Teams and tasks

Active bibliographic instruction with high school students in a summer engineering program

by Sharon Huge, Bob Houdek, and Sherri Saines

"What's black and white and read all over? Bar codes, of course!" And so began one of the group presentations from the summer 2000 Women in Engineering and Technology program at Ohio University. This witty opening demonstrated the student's enthusiasm for a teams-and-tasks approach to a library introduction.

MENT and WENT

Minority Men in Engineering and Technology (MENT) and Women in Engineering and Technology (WENT) are programs designed to encourage high school sophomores and juniors to consider careers in engineering and the sciences.

The two-week intensive program introduces students to research and lab work in engineering while emphasizing teamwork. The experience culminates in small groups working to build a battery-operated LEGO truck that can carry a bag of sand up a hill.

Because the academic part of the program is intense, recreation and support services are offered to provide a complete experience for the students. A day at an amusement park, a pool party, and a cookout are part of the fun. A trip to a local factory involves students in real-life applications. One evening activity even includes attending a formal dinner to learn etiquette. The students live in dorms and are chaperoned by mentors and counselors who are full-time juniors and seniors enrolled in the College of Engineering.

Library involvement

In 1997, Ohio University librarians were asked to participate in one-hour sessions with MENT/WENT. We first offered a short library overview; the next year, an overview with an assignment; the next, a lab session. In 2000, our role expanded, and we were given half-days to work with four separate classes, two MENTs and two WENTs.

Our approach came out of the team-building activities the students were already participating in and the emphasis on teamwork in the engineering education literature. Using teams to do research would also mimic the way engineers collaborate "in the real world."

The bibliographic instruction sessions that accompanied the program in 2000 were aimed at giving students a taste of literature in the field and academic research. After a brief hands-on introduction to resources, students were divided into small groups that were assigned to find a book, a journal article, a science encyclopedia entry, and a Web site on a prescribed topic. The hour's research became the basis of a 20-minute group presentation displaying research, evaluation, and presentation skills.

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Students' responses to this format were more positive than to previous years' short lecture/demonstration attempts at covering the same material. The librarians' experience was so positive that we have successfully adapted the format for other classes, repeated it for the engineering summer program in 2001, and are preparing for summer 2002.

Topic selection

Looking for workable and appropriate topics took far longer than we had imagined. We discovered a number of constraints: topics had to be well-defined; they had to be comprehensible to high school students; they needed to be current enough that research was still occurring; and they had to be neither too easy nor too hard to locate. For example, "famous women engineers" isn't a good topic because there is a paucity of information, and XML is too abstract. We finally settled on three topics that seemed to meet our criteria: bar codes, shape-memory alloys, and Stirling engines.

Sources were chosen to provide examples on the margins of the engineering literature—one move away from general sources, but not too difficult for our audience. We decided to show students our online catalog; two periodical databases, Applied Science and Technology Index and

Periodical Abstracts; and two e-science encyclopedias, *Access Science* (McGraw Hill online) and *Wiley Encyclopedia of Electronics and Electrical Engineering.*

We chose the Internet search engine Alltheweb[1] because its results brought up links to local companies involved in related commercial ventures. With these resources, we could require information on background, current literature, and future applications of the topics.

At the end of the sessions, each group would report its findings to the whole class in an attempt to mimic the conference structure of knowledge transfer in the sciences. This would also force the quick understanding and recall that often occur in office teamwork settings.

The final plan

After a trial run in which we refined our topics and process, the MENT/WENT sessions were set up as three-hour sessions divided into three blocks: the first and shortest block was an introduction to library resources; the second block was the student research phase; and the third block was the student group-report section. Three librarians would team teach each session.

The first block began with a brief introduction to the library catalog, searching in periodical databases, and Internet searching using Alltheweb. We realized that we also needed to provide the students with some information on presentation skills. These topics were divided between the librarians, with one doing the presentation and the other two helping students keep up with the hands-on examples offered.

Students were then divided into groups of four to six and given a handout with the group's topic, four information-seeking tasks (book, journal article, Web site, and encyclopedia article), and hints on how to complete the assignment. Each small group was assigned a librarian as helper/expert. The next hour was devoted to scouring the library.

Next, a brief but important cookie break occurred during which the groups discussed their presentation strategies.

The last hour of the session was divided into three 20-minute reports. Students were instructed to present both the information

Suggestions for success

- Limit learning objectives to key points.
- Select topics ahead of time to ensure searching success. Test each one thoroughly.
- Show the students how to use the sources.
- Limit the team to four to six individuals.
- Don't be afraid to intercede in group processes if the team gets hung up.
- Team teach!
- After each presentation, go over anything that needs further emphasis or was misunderstood, but don't correct students during their presentations.
- Evaluate the process and the outcomes.

they discovered and an analysis of why they thought the sources were reliable, and the means of discovery. Presentation style and content were entirely up to the group.

The real thing

The format met with success. Students were politely attentive during the librarians' lecture-demonstration, and most were engaged enough to click along. Having the roaming librarians in the lab during this time was very helpful in keeping students on track.

As the second block opened, groups had varying degrees of initiative. Librarians attempted to stay on the sidelines, allowing students to organize themselves. Some groups took the assignment, turned to their computers, and began tackling the entire list of tasks individually. A librarian had to intervene to help them get organized and work together as a team. For other groups, the group process seemed to come more naturally and they would huddle and discuss before tackling the listed tasks. Once started, however, all groups did accomplish all tasks acceptably.

The reports back to the whole group were surprisingly well done. Most small groups opted to have the person who had done a particular part of the research show how and what he or she found, often using overhead Web projection to point out interesting facts or sources. While some incorrect or incomplete information was presented, all groups found and reported the most important facts requested. The topics were complicated; if after only an hour's research in a completely new setting students understood these few basics, we counted that as success.

During the question period at the end of every presentation, the librarians tried to ask the group at least one challenging question. After the first group attempted to bluff their way around their ignorance, we let people know it was all right to say, "I don't know." However, it was still a great temptation for them to try to appear more knowledgeable than they were.

Experiential learning works

What did we learn? We confirmed what we always knew: students like hands-on instruction, and they learn more from it than from straight lecture. Having to digest the information makes the need immediate. Having to report back forces articulation of lessons. Hearing something from your peers makes it more memorable. All of these activities reinforce learning.

Having four sessions also allowed us to see that it was not just coincidence that this structure worked well. Students were engaged, they enjoyed the presentations, and they dug into the research.

We have since tried adapting the same ideas into shortened sessions for other classes, with good results. Our annual rush of library introduction sessions for interpersonal communications (public speaking) classes, for example, used the group-research model with a 50-minute scaled-down version in general sources.

Improving the process

Several areas for improvement have merited discussion among us as we have evaluated the teams-and-tasks approach.

• Given time constraints, is it more important to learn how to use the library by trial and error or is it more important to gather many accurate facts quickly? How much should we *tell* students about research and how much should we give them the opportunity to *discover*?

• How could we improve upon the uneven coverage or understanding of facts? Was this caused by a poor presentation of resources on our part or a lack of background on theirs? (For example, to understand Stirling Engines, one must understand properties of gases. Do they know these?)

• What is the role of the librarian during the research phase? Should the librarian be the group facilitator? How much should he or she help?

• Should we care about the quality of the group presentations? Should there be some feedback or evaluation? If so, by whom—peers, advisors, librarians?

In addition, we would like the MENT/WENT organizers to include some questions about the library sessions in their evaluations by students.

Note

1. Visit http://www.alltheweb.com. ■