An Intervention to Improve Information Research Skills

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Abstract

Reviewing the literature cited by undergraduates in research and design projects revealed significant use of World Wide Web resources and a lack of journal citations. To determine why the imbalance of information sources was occurring a survey of students was conducted. The survey sought to determine their knowledge of and comfort level in using the various information resources available to them. The results of the survey led to the creation of a two-hour information resource workshop for the students. The abilities and attitudes as reported in the survey are presented and discussed. The workshop developed to address the deficiencies is detailed. Student and faculty views obtained after instituting the workshop are discussed and related to the success of the workshop. Ideas on improving the intervention are also presented.

Introduction

The Department of Manufacturing Engineering at Miami University in Oxford, Ohio, requires students in the Department to take its two-semester senior project course. (This course sequence fulfills the University’s capstone requirement and is open to all students at Miami with senior standing. It is common for students from the Physics Department majoring in Engineering Physics to take the Department’s sequence). Students work in small groups of typically 3 or 4 students and are assigned an advisor from the Manufacturing Engineering faculty. In the first semester, students identify and define a problem, investigate solutions, and generate a proposal; during the second semester the students implement their proposed solution. It became evident in grading the project reports that the information research done for the projects was less than what was desired. All students showed familiarity with using the World Wide Web (WWW). It was not evident, though, that critical analysis of the sites and information gathered there was being used. Also, there was little evidence that students were aware of, or aware of the full use of, the resources available through the library.

Addressing the Problem

This problem is not unique to Manufacturing Engineering or Miami University. One survey of faculty in the sciences found that only 26% rated the ability of their third and fourth year student to do library research as good. In the days of physical card catalogues and bound indices and abstracts of technical literature, students were typically taken to the library and shown these resources. Today, students typically have computer access to library resources, from electronic “card catalogues” to article abstract services to on-line full-text article services. These students
also typically show computer skills, as exhibited by their WWW use. It seems to be assumed that the access to computer resources and the evidence of computer use somehow implies knowledge of what information resources are available and how to use them. The lack of information research skills is probably the result of lack of training. The need for a mechanism to inform students on the use of information resources has led to several instances of schools creating a library resource web page to centralize the information. At Miami, the Science Librarian assigned to the Department has created an excellent web-based resource that has a link from the Department’s web page. However, students do not seem to be using this resource. It was apparent that some sort of instruction on using the information resources was necessary.

The on-line library resources at Miami University are accessed through MiamiLINK, the Miami University Libraries' Web site. At this site, students are presented with a wealth of access links. Among the first tier of choices are links, not only to Sherlock, Miami's database of books, journals, videos etc., but also to a shared state wide catalog, OhioLINK. OhioLINK is a consortium of Ohio’s public and private universities and colleges and the State Library of Ohio. OhioLINK gives our students nearly as ready access to materials in libraries across the state of Ohio as they do to those in Miami's own collection. These materials can be requested on-line and delivered to our campus in a few days. MiamiLINK also gives students access to research databases, on-line journals, and links to various WWW search engines.

In developing the appropriate content to inform students about the information resources available, we surveyed the students at the beginning of the first semester of the senior project course on their familiarity and use of information resources. (We have continued the survey at the start of each first semester of the senior project course in order to fine-tune the workshops to the needs of the students.) Of the students responding, all have used MiamiLINK, but only 8% say they have used it frequently. Three quarters of the students report using MiamiLINK to access Sherlock. Less than 40% of the students report use of research databases. These students are typically using Applied Science & Technology; only about 8% report using Compendex. In answering questions concerning the use of the WWW, over 90% report using it to find information. Only 40% of the students, though, report being satisfied with the information received from WWW searches.

