Shifting the Language of Research Using Problem-based Learning

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The Problem

A student asks a friend if he wants to go see a movie. The friend says, "Sure, what's playing?" The student responds, "I'm not sure; let's check." Instinctively, these students already know how to break down this question and find only the relevant information.

Ask the same student to go to the library and research a topic and most times he/she is confused on where to start and how to proceed. What is the difference? The difference comes partially from a misunderstanding of the nature of the research process. Students think there is a vast difference between researching a topic and answering an unknown question, when actually many of the same skills are involved.

The same student who automatically knows that there are a variety of elements in breaking down the question: "What movies are playing?" (i.e., the times movies are playing, the local theaters, the names of the movies, etc.) is completely stumped when they approach a librarian and state: "I need to research "topic X" and the librarian asks, "What about 'topic X' are you interested in?"

The student does not understand that this research topic needs to be broken down just like the question about the movies. As Pelikan (2004) states, "By far the toughest challenge my students face is that of having some idea of what they are looking for and why" (p. 511). Fister (1992) in her study of undergraduate research habits found that "getting a focus for research was the most challenging and the most time-consuming" (p. 164) task for students. This is because the student is only thinking about research in terms of a topic, not as a research problem or question. This is the point where there is confusion. Students generally do not have a good understanding of the research process.

A way to help students out of this confusion is to use a problem-based learning model when teaching students how to conduct library research. Using problem-based learning allows instructors to better model the research process to help students understand what they are doing when conducting research. To understand how this works, it is important to look at the differences between how faculty and students, primarily undergraduates, conduct research and what problem-based learning is.

Research

Professional researchers generally do not research topics. Instead, they are interested in answering research problems. Their research is directed by the questions, focused on a topic, that they want to answer. However, their research is question based, not topic based. They are generally not interested in finding out everything there is to know about a topic. Instead, researchers are interested in knowing about a topic to answer questions they have. They know how to break down a topic to find only the information which is relevant to their current research question. They conduct very directed research.

Faculty's research methodology is aided by their knowledge of the field. Faculty are aware of what research questions have been answered and where new areas of research are opening up. Faculty conduct research to make an argument.

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They are interested in proving the best way to answer a particular research question. The answer to the research question is what is important. It is a circular process. A research question comes up, the question guides the research and the information found leads to ideas on how to answer the question.

Students think of research in different terms. Students think that research is all about finding information on a topic. They often do not stop to consider what it is about a topic that they are going to explore. Instead, students think they are exploring the whole topic and when they are faced with the vast amount of information that they find they are overwhelmed.

Often this leads to students just using the first few sources that they find, not questioning if the information they have found is even relevant or related to other information about their topic. For students, it is all about just finding information, any information. Because they do not form a research question to guide their research, they view the information itself as the purpose of research. If they just find information on their topic, they feel they have done the research. When students are asked to come up with a topic to research, they often do not take the next step and develop a question to guide and direct their research. Just having a topic seems to be enough in the students' eyes.

Research Problem vs. Research Topic

There is a big difference between a research topic and a research question. Research topics are big and all encompassing. They do not provide any focus by themselves. On the other hand, research questions or problems are focused and provide some limits on the point and purpose of the research.

An example of a research topic is "movie times."

An example of a research question is "what time and where is movie x playing?"

The research question is much more focused and leads directly to research ideas. In the research problem itself, there is a purpose and a direction for the research. It is not just a broad topic out there by itself.

Research problems are useful for not just what they do in helping focus a person's research, but also for what they eliminate from one's research. The research problem about what time a movie is showing is much more focused than the topic "movie times." The research problem has eliminated such research ideas as: why are movies as long as they are, why do movie theaters show the movies at the times they do, etc. Instead, the research problem has focused a researcher on what information is important and relevant. Thus, a researcher has a better understanding of what information they need to solve the research problem. Any information which addressed any of the eliminated research problems can also be eliminated.

Another example of a more academic research topic is "medical ethics."

An example of a research problem is:

> Recently a medical researcher in Korea was accused of falsifying his research. What effect do his actions have on other medical research efforts? Why might a researcher make false claims? What role does the medical community play in "policing" research results?

Here we see many of the same issues as the "movie times" idea. The research problem is more focused, provides a direction for the research and eliminates certain research avenues which the topic does not. Students need to be taught that research is about questions, instead of just topics. This is where the shift in language is needed.

Problem-based Learning

By using a problem-based learning pedagogy, librarians can teach students to understand how researchers/faculty conduct research. Problem-based learning is a teaching methodology that can help students better understand the research process. Although the scale and tools might be different than research they have done in the past, they are going to go through or need to go through many of the same research steps.

