Evidence Based Library and Information Practice

Formulating the Evidence Based Practice Question: A Review of the Frameworks

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Introduction

Questions are the driving force behind evidence based practice (EBP) (Eldredge, 2000). If there were no questions, EBP would be unnecessary. Evidence based practice questions focus on practical real-world problems and issues. The more urgent the question, the greater the need to place it in an EBP context.

One of the most challenging aspects of EBP is to actually identify the answerable question. This ability to identify the question is fundamental to then locating relevant information to answer the question. An unstructured collection of keywords can retrieve irrelevant literature, which wastes time and effort eliminating inappropriate information. Successfully retrieving relevant information begins with a clearly defined, well-structured question. A standardized format or framework for asking questions helps focus on the key elements. Question generation also enables a period of reflection. Is this the information I am really looking for? Why I am looking for this information? Is there another option to pursue first?

This paper introduces the first published framework, PICO (Richardson, Wilson, Nishikawa and Hayward, 1995) and some of its later variations including ECLIPSE (Wildridge and Bell, 2002) and SPICE (Booth, 2004). Sample library and information science (LIS) questions are provided to illustrate the use of these frameworks to answer questions in disciplines other than medicine.

Booth (2006) published a broad overview of developing answerable research questions which also considered whether variations to the original PICO framework were justifiable and worthwhile. This paper will expand on that work.

Question Frameworks in Practice

PICO

The concept of PICO was introduced in 1995 by Richardson et al. to break down clinical questions into searchable keywords. This mnemonic helps address these questions:
P - Patient or Problem: Who is the patient? What are the most important characteristics of the patient? What is the primary problem, disease, or co-existing condition?
I – Intervention: What is the main intervention being considered?
C – Comparison: What is the main comparison intervention?
O - Outcome: What are the anticipated measures, improvements, or affects?

Medical Scenario and Question: An overweight woman in her forties has never travelled by airplane before. She is planning an anniversary holiday with her husband including several long flights. She is concerned about the risk of deep vein thrombosis. She would like to know if compression stockings are effective in preventing this condition or whether a few exercises during the flight would be enough.
P – Patient / Problem: Female, middle-aged, overweight
I – Intervention: Compression stockings
C – Comparison: In-flight exercises
O – Outcome: Prevent deep vein thrombosis

The PICO framework and its variations were developed to answer health-related questions. With a slight modification, this framework can structure questions related to LIS. The P in PICO refers to patient, but substituting population for patient provides a question format for all areas of librarianship. The population may be children, teens, seniors, those from a specific ethnic group, those with a common goal (e.g., job-seekers), or those with a common interest (such as a gardening club). The intervention is the new concept being considered, such as longer opening hours, a reading club, after-school activity, resources in a particular language, or the introduction of wi-fi.

LIS Scenario and Question: Art history master's students submit theses with more bibliography errors than those from students of other faculties. The Dean of art history raised this issue with the head librarian. The head librarian suggested that database training could help.
P – Population: Art History master's students
I – Intervention: database searching training
C – Comparison: students with no training or students from other Faculties
O – Outcome: Improved bibliographic quality

Table 1 illustrates the different components introduced in several PICO framework variations. Fineout-Overholt and Johnson (2005) considered the questioning behavior of nurses. They suggested a five-component scheme for evidence based practice questions using the acronym PICOT, with T representing timeframe. This refers to one or more time-related variables such as the length of time the treatment should be prescribed or the point at which the outcome is measured. A PICOT question in the LIS field is: In a specialist library, does posting the monthly library bulletin on the Website instead of only having printed newsletters available result in increased usage of the library and the new resources mentioned in the bulletin? In this question, the timeframe refers to a month.

Petticrew and Roberts (2005) suggested PICOC as an alternative ending to PICOT, with C representing context. For example, what is the context for intervention delivery? In LIS, context could be a public library, academic library, or health library.

A variation similar to PICOT is PICOTT. In this instance, neither T relates to timeframe. The Ts refer to the *type* of question and the best *type* of study design to answer that particular question (Schardt, Adams, Owens, Keitz, and Fontelo, 2007). An example LIS question is: In a specialist library, does instant messaging or e-mail messaging result in the greatest customer satisfaction with a virtual reference service? This type of question is user analysis, and a relevant type of study design is

Table 1
Components of the Different PICO-based Frameworks

	Patient / Population	Intervention	Comparison	Outcome	Timeframe	Context	Type of Question	Type of Study Design	Professionals	Health Care Setting	Exposure	Duration	Results	Environment	Stakeholders	Situation
Richardson et al., 1995	▓	▓	▓	▓												
Fineout-Overholt & Johnson, 2005	▓	▓	▓	▓	▓											
Petticrew & Roberts, 2005	▓	▓	▓	▓		▓										
Schardt et al., 2007	▓	▓	▓	▓			▓	▓								
ADAPTE Collaboration, 2009	▓	▓		▓					▓	▓						
Dawes et al., 2007	▓		▓	▓							▓	▓	▓			
Schlosser & O'Neil-Pirozzi, 2006	▓	▓												▓	▓	
DiCenso, Guyatt, & Ciliska, 2005	▓															▓

a questionnaire. The PICOTT framework may be too restrictive when searching. If you are searching for effective Websites then transaction log analysis would be a reasonable type of study design. By limiting to that study type you would miss user observation studies, focus groups, and controlled experiments. These frameworks should focus the search strategy, while not excluding potentially useful and relevant information.

