2006-104: LIBRARY EXPERIENCE FOR APPLIED ENGINEERING TECHNOLOGY STUDENTS

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Library Experience for Applied Engineering Technology Students

Abstract

The full-time Applied Engineering Technology Program at Goodwin College of Drexel University was launched two years ago. This program clearly distinguishes itself from traditional engineering programs. The curriculum places emphasis on the application of theory rather than on derivations and proofs. The majority of courses are fully integrated with training and laboratory experience, extensive use of software and industrial case studies. The information literacy of students plays an important role in the education process. The primary goal of an academic library is to support the curriculum and provide a more successful library experience for students. The communication between the librarian with liaison responsibilities and the academic program is described in this work.

During the class-session of the Introduction to Applied Engineering Technology Course, the librarian introduces students to library resources including databases and electronic products, services, programs and policies, as well as to proper communication links between the library and the various colleges and schools. The information skills learned during the process contribute to life-long learning among the students in this program. Several activities such as research skills workshops, informal consultations, electronic reference and virtual chat, and informal mentoring are used to provide informative library experiences to the students. The role of the communication and collaboration among the faculty and the librarian to develop the content for the library skills workshops and assignments to assess the information skills learned are considered crucial for providing enriching library experience. The core information skills that will enhance the knowledge fundamentals form the central theme of this collaboration between the faculty, students, and librarians.

Applied Engineering Technology (AET) Program at Drexel University

The Bachelor of Science (B.S.) degree in Applied Engineering Technology at Drexel University's Goodwin College is designed for students who plan to pursue careers in a variety of design, manufacturing, and production-related positions[1]. The program content provides an integrated educational experience directed toward developing the ability to apply the fundamental knowledge gained in the Goodwin College to the solution of practical problems in the engineering technology field. The AET program is based on a cyclic model of the relationship between knowledge production and improvement of practice in undergraduate STEM education. For over two years Drexel has been offering its AET major in collaboration with the Delaware County Community College (DCCC) under a dual enrollment model. The students can pursue both AAS and BS degrees concurrently at DCCC facilities. During the fall of the 2004-2005 academic year, the

major became available to traditional students at Drexel wishing to pursue the BS in AET on a full time basis. Concentrations are available in Electrical, Manufacturing, and Mechanical Engineering Technology.

The Applied Engineering Technology program distinguishes itself from traditional engineering programs by emphasizing the application of theory, integrating most courses with laboratory experience, and incorporating faculty with extensive industry experience. The program attempts to fill the gap that usually exists between the engineer/scientist and the technical and/or production workforce. It also prepares students for graduate study in a variety of fields including engineering management, business administration, and health technology.

Hagerty Library description

The Drexel University library system consists of three physical libraries: W.W. Hagerty Library located on Drexel's main (University City) campus, and the Hahnemann and Queen Lane libraries located on the health sciences and medical campuses, respectively. Each of these libraries has the primary mission of meeting the essential information, intellectual, teaching, learning, and research needs of the University. The collections emphasize subjects relevant to the University's disciplines, with print resources distributed to meet the needs of the programs and departments at each location. In addition, the Drexel University Libraries' web-based information system includes a wide range of electronic databases, electronic books and journals, and other resources that support research and scholarship both in the Libraries and online[2]. W.W. Hagerty Library presently houses nearly half a million books, periodicals, microforms, and non-print materials. The collection's strengths reflect the curricular strengths of the University City campus: engineering, computer science, business, information science, and media arts and design, as well as general science, humanities, and social sciences.

Library staff members at each of the three locations are available to help library patrons at all times. Reference and subject librarians are available to assist individuals doing research and using the library or to provide organized classes covering specialized or general research skills. For the Applied Engineering Technology curriculum, engineering librarian and his assistant provide instructional support in collaboration with AET faculty members. The Library Instruction section of this paper describes how this instructional experience has been accomplished thus far.

Drexel Libraries' electronic holdings provide remote access to many online databases, e-journals, and e-books of use to engineering students. At present the library's web site provides access to more than 32,000 electronic books, 16,000 electronic journals, and 300 electronic databases. Online tip sheets such as 'New Students' Guide to the Libraries' provide web based information to Drexel's faculty and students[3]. Hagerty Library's web site provides links to its online catalog, databases by subject and title, and subject resource guides for various disciplines.

The existing library system also aims to provide Drexel's distance learning community (students, staff and faculty involved in distance learning courses offered through Drexel University) services equivalent to those available on the physical campuses. One of the advantages of being a part of the distance learning community at Drexel, in contrast to many other universities, is the vast array of electronic resources the library has to offer. Since one section of the Applied Engineering Technology course is offered at the remote location of Delaware County Community College, students from that section are eligible to take advantage of distance learning and research opportunities available through the library's website.

