students' journals followed up by an interview addresses McKnight and Peet's assertion that "there is a great need for multi-method research into nurses' information behavior" [9].

Interview questions included: How did you choose what resources to consult? What principles guided your search? Did you encounter any barriers in finding information? Did you consult anyone in your search? As the study progressed, the questions changed to reflect the emerging theory and included: How long do you normally spend searching for information before you give up? What would a perfect information help service look like? Throughout the data analysis, "memo-writing," which consists of writing and analyzing notes to oneself throughout the research and is described by Charmaz [10], was used to capture emerging ideas and questions to follow up.

Data analysis and interpretation

The data consisted of participants' journal entries, the authors' field notes and memos, and the interviews, which were transcribed verbatim, reviewed for accuracy, and entered into NVivo 8 software for analysis. Data collection and analysis occurred simultaneously; written records were analyzed using the grounded theory approach as outlined by Charmaz for initial, focused, and theoretical coding [10]. Data were coded line by line, and the exact words of the participants were highlighted to create initial codes that reflected as closely as possible the participants' own words. The most significant or frequent initial codes were then sorted, synthesized, integrated, and organized. From the initial codes emerged focused codes, which are "more directed, selective, and conceptual than word-by-word, line-by-line, and incident-by-incident coding" [10]. Theoretical coding involved comparing and contrasting the focused codes in order to develop the emerging theory of the information-seeking process. Credibility was ensured by checking with participants both in the

follow-up interview while reviewing the data the students entered in their journals and after the interview for further clarification of data or additional information. To establish confirmability, both authors reviewed the data and interpretations to ensure that data analysis followed logically from the data itself [10].

RESULTS

Eleven students volunteered; 9 students were regular stream students, and 2 had prior degrees. The participants ranged in age from 20–46, with a mean age of 30.27 (SD=9.38). Nine students were female; 2 were male. All but 1 student attended at least 1 of the library orientation sessions, and 5 attended both the 1st- and 3rd-year sessions. In terms of computer experience, 8 participants selected “have learned and used between 3 and 10 software programs”; 2 selected “I have used only one or two software programs”; and 1 student chose “other” and indicated receipt of a computer technology diploma. Ten students described themselves as “moderately skilled” Internet users; 1 self-described as “expert.” In terms of their research skills, 1 self-described as “novice,” 7 as “moderately skilled,” and 3 as “highly skilled.”

Although all the students were eventually successful in finding material relevant to their topic, their main concern was the frustration they experienced throughout the searching process. The word “frustration” was used by eight of the students in regard to selecting words to query a database, navigating the database interface itself, sifting through thousands of results, finding relevant information for their topics, and locating the full text of articles. One student recounted her searching experience: “I chose some different words ethnic population illness so um this I got frustrated with because I had too many results and it just took me so long to look through them and the results that came up the title sounded ok but when I read the abstract it didn’t so I got all frustrated so I left it at that.” This student recommended fellow students “try to stay away from things that are maybe too complicated. Like don’t even bother because you’ll just get frustrated after like an hour of searching and then you’ll just give up.” All students developed strategies to retrieve relevant information from databases, but many felt that they would have been able to search more efficiently if they were thoroughly familiar with the primary database for nursing, CINAHL.

All students experienced frustration throughout the searching cycle; however, the process of choosing words to query the database, often unsuccessfully, and having to try different words and re-query the database produced the most frustration. This basic “social process,” defined by Glaser as “a central theme that unites all categories and explains most of the variation among the data” [11], was labeled “discovering vocabulary.” It consists of choosing words, reviewing results, and trying new words until relevant material is retrieved.

Figure 1
The four subprocesses of discovering vocabulary



As the students search for relevant information on their topic, they are discovering the vocabulary of their profession. “Discovering vocabulary” occurs throughout the searching process as students attend classes, choose their topics, and navigate their way through databases, websites, and journal articles. Coding revealed four subprocesses of discovering vocabulary: “confirming principles,” “testing the waters,” “selecting search terms,” and “adjusting search strategy” (Figure 1).

