Evidence Based Library and Information Practice

Evidence Summary

Neuroscientists' Domain Knowledge Does Not Improve Search Performance in PubMed

Reviewed by:
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Abstract

Objective – To determine whether neuroscientists and life scientists' domain knowledge affects their search performance in PubMed for neuroscience topics.

Design – Cross-sectional experimental study.

Setting – State-funded research laboratories in the cities of Paris, Bordeaux and Poitiers, France.

Subjects – There were 32 participants in the study: 16 neuroscientists and 16 life scientists with no experience in neuroscience. Both groups were similar in terms of age, gender, occupation, and online database search experience.

Methods – All participants were asked to complete the same five tasks in PubMed to assess their search performance with this database. Each task consisted of finding and selecting bibliographic references on a neuroscience topic within 15 minutes. The instructions for these tasks were hidden from view during the search process. Participants performed the tasks on their office computers between May 2005 and June 2006 in the presence of one researcher who prompted them to verbally describe what they were doing and thinking as they searched. Each participant also filled out a questionnaire about their personal characteristics at the beginning of the search session and completed a second questionnaire about their knowledge of PubMed at the end. The entire experimental procedure lasted between 60 and 90 minutes and was recorded. The relevancy of the

bibliographic references selected was later scored by two neuroscientists who did not participate in the study. The data were analyzed using multivariate analysis of variance (MANOVA) and qualitative analysis of verbal protocols.

Main Results – The MANOVA analysis did not show any significant differences between the total scores obtained by the neuroscientists and the life scientists. Both groups were able to find relevant PubMed references for each task within the time allotted. Contrary to the researchers' first main hypothesis, the neuroscientists' domain knowledge did not result in a superior search performance (i.e., in less time spent searching and more relevant results) compared to that of the life scientists.

However, domain knowledge did affect the method of searching, confirming the researchers' second hypothesis. The life scientists spent more time reading the instructions for each task, included more keywords in their search queries, and opened more abstracts to select relevant references than the neuroscientists. The life scientists also used keywords that were almost exclusively taken from the instructions for each task when they searched PubMed and made significantly more mistakes than the neuroscientists.

Furthermore, the participants' knowledge of PubMed was poor as was expected, despite stating they used it very frequently. Half of the participants did not attempt to use limits even when the task called for it. The majority only used PubMed in the most basic way, that is, by typing keywords in the search box.

Conclusion – Domain knowledge affects how end users search PubMed for topics in their specialty, but it does not impact their performance. Both the neuroscientists and the life scientists successfully completed the search tasks on neuroscience topics within the allotted time. Both groups had basic knowledge of PubMed, but were satisfied with their performance and results.
The authors suggest that scientists would only be interested in attending a PubMed training

session if they are convinced that they will learn how to search more quickly. Further experiments are needed to verify the effects of domain knowledge on search performance with topics that are more general. The search tasks used in this study were very specific, which may have positively influenced the performance of all participants. A different control group that shares less basic domain knowledge with the neuroscientists, such as mathematicians or chemists, may also be tested.

Commentary

Lindsay Glynn's EBLIP Critical Appraisal Checklist (2006) was used to critically appraise this study. To place this study in context, the authors conducted a comprehensive literature review to identify the factors that influence scientists' online information seeking behaviour. These factors are: experience in online searching, knowledge or experience using the search tool, domain knowledge, and general cognitive abilities such as spatial visualization, vocabulary level, and processing speed. This study examined one of these factors, domain knowledge, and the results indicate that domain knowledge does not affect search performance in PubMed, which contradicts the authors' original hypothesis.

However, there are confounding variables in the study that may negate its findings. For example, the search tasks were very specific. Eighty-four percent of the keywords used by the neuroscientists to compose their queries and 93% of the keywords used by the life scientists were taken directly from the search question. Participants were also required to find only one or two articles to complete each task. Both points raise questions about the validity of the search tasks. Rather than measuring the participants' search performance, the tasks may actually have assessed the effectiveness of PubMed to return some relevant results to pertinent keywords, which were supplied by the researchers in the search question. Secondly, the control group (the life scientists) followed a similar

undergraduate program to the test group (the neuroscientists), which may have resulted in sharing some basic domain knowledge that gave both groups the same advantage in answering the questions. The authors suggested further experiments that will address these weaknesses, including using less well-defined questions and adding a control group that does not share basic domain knowledge with the neuroscientists.

In addition, the small sample size and the authors' omission of their selection criteria for the sample population make it difficult to generalize the study's findings. Stronger evidence is needed to confirm that domain knowledge does not improve search performance in PubMed. It would also be difficult for other researchers to replicate this study, since the pre-task and post-task questionnaires are not included in the appendices.

Despite its weaknesses, this study will interest reference and instructional librarians who seek to understand how scientists search PubMed. The appendix includes a detailed list of errors made by participants during their searches, which may suggest concepts or features that should be stressed during a PubMed training session. The authors feel that PubMed training should focus on showing users how to decrease the number of their mistakes and search more quickly, rather than emphasizing how to increase the relevancy of their search results. The authors remind readers that scientists and health professionals exhibit satisficing behaviour when it comes to information seeking, searching only as long as it takes them to find enough useful references to satisfy their information need.

References

Glynn, L. (2006). A critical appraisal tool for library and information research. *Library Hi Tech, 24*(3), 387-399.