Problem-based learning (PBL) was first developed at McMaster University Medical School. Instructors at the medical school developed PBL to "enhance acquisition, retention, and use of knowledge" (Norman, 1992, p.558). The idea was to place students into real-world problems which they would face as practicing doctors. The goal was to move the learning process away from straight memorization, with no connection to clinical situations, to a process where students would have to apply their prior knowledge to answer a new problem (Norman 1992). Instructors wanted to teach the students to think like doctors, so the students were placed into situations similar to those they would face as a doctor. Now instead of learning in a vacuum, students are researching and thinking like doctors. Students were not sent off to learn about a topic, but instead were faced with a problem that they had to solve. In PBL, the instructor is not the source of knowledge who lectures the students telling them what they need to know; instead the instructor is a guide who provides pointers and a basic map to help the students find their own way to the proper solution.

PBL is a natural fit for information literacy and library instruction. The ALA Presidential Committee on Information Literacy (1989) stated "to be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information." PBL is an instructional pedagogy which puts a student directly into a situation where he/she must accomplish each part of this definition. Applied to library instruction, PBL puts students into a real world research situation and the librarian guides the students through the process so they can learn good research practice.

Applying Problem-based Learning

For students to learn how to do research it is important for librarians to model how research is best done for the students. Since research done by faculty is not focused on topics, but instead is focused on answering questions or research problems, then PBL can be an effective model librarians can use to teach students how to conduct research.

One of the main strengths of using PBL for library instruction is librarians can model to students what makes up a good research problem. Because students are presented with a focused research problem, they can already see some direction in how to conduct their research. Students can see how a research problem leads directly towards what to look for when they are searching for sources much more than just a general broad topic. Students will then understand how a good research problem leads to good research.

The main place librarians at Texas Lutheran University use PBL is in the second semester of composition. Students are guided through the research process over two class sessions.

In first class session, the librarian visits the class in its normal classroom and introduces the class to a research problem. The research problem is developed by the librarian in consultation with the instructor, and is relevant to the issues being addressed in the class. The librarian introduces the idea that research is about answering questions as opposed to focusing on a topic. Students are then divided into groups and given a worksheet. The worksheet presents the research problem, asks the student to think about what information they will need to solve the research problem, asks them where the students think they will find that information, and asks them to develop some keywords and phrases to search for the information they will need. In other words, the worksheet provides the parts of the research process students should focus on before looking for information.

The second session takes place in the library's computer lab. During this session, the students again work in the same groups from the first day. The students are given another worksheet to guide the work they are doing. This worksheet directs the students to a few pre-selected resources (each group has slightly different resources) to work with to find sources to assist them in answering the research problem which was presented the first day. The students try out the keywords and phrases they developed in the first session and then are asked to evaluate the results as to what type of source they are finding (newspapers, books, scholarly articles, etc.), and if the information they are finding will help them answer the research problem. The librarian visits each group to see how they are doing and to offer suggestions as needed. After the groups search individually, the librarian brings the whole class together to discuss what worked and what did not work for each of the groups. Some of the issues which come up include the use of Boolean operators and search terms.

When creating search phrases, the students' first choice was generally to either use a single term, a phrase with a preposition, e.g., "bible in schools," or just a basic idea, e.g., "falsifying medical research." Search "phrases" expressed this way were used by students when searching in the various resources. When it was suggested that students use a Boolean operator in a search phrase, such as "bible and schools," students were pleased with the higher quality of their search results. Although, when they were asked why this phrase worked better, the response was generally that "and" was in a lot of articles. Students viewed the Boolean operator as just another search term; they did not know what its function was in the search phrase. This is where the librarian as a guide can explain how Boolean operators work.

Students often pulled out a concrete example from the problem as a search term. When using the medical ethics research problem mentioned previously, although the name of the Korean doctor was not mentioned, every group said this type of detail was needed to answer the research problem. One or two students did say that the research problem could be answered without the specific concrete detail.

One of the main goals of designing a learning process like this exercise is that the focus is on how students think about the research process. This parallels Pelikan (2004). The problem for students is not finding information but instead finding good, relevant information. Because students only stay with topics and do not give enough thought to the research process or develop research problems, they do not find relevant information to make a good argument.

Because PBL is an instruction pedagogy which relies on active learning, keeping students on task is fairly easy to do. The students are given a learning task which is both relevant to other work they are doing in class and the task is also directed, giving them guidance as to where their activities should take them. Each group developed many ideas about what type of resources were needed to answer the research problem, and developed a wide variety of subject terms to search.

Conclusions

PBL provides an opportunity to put students into real world research situations. By providing a good research problem for the students, librarians can help students understand that research is more than just having a topic, but also involves answering questions. It is a shift away from the idea of just having a topic to the idea that research is about solving problems and finding answers. This provides students with more direction and focus in their research and breaks down some of the barriers between doing research they already know how to do and academic research.

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