Stretching PICO: Implications for Database Searching and Perceived Searching Confidence

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Introduction

Library and Information Technology (LIT) students develop knowledge and expertise in translating diverse patron reference questions into effective search strategies. Traditionally, LIT students are taught generic concept mapping for identification of searchable components. This research explores how PICO could be modified and applied, outside of the clinical context, as a novel teaching approach in LIT education, by specifically examining the effectiveness of PICO vs generic concept mapping as searching strategies for first year LIT students. Also considered are student preference and differences in perceived searching confidence between the two strategies.

Literature Review

The use of concept mapping assists searchers in translating an information need into a structured search strategy, and has been associated with more competent searchers, better search results, and increased searcher confidence (Booth, 2006; Kuhlthau, Heinström, & Todd, 2008). In evidence-based practice in healthcare, PICO (an acronym wherein P=patient or population; I=Intervention; C=Comparison; O=Outcome) is used to formulate answerable clinical questions, and can be applied as a structured concept mapping approach to develop more focused search strategies for retrieving more relevant results (Adams, 2014; Booth, 2006; Crumley & Koufogiannakis, 2002; Kloda & Bartlett, 2013).

The application or adaptation of PICO for use beyond a strictly medical or clinical context has been suggested in the literature (Booth, 2006; Crumley & Koufogiannakis, 2002; Davies, 2011; Kloda & Bartlett, 2013), with some seeing its potential for enabling learners to develop search strategy thinking (Snowball, 1997; Welty, Hofstetter & Schulte, 2012). Although Hoogendam, de Vries Robbe and Overbeke (2012) have found there to be no significant difference with using PICO vs unguided searches for medical contexts, in medical databases, with medical students, there is no identified research into the application of PICO for answering patron questions outside of the medical field.

This research fills gaps in the published literature on the effectiveness of applying PICO outside of the clinical health context.

Methodology

Research Questions:

1. Does using PICO produce more relevant search results than using a generic concept map?
2. Does using PICO improve perceived searching confidence when compared to using a generic concept map?

The professor and librarian collaboratively facilitated guided searching activities during one lecture period in a computer lab, wherein students employed both PICO and generic concept map strategies for consumer health related patron reference questions. Students completed an online form providing the following:

- Permalinks to database search results
- Indication of preferred strategy
- Perceived confidence scores
- Comments

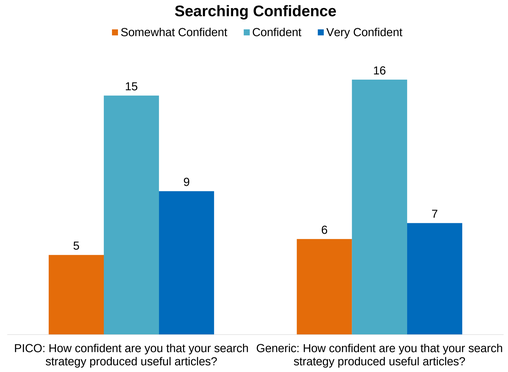
This study received Research Ethics Board approval from MacEwan University.

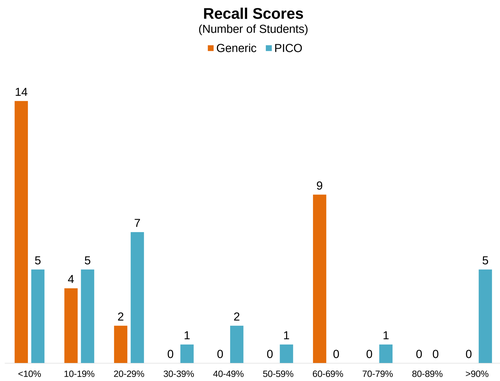
Results

Database search results were analyzed for recall, the effectiveness of the search strategy in retrieving relevant results, and for precision, the percentage of relevant results within results retrieved. Database subject headings were used to establish a set of relevant articles for each topic. Recall and precision scores were calculated for both the generic concept mapping search results and the PICO search results, as follows:

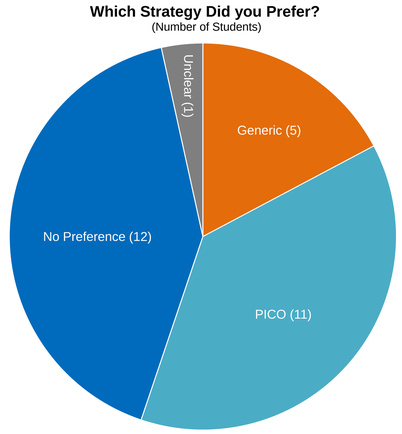
R = Established set of all relevant articles within database for topic
X = Search result count (total articles retrieved in search)
N = Number of R (relevant articles) within X (search results)