The first subprocess of discovering vocabulary was confirming of the principles presented to students by their instructors and in their textbooks. Textbooks were often consulted to consolidate theory and to glean words and phrases to represent their assigned or chosen topic: “I started at my textbook because that’s always a good place to start when you’re in a class just to see what kind of ideas they had”; “I decided to pull out my textbooks and just look up exactly what they said the primary health care principles were because they’ve been ingrained enough, but I wanted to know what the text said specifically”; “[got ideas for search words] from kind of looking at textbooks and seeing the different terms they used.” Words and phrases from the textbook, as well as terms mentioned by instructors, were often selected as query terms in the databases. Only one student asked a friend for assistance in identifying some search terms. One student revisited her textbook to confirm principles as she drafted her assignment.

Most participants engaged in confirming principles, which led to the second subprocess, testing the waters. After choosing a topic, students often tested the waters by typing a few words or phrases into Google Scholar, Wikipedia, or even CINAHL to see

what information was available: "I research kind of just generally to see what's out there and what's available to me and what I can find"; "I just wanted to see generally what information is there"; "I just tried typing what I thought would be the obvious thing to get responses and then it didn't work so I got kind of frustrated." Some students tested the waters at the beginning of their search process, but some tested the waters during their search if their search was not going well: "I think I normally go to the database first and then if I am confused or if I'm not getting good results then I'll google it."

Through confirming principles and sometimes testing the waters, students have started the subprocess of selecting search terms to query their databases or search engines. They might select words from their textbooks, class notes, the assigned topic, or the same word or phrases used to test the waters, or they might alter their words based on their initial search attempts. Most students spent a lot of time trying different terms and struggled to determine which terms would retrieve the most relevant results: "I can kind of waste a lot of time oh try this term, no that doesn't get me anywhere, try this term, you know, no that doesn't get me anywhere you know. That's kind of frustrating sometimes"; "that's why I tried multiple terms because sometimes if you just get on it it's perfect but it takes a while." One student recommended to "maybe have a couple different terms you want to search for. Because sometimes the first ones you come up with don't work very well." To determine whether the articles retrieved were relevant to their topic, the students normally scanned the titles of retrieved documents looking for words in the article title that matched their search terms. During this process, they might "discover" additional words to try: "when I first search I will go through several papers and choose some words from the paper and use them to research"; "figuring out how to word things is very difficult and a lot of times that doesn't occur to me until later until I've read something else, and then I'll go back and research"; "from the articles I can find some better information and I use this one [word] and go back and search."

Certainly, the subprocess of selecting search terms represented the biggest challenge for students, as the previously mentioned statement indicates: "I can kind of waste a lot of time, oh try this term no that doesn't get me anywhere, try this term, you know, no that doesn't get me anywhere you know. That's kind of frustrating sometimes." All students discovered their own strategies for coping with the challenge of selecting search terms. A few brainstormed to think of additional terms and advised fellow students to "choose your words carefully and just try different ones" and "you just have to kind of play around with the words." Another way of selecting terms was to scan relevant articles, noting relevant keywords in the title or abstract that had not previously come to mind, "and then I'll go back and research." One student reported using an online thesaurus to generate additional search terms: "I use the thesaurus quite a

bit too like if something doesn't like the word or doesn't come up with anything I'll try a different one," while another mentioned reviewing the cited references of relevant journal articles.

Students did not have a strong understanding of the difference between searching using keywords and searching using subject headings: "I don't know what the difference between subject headings and key words are." They were confused after entering their search terms in CINAHL and being presented with a list of subject headings: "then it took me to that main headings page that you get in CINAHL which I don't really know what to do when I get there"; "I usually skip that part if I have to if I can I go to something more easy and just kind of more convenient for me." Some students recalled being introduced to the concept of subject headings in the library orientation session in their third year, but most students chose to continue searching by keyword, a searching method taught in their first-year library orientation session. One student commented: "if I had a better or maybe more experience a better working knowledge with CINAHL it might I might be able to use their organization and find more appropriate articles...It is hard to use." Another student advised, "make sure you have a solid understanding of how you can use CINAHL, how you can use it effectively because even though I've been through your information sessions ...and at [the technical institute] I still don't know how to use it properly. So I think that's one of my barriers. So if I was able to better understand how to use it that's now the tool that you're going to use and then don't be afraid to ask." Only one student was comfortable searching CINAHL, but she went about her searching quite differently. She chose to search CINAHL by keyword and deliberately kept her topic broad rather than picking a specific topic at the outset. She would then test the waters in CINAHL and was guided by the journal articles that she retrieved. Often, she would add a second or even third search term to narrow down her results, but she put off choosing a specific topic until she had identified a significant number of papers and once she had secured an acceptable number of high-quality papers, she would finalize her topic and begin to write. This student searched CINAHL by keyword and recommended that fellow students do the same.

