Evidence Based Library and Information Practice

Searching on Health Information Databases: A Search Interface Including Thesaurus Term and Tree Browsers is More Effective than a Simple Search Interface

A Review of:
Mu, X., Lu, K., Ryu, H. (2014). Explicitly integrating MeSH thesaurus help into health information retrieval systems: An empirical user study. *Information Processing and Management, 50*(1), 24-40. http://dx.doi.org/10.1016/j.ipm.2013.03.005

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Abstract

Objectives – To compare the effectiveness of a search interface with built-in thesaurus (MeSH) terms and tree browsers (MeshMed) to a simple search interface (SimpleMed) in supporting health information retrieval. Researchers also examined the contribution of the MeSH term and tree browser components towards effective information retrieval and assessed whether and how these elements influence the users' search methods and strategies.

Design – Empirical comparison study.

Setting – A four-year university in the United States of America.

Subjects – 45 undergraduate and postgraduate students from 12 different academic departments.

Methods – Researchers recruited 55 students, of which 10 were excluded, using flyers posted across a university campus from a wide range of disciplines. Participants were paid a small stipend taking part in the study.

The authors developed two information retrieval systems, SimpleMed and MeshMed, to search across a test collection, OHSUMED, a database containing 348,566 Medline citations used in information retrieval research. SimpleMed includes a search browser and a

popup window displaying record details. The MeshMed search interface includes two additional browsers, one for looking up details of MeSH terms and another showing where the term fits into the tree structure. The search tasks had two parts: to define a key biomedical term, and to explore the association between concepts. After a brief tutorial covering the key functions of both systems, avoiding suggestion of one interface being better than the other, each participant then searched for six topics, three on each interface, allocated randomly using a 6x6 Latin square design.

The study tracked participants' perceived topic familiarity using a 9-point Likert scale, measured before and after each search, with changes in score recorded. It examined the time spent in each search system, as recorded objectively by system logs, to measure engagement with searching task. Finally, the study examined whether participants found an answer to the set question, and whether that response was wrong, partially correct, or correct. Participants were asked about the portion of time they spent on each of the system components, and transaction log data was used to capture transitions between the search components. The participants also added their comments to a questionnaire after the search phase of the experiment.

Main Results – The baseline mean topic familiarity scores were similar for both interfaces, with SimpleMed's mean of 2.01, with a standard deviation 1.43, compared to MeSHMed's mean of 2.08 with a standard deviation of 1.60. The mean was taken for topic familiarity change scores over three questions on each interface and compared using a paired sample two-tailed *t*-test. This showed a statistically significant difference between the mean change in topic familiarity scores for SimpleMed and MeSHMed.

Only 46 (17%) of the questions were not answered, 34 (74%) when participants were using SimpleMed and 12 (26%) when using MeSHMed. Researchers found a chi-squared test association between the interface and whether the answer was correct, suggesting that MeSHMed users were less likely to

answer questions incorrectly. The question-answer scores positively correlated to the topic familiarity change scores, indicating that those participants whose familiarity with the topic improved the most were more likely to answer the question correctly.

The mean amount of time spent overall using the two interfaces was not significantly different, though researchers do not provide data on mean times, only total time and test statistics. On the MeSHMed interface, on average participants found the Term Browser feature the most useful aspect and spent the most amount of time in this component. The Tree Browser feature was rated as contributing the least to the searching task and the participants spent the least amount of time in this part of the interface.

Patterns of transitions between the components are reported, the most common of which were from the Search Browser to the Popup records, from the Term to the Search Browser, and vice versa. These observations suggest that participants were verifying the terms and clicking back and forth between the components to carry out iterative and more accurate searches. The authors identify seven typical patterns and described four different combinations of transitions between components.

Based on questionnaire feedback, participants found the Term Browser helpful to define the medical terms used, and for additional suggested terms to add to their search. The Tree Browser allowed participants to see how terms relate to each other, and helped identify related terms, despite many negative feedback comments about this feature. Almost all participants (43 of 45) preferred MeSHMed for searching, finding the extra components helpful to produce better results.

Conclusion – MeSHMed was shown to be more effective than SimpleMed for improving topic familiarity and finding correct answers to the set questions. Most participants reported a preference for the MeSHMed interface that included a Term Browser and Tree Browser to the straightforward SimpleMed interface. Both

MeSHMed components contributed to the search process; the Term Browser was particularly helpful for defining and developing new concepts, and the Tree Browser added a view of the relationship between terms. The authors suggest that health information retrieval systems include visible and accessible thesaurus searching to assist with developing search strategies.

Commentary

Health literacy is a fast-growing area of research and this study looks to contribute to this area. The study evaluates the usefulness of providing easy, visible access to thesaurus and tree browsers to enhance retrieval of health information from a bibliophic health database. On the whole, the study is well designed and conducted when evaluated against Glynn's critical appraisal tool (2006). One shortcoming is that effect sizes should be reported, such as the mean change in topic familiarity scores, rather than only the statistical tests and significance (Sullivan & Feinn, 2012).

The participants in this study are well-educated university students familiar with research. It is worth questioning whether they serve as a representative sample of consumers looking for health information online who may be unfamiliar with medical terminology. Participants were also volunteers and paid for their involvement, which may have biased the sample, although this is unlikely as the remuneration is very small. The study findings may not be generalizable to all health consumers or even all university students due to the small sample size.

The new systems under study searched across a subset of the Medline database records, whose intended audience is health professionals and researchers. Therefore, this is not the most accessible source of health information for a general consumer. There are many reliable, pre-appraised, synthesised, evidence-based health resources available on the Internet, such as MedlinePlus (http://www.nlm.nih.gov/medlineplus/) and

Patient.co.uk (http://www.patient.co.uk/). These resources are specifically written without medical terminology for a lay audience, and do not need thesaurus browsers to be able to find the information that is required. Health consumers, particularly lay people, require skills in judging if online health information comes from a reliable source and should be directed toward trustworthy resources by health professionals or professional organisations.

Although the study results may only directly apply to a small proportion of health consumers, many health professionals and medical students often struggle with retrieving answers to clinical questions from databases such as Medline. Search engines and interfaces have tended to simplify the searching functions in recent years, but this study suggests that people need more tools that increase personal understanding of a topic. MeSH browsers are available on PubMed and other interfaces, but generally users have to know what thesaurus terms are, how to use them, and where to find them in the system, to be able to use them effectively.

Searchers who may not already be familiar with a topic tend to use general search engines and online dictionaries to help find and define related terms before searching a database. The built-in MeSH 'Scope Notes' do not always give adequate definitions of the thesaurus terms. More resources, such as thesaurus and tree browsers, that are easily accessible and visible should be built into search interfaces.

Often thesaurus searching is seen as too advanced and not taught with simple searching techniques. Therefore, this study has implications for how searching skills are taught to health professionals, and suggests the importance of search skills instruction that highlights the added benefit of using the in-built thesaurus from the beginning. The findings of this study are particularly useful for librarians and other information professionals who teach search skills, and may benefit and influence developers of search interfaces.

References

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