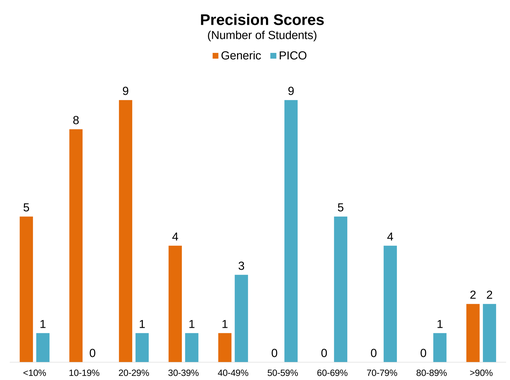
Recall score: N/R * 100
Precision score: N/X * 100



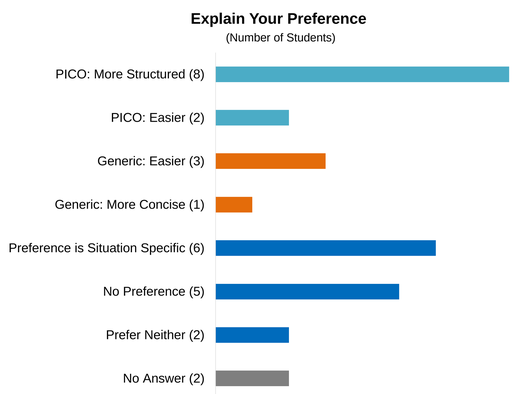


	Generic	PICO
Mean	25	36
Median	10	20





	Generic	PICO
Mean	26	58
Median	24	57



Discussion

Analysis of the search results revealed:

- Comparable recall scores for both the generic concept mapping strategy and PICO strategy.
- Greater precision with PICO searches.

Self-rated searching confidence results were not significantly different between the two strategies.

Students commented on the effectiveness of PICO for structuring a focused search, yet no clear preference was indicated. Several students noted preference would be situationally determined by the reference context.

Limitations:

- Different search topic questions were used for the generic concept map and PICO examples. As search strategy development may differ for different topics, this may have affected the precision and recall comparison.
- The process for establishing a set of relevant articles differed slightly between topics due to assigned database subject headings.
- Improved precision scores for PICO may be a reflection of skills developed in prior practice via application of concept mapping.
- Data resulting from errors in student application of search strategy methodology were removed from the dataset prior to analysis. i.e. use of OR rather than AND.

Recommendations

Though students did not indicate a clear preference or difference in confidence ratings between the PICO and generic concept mapping search strategies, the findings indicate both are useful strategies for LIT students, depending on their personal searching abilities and context of patron interaction.

It is imperative to teach future library and information professionals a range of strategies to develop searching expertise and enhance flexibility for future studies and patron interactions. PICO can be considered a valuable tool that could be adapted for general reference practitioners.

References

Adams, N. E. (2014). A comparison of evidence-based practice and the ACRL information literacy standards: Implications for information literacy practice. *College & Research Libraries, 75*(2), 232-248.

Booth, A. (2006). Clear and present questions: Formulating questions for evidence based practice. *Library Hi Tech, 24*(3), 355-368.

Crumley, E., & Koufogiannakis, D. (2002). Developing evidence-based librarianship: Practical steps for implementation. *Health Information & Libraries Journal, 19*(2), 61-70.

Davies, K. S. (2011). Formulating the evidence based practice question: A review of the frameworks. *Evidence Based Library and Information Practice, 6*(2), 75-80.

Hoogendam, A., de Vries Robbe, P. F., & Overbeke, A. J. P. (2012). Comparing patient characteristics, type of intervention, control, and outcome (PICO) queries with unguided searching: A randomized controlled crossover trial. *Journal of the Medical Library Association, 100*(2), 121-126.

Kloda, L. A., & Bartlett, J. C. (2013). Formulating answerable questions: Question negotiation in evidence-based practice. *Journal of the Canadian Health Libraries Association, 34*(2), 55-60.

Kuhlthau, C. C., Heinström, J., & Todd, R. J. (2008). The 'information search process' revisited: Is the model still useful. Information research, 13(4), 45-58.

Snowball, R. (1997). Using the clinical question to teach search strategy: Fostering transferable conceptual skills in user education by active learning. *Health Information & Libraries Journal, 14*(3), 167-172.

Welty, E., Hofstetter, S., & Schulte, S. J. (2012). Time to re-evaluate how we teach information literacy: Applying PICO in library instruction. *College & Research Libraries News, 73*(8), 476-477.