After selecting search terms and executing the search, students were either successful in finding relevant information for their topic or they were not. Whatever the search outcome, most students had to adjust their search strategy, the final subprocess of discovering vocabulary. Students who successfully retrieved pertinent articles often found themselves with too much information and faced the task of having to winnow down their retrieved documents. The most common way of doing this was to exclude documents relating to other health professions and retain only the material relevant to the nursing profession by adding the word "nursing" to the search. Some students added geographic terms such as "Canada" to limit their retrieval.

The students who were not successful in locating relevant information either revised their search strategies again by trying different search terms or decided to change their topics. When asked what determined how long students would persevere in their searching, the most common answer was "confidence" that information existed on the topic they were searching.

Figure 1 aims to represent the searching process graphically. Although all students eventually wrote a paper, they might not have participated in all of the subprocesses, but would have participated in at least one or two before writing their papers. The diagram represents the most common path, moving from the outside of the circle toward the center, but students did start at different places in the model and depending on their success, moved through the processes more than once.

DISCUSSION

This study set out to examine the information-seeking processes and behavior of senior undergraduate nursing students on a given topic. From an early stage, the students revealed their "frustration" with the process of locating relevant information for their assignments. While multifaceted, the frustration focused primarily on the difficulty of identifying the most fruitful of words or phrases to retrieve relevant results in databases. This process was labeled "discovering vocabulary" since it involved students initially trying words and phrases familiar from textbooks and professors, then coming across unfamiliar words and phrases or words that had not occurred to them previously to search. Confusion around keyword searching and subject heading searching complicated the searching process. The subprocesses of discovering vocabulary were confirming principles, testing the waters, selecting search terms, and adjusting search strategy.

The array of information-seeking studies is vast and diverse. To organize the inordinate number of articles published on this topic, Case categorizes studies into four areas: "information seekers by occupations (e.g. sciences, managers); information seekers by role (e.g. patient or student); information seekers by demographics (e.g., by age or ethnic group); theories, models, and methods used to study information seekers" [12]. To assess the significance of the current study's findings, it seems reasonable to compare it with two of these categories: firstly, information seekers by role, in this case nursing students, and secondly, information seekers by occupations, in this case clinical nurses.

Dee and Stanley's study of nursing students described earlier found that 96% of the 25 nursing students did use CINAHL, but 20% felt that they lacked the skills to search electronic databases properly. More often students relied on Internet search engines, such as Google, and employed keyword searching [5]. While the students demonstrated significant comfort with computers and skill in

querying Internet search engines, they required significant training to search specialized databases such as CINAHL and MEDLINE and use the hierarchical, controlled vocabularies to find information efficiently and effectively. During subsequent interviews, the students acknowledged that they were not aware of subject heading searching. The current study confirms the discomfort with a subject heading approach to searching specialized databases and sheds light on some of the reasons for this discomfort.

Franks and McAlonan's study also raised the issue of student confidence while they search the literature. It revealed that fifteen of the forty-three students felt "not very confident" or "not at all confident" when using CD-ROMs and databases [7]. However, that exploratory study did not delve into the specific reasons for the students' lack of confidence. By contrast, ten of the eleven students in our study described themselves as "moderately skilled" or "highly skilled" researchers but still experienced a significant amount of frustration with the searching process.

A 2005 study in the United States that measured the impact of information-skills training on student midwives alluded to the challenge of selecting appropriate vocabulary, "the tutor seemed to always be able to think of alternative search terms, like 'hypertension' and 'blood pressure'"; "It isn't always so easy when we're doing it, but I understand why we have to do it. I suppose the more assignments we do the easier it will become" [13]. A Swedish study examined perceptions of librarians' expertise by nursing students and faculty. A nursing professor acknowledged the difficulty of identifying appropriate keywords: "They help you to...find the keywords, that is, for the students...it's the same thing for me when I'm doing my thing and my research and for the students when they are about to start with their essays. It's hard to say what it is exactly, what keywords fit. In our area there are so many soft terms that are difficult to get a grip on" [14].

