

Ellen Welty, Sheila Hofstetter, and Stephanie J. Schulte

Time to re-evaluate how we teach information literacy

Applying PICO in library instruction

Students do not know where to begin and end a research question, a database search, or a research paper. So asserts the 2010 Project Information Literacy (PIL) study, which emphasizes the need for academic librarians to teach students to formulate research questions “over teaching the selection of resources.”¹

Academic librarians teach students information literacy skills to successfully complete assignments in preparation for a 21st century workplace and its ever increasing accountability for effectiveness and efficiency. As the workplace demands that decisions be based on valid data and best evidence, so should academic librarians be held accountable for their pedagogical methods when teaching information literacy skills.

The PIL study was conducted by the University of Washington Information School and surveyed 8,353 sophomores, juniors, and seniors across 25 college and university campuses. The study reported many findings related to students’ information-seeking strategies and research difficulties. Most troubling, PIL uncovered a dire need for students to be guided in formulating a research question and reported anxiety surrounding this first step was pervasive and debilitating.

Finally, librarians have large scale data to guide us in how to best help students. PIL recommended librarians rethink their instruction, focusing on process rather than finding sources. That focus on process draws attention to getting started and formulating

a research question. How do we do this? What effective pedagogical method is there to teach students to formulate a research question?

In the early 1990s, a working group from McMaster University in Canada introduced the medical world to evidence-based medicine, a new paradigm for teaching medicine. In doing so, this group suggested that building good clinical questions was the foundation for finding relevant evidence to answer such questions. So too did they recognize that this acknowledgement of a knowledge gap could provide the basis for an efficient search of the literature.

In 1995, the anatomy of a clinical question was described as having components mirroring the research process: patient or problem (P), intervention (I), comparison intervention (C), and outcome (O).² The PICO movement was born, an acronym that health sciences librarians have used successfully for many years to guide students as they begin their research.

Could such an acronym be the solution to the problems described in PIL?

Ellen Welty is associate librarian in the Applied Programs and Education at Arizona State University-Polytechnic Campus, Sheila Hofstetter is health sciences librarian in the Noble Science and Engineering Library at Arizona State University, e-mail: sheila.hofstetter@asu.edu, Stephanie J. Schulte is education and reference services coordinator in the Health Sciences Library of the Ohio State University, e-mail: schulte.109@osu.edu,

© 2012 Ellen Welty, Sheila Hofstetter, and Stephanie J. Schulte

As we see it, the answer is yes. PICO skillfully serves three vital purposes that help students get started. First, the elements of the research question are penned in a structured manner. Even if the question is imperfect, the structure forces the development of a defined research question even within a complex situation, compelling the student to start. Second, PICO logically provides the beginnings of a focused search. Terms that are noted for each letter of the acronym form the basis of a formulaic search strategy that can be refined for the topic and discipline at hand. Third, it demands librarians alter their typical approach and spend time on question development before jumping into the depths of resources and searching.

Though the PICO acronym originally provided few synonyms for each letter (patient or problem, intervention, comparison intervention, outcome), today's major textbooks on evidence-based practice have expanded this list to address a broader range of questions. We propose that this broader range of synonyms provides an excellent tool that can be adapted for facilitating student research in many disciplines, not just health sciences.^{3,4}

Some PICO possibilities include: *population* (or participants, principle person or thing, problem, predicament, process); *intervention* (or a novel therapy, treatment, test, program, educational technique, investigation of time/exposure/analysis, issues of interest including risk, predictors, anomaly, or improvement); *comparison intervention* (or standard of operation/care/technique, placebo, or possibly no comparison); and *outcome* (results or endpoint).

In the simplest form, a research question could be condensed to just the P elements, often who or what, and to the I elements, often how or why. After writing specific PICO questions, sometimes students realize they need to build a basic topical knowledge base by answering the traditional 5Ws, i.e., who, what, where, when, why. Launched with this knowledge base into secondary and tertiary sources, students can more easily formulate searches using the PICO framework.

Not all PICO elements may be needed for an effective search, depending on the topic. Many expert searchers in healthcare first search the P and I before considering the need to search other PICO elements. Once the elements are fleshed out, the search strategy P2, I2, C2, and O2 all represent any number of synonyms for the original research element and depending on search results, elements of the strategy can be eliminated one by one as appropriate. PICO could be theoretically written as: (P or P2) and (I or I2) and (C or C2) and (O or O2).

PICO is a proven pedagogical model that has been used successfully by health sciences librarians for years. Its simplistic approach is easy to remember and prompts students of all levels to formulate focused research questions that form the basis of search strategies that find relevant literature. Simple and easy to remember are two very important factors to undergraduate students.

We believe it is time to embrace the use of PICO outside health sciences to help undergraduates overcome some of the difficulties identified in the 2010 PIL findings.

Notes

1. Alison J. Head and Michael B. Eisenberg, "Project Information Literacy Progress Report: Truth be told: How college students evaluate and use information in the digital age," retrieved December 1, 2011, http://projectinfolit.org/pdfs/PIL_Fall2010_Survey_FullReport1.pdf; 2, 25, 39.

2. W. Scott Richardson, Mark C. Wilson, Jim Nishikawa, and Robert S. Hayward, "The Well-built Clinical Question: a Key to Evidence-based Decisions," *ACP Journal Club*, 123, no. 3 (1995): A12-3.

3. Bernadette M. Melnyk and Ellen Fineout-Overholt, *Evidence-based Practice in Nursing & Healthcare: A Guide to Best Practice* (Philadelphia: Lippincott Williams & Wilkins, 2011); 31.

4. Sharon E. Straus, Pau Glasziou, W. Scott Richardson, and Brian Haynes, *Evidence-based Medicine: How to Practice and Teach It* (New York: Churchill Livingstone, 2010); 15. *z*