Collaborations

Studies conducted at Drexel University of collaboration between the library and various engineering departments have shown that involvement by the faculty and librarians play crucial roles in educating students about the variety of information tools and resources available for their academic research[4,5,6]. Using a similar approach with the AET students can also prove to be extremely useful in helping these students acquire information skills. These faculty-librarian collaborations are important for teaching students how to find the information required for the successful completion of courses in the AET curriculum.

Student information needs

Since students in this program will be exploring engineering related topic areas with a hands-on approach to learning, focusing on applying engineering principles, their information needs will differ from the needs of traditional engineering students. The AET students' needs vary from developing background knowledge in a particular subject area to finding research information on their chosen topic, using a variety of resources and tools. Application of learned technologies in engineering problem solving is a key component of their developing expertise in their chosen area. With the emphasis on lifelong learning skills in the ABET accreditation requirements, it is crucial that their information needs are addressed through effective collaboration among the faculty, librarians, and students.

Literature Review

In their Information Literacy Competency Standards for Higher Education (2000), the Association of College Research Libraries states: "Information literacy forms the basis for lifelong learning. It is common to all disciplines, and to all levels of education. It enables learners to master content and extend their investigations, become more self-directed, and assume greater control over their own learning."[7]   Several papers have examined the teaching of information literacy through university libraries and have demonstrated the importance of collaboration between librarians and faculty in information literacy instruction.

In her comprehensive survey of the state of academic librarianship in Australia and New Zealand, Irene Doskatsch (2003) repeatedly stresses the importance of faculty-librarian

collaboration and examines reasons why, historically, such collaboration has been limited (much of which boils down to a "disjunction between the perceptions of librarians and the beliefs of senior academics"[8]) and suggests ways, in which this collaboration can be facilitated in the future.

Hooks and Corbett (2005) reported on a program of information literacy instruction for off-campus graduate cohorts. They based their instruction on the principle that information literacy is part of life-long learning. Each instruction session was team-taught by two faculty members and a librarian. They report that after four years, the results of this model "have been nothing short of sensational"[9].

As part of a discussion on integrating library instruction into a pre-existing freshman curriculum, Robinson and Nelson (2002) conclude: "Collaboration is…the key. Librarians and instructors must routinely work to meet the needs of students. Students need to see the connection between what they are learning in media literacy and their current research projects."[10]

In a presentation to the ASEE[11], Nestor L. Osorio (2002) looked at the specific information resources available to engineering students and how this shapes their need for information literacy instruction. The wide range of specialized technical resources can be quite daunting for the new engineering student; many consider themselves to be expert searchers, based upon their usage of the web, but have never attempted to navigate a database of scholarly literature. Osorio found that integrating library education into the engineering curriculum, through close faculty-librarian partnership, was valuable in building students' lifetime learning skills.

Through this literature, two themes emerge: first, information literacy is a part of life-long learning (and a skill required of college graduates), which is a view long held by librarians and second, students will not seek help until they have a perceived information need. But when library instruction is closely linked to their other coursework (through faculty-librarian collaboration), students see the solution to their information needs at the same time as their needs are developing and are more likely to successfully utilize library resources.

Collaboration between librarians and AET faculty

Since information skills play a crucial role in life-long learning, it is obvious that the collaboration between librarians and faculty must address the ways in which students develop information seeking skills. Since Drexel's Applied Engineering Technology program is also offered at the Delaware County Community College (DCCC), it was important to consider how DCCC students' information needs may be met.

Building library collections together

Students in the AET program need educational materials such as books, handbooks, encyclopedias, instructional manuals and other reference items, which provide information on material properties and manufacturing procedures. Ever since the program's early development, it was envisioned that both faculty and librarians would work together in developing the necessary collection. This approach was used for the *Introduction to Applied Engineering Technology* course and will be used for other courses in the future. Faculty identified appropriate materials and sent their recommendations to librarians for acquisition by the library. Both print and electronic resources are considered. Librarians also informed faculty about the availability of electronic materials such as ENGnetBASE (an online collection of engineering handbooks) and Knovel (electronic reference books and databases covering multiple engineering subject areas), which can be used as additional supporting material for their courses. Additionally, databases such as Engineering Village2, Applied Science and Technology Abstracts, and IEEE Digital Library are electronic resources available to help students find scholarly literature. All of the resources mentioned are subscription-based and available only to Drexel University faculty and students, although they can be accessed from off-campus. DCCC students are part of Drexel's Applied Engineering Technology Program and therefore, as distance learners, they have access to all available electronic resources. In addition, DCCC students can also request print books from Drexel's libraries. Once requested, books are located and shipped via regular mail to the student's home address. Hagerty Library's web page 'Services for Distance Learners' details procedures and policies on how different types of library resources and materials are made available to off-campus Drexel students[12].

Developing AET library web site

Another part of the AET program is the library-created website: Applied Engineering Technology. Faculty and librarians again collaborated to identify resources to include in this website aimed at AET students. Through emails, informal visits, and brief discussions over the telephone a core list of important resources was developed. Making these resources available electronically, through the class guide, allows students to access them from anywhere, at any time, for self-guided learning.