The Intervention

We undertook to develop an intervention to present to the students the various information resources available to them and demonstrate how to use these resources. We wanted to provide information on the on-line resources of the library, to encourage students to think about what information they are looking for and how they will use it before they go on-line, i.e., encourage them to plan a search strategy before conducting a search, and to show how to proceed in both the library and WWW realms. To cover this information, two 50-minute sessions, conducted on successive class periods, were developed. These sessions were conducted as a workshop in a computer lab where each student had the use of a computer and the instructor, the librarian assigned to the Manufacturing Department, had a computer with a projected monitor. The first workshops were conducted in the 1998 Fall semester.
The first workshop is devoted to library resources and search strategies. The workshop begins with a discussion of why a literature search is done and what types of information might be found. Included in this discussion are how information becomes published in journals and collected in databases, and the significance of peer review on the validity of the information. Methods of developing a search strategy are then presented. Students are encouraged to think about what information they are looking for and how they will use it. Using the topic of one of the projects the students have chosen for the course, students are shown how to develop a list of key words for their search and how to combine them to either expand the search results to obtain additional references, or focus the search to eliminate extraneous references. Students are shown how to access MiamiLINK and, from there, research databases. Various databases are described in both the information they contain and how they are structured. Those of special interest for engineering, such as Applied Science & Technology, Compendex, and Science Citation Index, are emphasized, as are several patent databases. The students are then guided through a search on Applied Science & Technology and Compendex using the key words developed for the example. The differences and similarities in how to use the keywords in the two databases and the differences in the results of the searches are examined. The methods of capturing search results for saving to a file or printing are then explained, as are the procedures needed to obtain the articles of interest found in the databases.

In the second workshop session, remaining issues on research databases are resolved, and search strategies are reviewed. Information searches on the WWW are then described, helping students put the Internet and the WWW into some sort of context. A brief introduction to the history of how the Internet and the WWW evolved is given. The dynamics of publishing on the WWW are discussed. The fact that anyone can publish anything on the Web is still a new notion to many, so an effort is given to impress on the students that they have to assess the validity of the information. Students are directed to think about how reliable and error-free material from the web is, who the author is in respect to qualifications and possible bias, and currency of the information. Students need to realize that if the author or sponsorship of the information is not clearly identified, and if there is no indication of date of publication or update, then the material should not be used. Next, the differences between WWW search engines, web directories, and metasearchers and how to use each is covered. Web search strategies are discussed and compared with the previous database searches. Sample searches from the previous day are performed using the WWW. Finally, other web-based databases are discussed. The session is concluded with the librarian’s offer to meet with individuals and groups to answer project-specific question.

The Results

These workshops have received favorable comments both from the students and from the faculty grading the work on the projects. Ninety percent of the students who attended one or both sessions said that the sessions were helpful. In explaining how these sessions helped, a majority of students specifically mentioned the research databases as something they were not aware of before the workshops. Other comments included that the sessions helped explain effective navigation techniques, where to look for more types of research, how to better utilize search engines, and where to start looking. As part of the senior projects, each student is required to write a reflective essay on the project. One student volunteered in his essay, "Now, the Internet
is simpler to use due to the help of the two classes spent in King library." One of the faculty, responding to the question of whether the library workshops improved students’ research stated "Yes – (they) mainly increased student's awareness of not just the techniques, but of the need to do the research."

The Future

Given the favorable remarks from the students and faculty, we will continue these workshops. It is our plan to also develop this workshop as web-based instruction. A similar approach has been taken to help students gain the needed information research skills in a biology course. There are many advantages to web-based instruction. Students can access the instruction when needed, and can return to the instruction site for review. Many students, in evaluating the workshop, said that they wish they had the opportunity to attend the workshop earlier in their school career. Two such comments were “(The library sessions were) helpful in learning to use research databases. Never even knew they existed before this! I’m a senior. This activity should be done with freshmen.” and “They definitely exposed me to resources I had not used before. It would have been helpful to have this exposure in 141 (EGR 141 Introduction to Engineering Design, a first year course) even though there was no research. The information could have been helpful in more than just this class.” We placed the workshops in the senior design course since there is a definite need for information research there. The survey of faculty in the sciences indicates that faculty feel information research is more important in the 3rd and 4th years of undergraduate study. This opinion is reasonable, since the first two years of science education are heavily involved with “textbook” learning, where fundamentals are covered. This should not be the case for engineering, though, especially as design is inserted into these lower level courses. A student approaching a design project needs to be able to investigate the information available on the topic of the project. Thus, not only is it a desire of students to have information research training early in their schooling, but coursework is making it a need. Another significant aspect of a web-based information research course is that it would not take up class time – students could work through the information at their convenience outside of class time. Class time, of course, is already fully utilized, given the material needed to be covered in typical courses and with the design component that should be a part of engineering classes. With a web-based information research workshop, students could access the information early in their academic careers and refer back to it as their needs progress.

As pointed out by a faculty member in response to the survey question concerning the best way to work on improving information skills, "only when we require it in multiple classes will they start to get good at it." It is our goal, through the workshop and web-based instruction, to introduce students early to the skills needed to access information. The students would then be able to use, and improve, the skills in classes throughout their academic program.


5. http://staff.lib.muohio.edu/~jgoode/menew/


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