Specifically developed for building and adapting oncology guidelines is PIPOH (ADAPTE Collaboration, 2009). The second P refers to professionals (to whom the guideline will be targeted) and H stands for health care setting and context (in which the adapted guideline will be used). An example of this in the LIS setting would be:
What is appropriate training for fieldwork students working on the library's issue or circulation desk?
P – Population: Library users
I – Intervention: Training
P – Professionals: Fieldwork students
O – Outcome:
S – Setting: Issue or circulation desk

Dawes et al. (2007) developed PECODR and undertook a pilot study to determine whether this structure existed in medical journal abstracts. E refers to exposure, replacing

intervention to allow the inclusion of different study types such as case control studies and cohort studies. The D stands for duration, either the length of time of the exposure or until the outcome is assessed. The R refers to results. Here is a sample LIS question: Does teaching database searching skills to postgraduate students in a hands-on workshop compared to a lecture result in effective skills to utilize throughout two or more years of study? Duration would be the length of the postgraduate course (2+ years), and results could be defined as effective searching skills.

Schlosser and O'Neil-Pirozzi (2006) proposed PESICO which applied to the field of fluency disorders and speech language pathology. E refers to the environment or the context in which the problem occurs, and S stands for stakeholders. Stakeholders are an important consideration in certain library settings.

LIS Scenario and Question: Each year, library staff accompany new university students on an introductory library tour. The tour is time-consuming and may not be appropriate for new students who have much information to absorb in their first few days. Library staff and student instructors suggested that staff post a virtual library tour on the Website. It can be accessed at a time and place to suit the student, and may improve their understanding of library services.
P – Population: New university students
E – Environment: Library
S – Stakeholders: Library staff and student instructors
I – Intervention: Virtual library tour
C – Comparison: Physical library tour
O – Outcome: Improved understanding of library services

Many of the adapted PICO frameworks introduce terms worth consideration depending on the subject, area, topic, or question. The elements which are additions to the original PICO framework could serve as filters to be reviewed after gathering the initial PICO search results. They can help determine the relevance of initial search results. For example, consider filtering on context when determining if the results from a rural public library service are directly applicable to a large endowed university library.

DiCenso, Guyatt, and Ciliska (2005) suggested that questions which can best be answered with qualitative information require just two components. Such questions may focus on the meaning of an experience or problem.
P – Population: The characteristics of individuals, families, groups, or communities
S – Situation: An understanding of the condition, experiences, circumstances, or situation

This framework focuses on these two key elements of the question. An LIS example is: In a public library, should all library staff who have face-to-face, telephone, or e-mail contact with users attend a customer awareness course?
P - Population: Library staff with user contact
S - Situation: Customer awareness course

ECLIPSE

PICO and its variations were all developed to answer clinical questions. Within the medical field there are other types of questions which need to be answered. ECLIPSE was developed to address questions from the health policy and management area (Wildridge and Bell, 2002).

E – Expectation: Why does the user want the information?
C - Client Group: For whom is the service intended?
L – Location: Where is the service physically sited?
I – Impact: What is the service change being evaluated? What would represent success? How is this measured? This component is similar to outcomes of the PICO framework.
P – Professionals: Who provides or improves the service?
SE – Service: What type of service is under consideration?

LIS Scenario and Question: There have been user complaints about the current Interlibrary Loan (ILL) service. What alternatives might improve customer satisfaction?
E – Expectation: Improve customer satisfaction
C - Client group: Library users who request ILLs
L – Location: Library
I – Impact: Improve the ILL service
P – Professionals: ILL staff
SE – Service: ILL

SPICE

The previous frameworks can all be adapted to answer LIS questions. One framework, SPICE, was developed specifically to answer questions in this field (Booth, 2004):
S – Setting: What is the context for the question? The research evidence should reflect the context or the research findings may not be transferable.
P – Perspective: Who are the users, potential users, or stakeholders of the service?
I – Intervention: What is being done for the users, potential users, or stakeholders?
C – Comparison: What are the alternatives? An alternative might maintain the status quo and change nothing.
E – Evaluation: What measurement will determine the intervention's success? In other words, what is the result?

The SPICE framework specifically includes stakeholders under P for perspective and is therefore similar to the PESICO framework.

LIS Question: In presentations to library benefactors, does the use of outcome-based library service evaluations improve their perceptions of the importance and value of library services?
S – Setting: Library presentation to funders
P – Perspective: Library benefactors
I – Intervention: Outcome-based evaluations of library services
C – Comparison: Other evaluations
E – Evaluation: Improved perception of the importance and value of library services

Some of these additional concepts are related. Context, environment, and setting have similar connotations, and duration is similar to timeframe. This suggests that the options for constructing well-defined questions are not as numerous as Table 1 suggests.

Combining comparable and related terms would provide the following concepts:
P – Population or problem
I – Intervention or exposure
C – Comparison
O – Outcome
C – Context or environment or setting
P – Professionals
R – Research – incorporating type of question and type of study design R – Results
S – Stakeholder or perspective or potential users
T – Timeframe or duration

Conclusion

These frameworks are tools to guide the search strategy formation. A minor adaption to the medical question frameworks, usually something as simple as changing patient to population, enables the structuring of questions from all the library and information science domains.

Rather than consider all of these frameworks as essentially different, it is useful to examine the different elements: timeframe, duration, context, (health care) setting, environment, type of question, type of study design, professionals, exposure, results, stakeholders, and situation. These can be used interchangeably when required. Maintaining an awareness of the different options for structuring searches broadens the potential uses of the frameworks. Detailed knowledge of the frameworks also enables the searcher to refine strategies to suit each particular situation rather than trying to fit a search situation to a framework.

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