Library Presentation

AET faculty recommended that the librarians conduct information skills workshops for students at both Drexel and DCCC campuses. Even though the class resources web site was available, it was felt that having librarians physically present this workshop would encourage and motivate students to interact with librarians for other complex research assistance, as needed. Similar library sessions were scheduled for both Drexel and DCCC students, with approximately fifteen to twenty students in each presentation. Faculty and librarians identified content for this presentation with the intention that important information about the library's facilities, resources, and services would be communicated to the students. A special emphasis was placed on how both print and electronic resources can be used for their assignments and class projects. Learning how

to find needed information is crucial since students will need to be able to locate appropriate information in their other courses as well.

The Library presentation included:

1. Introduction to Drexel University Libraries and important resource links.
2. Use of the Online Catalog to locate both print and electronic resources, using the keywords "Nanotechnology" and "Molecular Devices" as examples. For DCCC students, a demonstration of DCCC's online catalog.
3. Various instructional tutorials including Evaluating Information on the Web, Deciphering Citations and Finding Full Text from Citations.
4. Major electronic databases to locate online magazine and journal articles.
5. Other Engineering Research Guides.

Both Library sessions lasted approximately ninety minutes. Both sessions were interactive in nature so that students were able to share their ideas about a particular topic of interest, provide their opinions on how information on that topic could be found, and determine whether a given article was from a magazine or from a scientific scholarly journal.   Students were encouraged to ask questions about their concerns.

Assessment and Assignment

Collaboration with AET faculty members was a key factor in planning how to assess what students learned during the library presentation. We were most interested in how students applied their newly learned skills in finding information. Part of this assessment took the form of a formal take home assignment. Additionally, during the last fifteen minutes of the library presentation we required students to reiterate '*Ten new things I learned*' during the class. To facilitate this process, two groups of students, with approximately eight to ten students in each group, were formed. Individual members from each group then spoke about what they learned. It was truly stimulating to see that students were extremely vocal in communicating what they learned during the presentation.

Some sample responses are included below:

1. "Even though I am at DCCC, I can get books from Drexel's library."
2. "I now know how to differentiate between a magazine and a scholarly article."
3. "Search engines like Yahoo and Google do not provide full electronic handbooks like Knovel and ENGnetBASE do."
4. "Handbooks and encyclopedias will help me develop an understanding of various engineering and technology related concepts so that I can apply them during hands-on experiments."
5. "There are many engineering subject guides available from Drexel Library's web-site."
6. "There are electronic databases that will help me find engineering related journal articles."

In addition to this, students were required to complete a take-home assignment consisting of six questions dealing with major concepts covered in the library presentation. The assignment is included in the appendix. Responses received indicated that most students learned the basic information skills concepts covered and follow-up guidance was provided to students through email to those whose responses needed corrections.

Conclusion/vision

One of the goals of the AET program is to provide students with a strong foundation of engineering practices and stimulate students' interest by using a problem-solving approach in state-of-the-art laboratories. To achieve this goal, the ability to use various sources of information, such as books, articles, web sites, etc., is essential. The librarian's assistance during students' initial experience plays an invaluable role in their educational process and in the future in their careers. It is envisioned that the findings described will encourage new partnerships between librarians and other Engineering Technology programs. Their experiences, feedback, and new ideas can be shared during future conferences. Information skills contribute to life-long learning and the Applied Engineering Technology students will benefit from this experience in other educational or professional settings as they embark upon their careers.

Appendix:

Drexel University – W. W. Hagerty Library
Applied Engineering Technology

INTRODUCTION TO
LIBRARY RESOURCES

QUESTIONS

Oct. 2005

1. Find the call number of a book which deals with molecular electronics. Use the W.W. Hagerty Library catalog (Drexel). Give the complete citation and location of the book. How would you go about requesting a book that is currently checked out and you still need when it is returned?

2. Can you locate the book 'Nanotechnology: Basic Science and Emerging Technologies', by Michael Wilson, in our catalog? Give the complete citation of the book, call number of the book, and the year when it was published.

3. What is the 'subject term' for the book in question #2 above? Are there any other books available on the same subject in our library either in 'Print' or 'Electronic' form? List one 'Print' and one 'Electronic' book with a complete citation.

4. Give four characteristics that distinguish between scholarly publications and popular magazines.

5. Using one of the databases (available from the library's web site) shown during the class, find one article on Industrial Electronics from a popular magazine and one article on the same topic from a scholarly publication. Write a complete citation and briefly describe how you obtained them. Email articles to bhatt@drexel.edu , Dr. Genis at genisv@drexel.edu, and Dr. Daneshpooy at alireza.daneshpooy@drexel.edu

6. Can you find the full articles you found in question 5 above in internet search engines such as Yahoo or Google? Why or Why not?

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