

Introduction

This module consists of three 50-minute sessions during which the students will be exposed to some contemporary issues and events that may have an effect on the practice of their engineering discipline. Your students will learn about sources for breaking information, utilize those sources to gather information and make a short presentation on one such issue.

Caveat: The author of this module has attempted to give examples that will work for all engineering disciplines, but it is likely that you will have to do some tailoring of the material below to fit your specific discipline. If you send your additions back, they will be added to the corpus for other instructors to use.

Student Activities

During this module, students will

1. Brainstorm on recent events and developments that may impact engineering practice.
2. Read news sources and find some relevant topics from recent headlines.
3. Learn about specific information sources for contemporary issues in their discipline and related disciplines.
4. Research a specific issue and prepare a short report and/or a PowerPoint presentation on that issue.

Module Objectives

After completion of this module:

1. Students should be able to name 3 sources of “breaking news” in their area (ChemE, CS, ECE, CivE, ...)
2. Students should be able to apply their search skills to find recent developments (say, in the last 3 months) on demand.
3. Students should be able to make initial applications of “breaking news” items to the likely future development of their discipline or sub-discipline.
4. Students should be able to suggest implications of these new developments into their engineering practice.
5. Students should be able to track some form of technical advance over a timeline, then predict developments 2-5 years in the future.

Justification

Change is accelerating in the world. The total amount of knowledge in the world is doubling every few months today, and is expected to double every 73 days by 2020. This contrasts to our history, when the world's knowledge doubled from the birth of Christ to the printing press, then again by the American Revolution, and again by 1900, and again by 1950.

The practical implication for engineers is that the expertise required to work in high tech fields is also doubling regularly. Any engineer who fails to keep abreast of developments in the field will very quickly be out of date.

[Cartoon: Two men in suits commenting on a hobo feeding pigeons on a park bench: "Bill used to be one of our best programmers, but he took a 6 week vacation, and was never able to catch up again."]

Some specifics of change over the last few years follow.

- The first World Wide Web browser was written in 1990, less than 10 years ago. Its impact on many areas of our society has been overwhelming. In particular, it has become one of the major sources of information for technical and medical fields.
- Desktop computers, which have changed the daily practice of engineering dramatically, only became common about 1985, only 15 years ago, which is less than half the career of a typical engineer. In other words, about half of the engineers practicing today were educated with little or no hands-on computer experience.
- Recent developments in MRI, controls/mechatronics, catalytic converters, automotive occupant restraint systems, assistive technology.
- ... (others)... *What are some examples from civil, electrical, chemical, environmental, aerospace...??*
- Examples from the medical field. New research has demonstrated possibilities:
 - Functional electrical stimulation of paralyzed limbs
 - Prosthetic developments
 - Eye laser surgery
 - Artificial organs or organ replacements
 - Possible vaccine for cancer
 - Repair stroke damage
 - Repair heart attack scar tissue and convert it into heart muscle, to mention only a few.

Would you want to be treated by a doctor that wasn't up on these developments?

Prerequisite knowledge

Some maturity in the discipline. Students should be able to recognize (with some small guidance) the relationships between a given issue and their field of engineering. It is expected that junior standing in the discipline would provide this level of maturity, although some freshmen students may possess it as well.

It would be good if they have already had the module or other training on oral presentations.

Classroom requirements

Little or none. A chalk or marker board would be beneficial to take down students' ideas as they brainstorm. A board would also be beneficial as you work through an example issue for the class on day 2. If you have computer and projection capabilities in the

classroom, students can make their presentations using them on the third day. But PowerPoint slides are provided, if useful.

Assignments

This module includes the following suggested homework.

1. First day homework: a simple list of 2 or more issues that should have an impact on engineering practice along with 2 sources for information.
2. One page summary of a specific issue, and a presentation on it, given the third day.

Grading Individual Students

The homework can be graded, but not stringently. This is an opportunity for feedback and a chance to get them involved in looking for sources.

Grading Student Groups

The presentation on the third day and/or the one page summary should be a group grade. You may add additional constraints or requirements.

Outcomes Assessment – Evaluating Module Effectiveness

One approach is to give a 'pop quiz' later in the semester or in a later course, asking about recent developments or discoveries that would influence engineering practice. An example question might be: "List two recent events or discoveries that might lead to (pick from: an adjustment of some engineering practices; an opportunity for improvement; a potential problem to avoid; ...)." Obvious possibilities include earthquakes and hurricanes, air crashes, bridges or buildings collapsing, computer viruses or hacker attacks, etc. Ideally, after the students finished the quiz, the instructor would be able to identify a few relevant events since the module was covered in class.

Other good questions:

- Identify two good sources of information for contemporary developments in my discipline.
- How can the practicing engineer keep up with current developments?
- Why is it important to keep up with contemporary issues relating to your profession? (Give examples, or give reasons...)

Sources of information on contemporary issues

Some of the best sources are on the web or by e-mail subscription. ACM sends an e-mail 3 times a week called "Technical Briefs" that gives a one-sentence, then a one-paragraph summary of major developments in the fields of computing. Each paragraph ends with a URL for the complete article, most of which close with URLs for related articles and issues. (See attachment.) ACM also has a weekly online magazine "Ubiquity" that focuses on current issues (referenced in the attachment).

Another major source (as seen below) is your professional society, both in hard copy and web sites.

Other sources:

- The Association for Computing Machinery has a monthly (paper) magazine ("Communications of the ACM") intended for the broader audience among computing professionals.
- "IEEE Spectrum" is a similar monthly magazine for electrical engineers.
- IEEE has a weekly news website: <http://www.spectrum.ieee.org/newslog/>
- "Chemical and Engineering News" from the American Chemical Society.
- "Chemical News" online at <http://www.acs.org/cen>
- "Chemical Engineering Progress" from AIChE.
- "Chemical Engineering" magazine <http://www.che.com>
- AIChE also has a "Newsroom" website: <http://www.aiche.org/newsroom/>
- ASCE (Civil Eng.) has a similar website, but at present it is at least a month out of date: <http://www.pubs.asce.org/newsbriefs/cenews.html> Try out the main site at www.pubs.asce.org
- American Society of Mechanical Engineers: <http://www.asme.org>
- Institute of Industrial Engineers: <http://www.iienet.org>
- American Institute for Aeronautics and Astronautics <http://www.aiaa.org>
- Society of Automotive Engineers <http://www.sae.org>
- Mechanical Engineering magazine <http://www.memagazine.org>
- <http://www.engineering.com> has news bulletins and will send news by e-mail.
- <http://www.aerospaceonline.com> has links to news in the aerospace and aviation industry.
- Current "news" and "popular science and technology" magazines may be good for popular implications of new technology.
- You should include some of the annual conferences that relate to your discipline or sub-discipline.

Attachments