Lack of confidence was a key finding in many of the studies examining the information-seeking behavior of clinical nurses as well. However, in these studies, lack of confidence was often related to weak computer skills [3, 15, 16]. Confidence was mentioned by a few students in the current study, but in a different context. Two of the students mentioned that they would invest more time researching a topic before giving up if they had a significant amount of confidence that information on the topic existed. Like the students in the Franks and McAlonan study, they expressed a desire for more training in electronic databases, CINAHL in particular.

The current study's finding of frustration was not explicitly noted in studies with nursing students or clinical nurses, but it was mentioned in one study that attempted to construct an information-seeking model for all professionals. Leckie and colleagues stated that "studies of diverse professional groups have all concluded that frequently, professionals are frustrated in their search for relevant and necessary infor-

mation. Frustration results because a large number of complex and interacting variables may influence information-seeking processes" [17]. The study did not, however, examine the information-seeking process in any degree of detail.

By contrast, Kulthau's detailed model of the information search process was developed after studying library users who were completing research projects. She suggests that there are six stages in the information search process: initiation, selection, exploration, formulation, collection, and presentation [18]. Kulthau's description of the exploration stage resonates with the authors' perceptions of the nursing students as they also experienced "confusion, uncertainty and doubt" when interacting with databases. The nursing students' struggle with selecting appropriate search terms echoes Kulthau's observations that communication between the user and the system is awkward. In our study, the awkwardness seemed to stem from confusion concerning keywords, subject headings, and the database interface. A notable exception was the student who deliberately did not choose a topic right away but chose instead to browse through the available literature and use what she read to help formulate a topic. This student's searching behavior affirms the success of this approach, and Kulthau suggests that librarians not underestimate highlighting the browsing stage when providing library instruction to students.

LIMITATIONS

Because one of the authors was a health sciences librarian who had provided library orientation sessions to many of the nursing students, there is a good possibility that those volunteering for the study did so because they felt confident about their searching skills. This seems to be reflected in the sample demographics: ten of eleven participants self-rated as either moderately or highly skilled searchers. Future research should be done with students who are less confident about their searching skills. It is also possible that students may not have felt they could be completely candid about their research experiences, given that one of the authors was the health sciences librarian responsible for the college of nursing. It is also important to note that this study was conducted at one institution only. It is possible that different students from different academic institutions would yield different results.

RECOMMENDATIONS FOR PRACTICE

This study brings to light specific challenges that senior undergraduate nursing students experience when researching and locating information. The results clarify students' searching processes and may allow both nursing faculty and librarians to pinpoint the origin of students' challenges and thus be more readily able to offer assistance. Because most students recognized the importance of their ability to search CINAHL well, it would be wise to make training in

appropriate CINAHL search techniques required. Librarians should consider spending more time during training sessions on strategies to assist students in identifying keywords and alternate keywords if their first choices do not yield results. These strategies include verifying concepts in the course textbook, using thesauri, noting the keywords or subject headings identified from located papers, consulting specialized nursing or other pertinent dictionaries, and checking Wikipedia or Google Scholar. Students can also be reminded to "pearl" located information by checking the cited reference lists of retrieved papers or by using Google Scholar or the Web of Science database to see if the paper of interest has been cited. Librarians would do well to explain the "iterative" nature of literature searching, which necessitates selecting keywords, querying the database, reviewing the results, modifying or adding keywords if necessary, re-querying the database, and repeating this procedure until one is satisfied that the information retrieved is relevant, as current as possible, and authoritative. Finally, the authors encourage all nursing faculty and health sciences librarians to work collaboratively to integrate the teaching of research skills into the curriculum to encourage the development of student information literacy skills.

CONCLUSION

In their search for relevant information to complete assignments, nursing students experience frustration as they struggle to select words and phrases that yield fruitful results in databases such as CINAHL and search engines like Google Scholar. Students also struggle with the concepts of keyword searching and subject heading searching even after attending library orientation sessions at two educational institutions and being presented with two different approaches to searching the literature. Understanding barriers and sources of frustration for students is important when designing information literacy programs. Strategies should be taught for identifying alternate keywords and phrases to represent search concepts. Because CINAHL is the main database for nursing and contains unique material, it is essential that students attain mastery of this database.

To provide quality care, practicing nurses must be able to locate evidence-based information efficiently. They must also possess strong research skills to support lifelong learning and facilitate informed patient consent. Understanding the information-seeking barriers and identifying strategies to assist undergraduate students in overcoming them to locate information are important steps toward achieving the goal of nurses truly becoming "knowledge workers."

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