

Day One Identify some initial issues and sources

1. Present an issue from your discipline. Ideally, it would be one the students might recognize from recent headlines. Examples:
 - a. California's power crisis. (Especially for EE/ME/CEs, but also Environmental Eng.)
 - b. Continual increase in speed of computers, coupled with the decrease in price. (All areas of engineering)
 - c. Scientists recently reported that they were able to stop light, hold it in place, then start it up again. (ECEs)
 - d. The explosion & destruction of the Boeing 747, TWA flight 800 out of NYC in July 17, 1996. (fuel tank explosion?) (MEs, AEs and ChemEs)
 - e. Hackers deface several government sites: Bulgaria, Iran, New Zealand, Beirut, as well as Microsoft, Vatican, ... Hackers have also stolen credit card numbers from e-business sites, and shut down other sites with distributed denial of service attacks. (CS, ECE)
 - f. Bringing down the Mir space station (AEs). Q: How many other satellites will need to come down in the next 20 years?
2. Ask them for possible and probable implications of that issue to the practice of their discipline. What changes, if any, should they make in their educational and training plans? How could they learn to avoid the problems or capitalize on the opportunities? (You may need to guide them initially in finding implications.)
3. Give the students the information about knowledge doubling from the "Justification" section of the Instructor's Guide. Assuming that the knowledge in their discipline will follow roughly the same pace, ask them what implications this will mean for them after they've been practicing engineers for 10 years. Use the "Think-Pair-Share" technique to develop and share ideas. One implication they should consider is the need for increased specialization, and the concurrent need for greater communication in a company. With each engineer's range of expertise shrinking as the body of knowledge grows, the need for communication with other engineers who are experts in related areas will grow dramatically.
4. Pick a second issue outside of your discipline. One of the above might work, or one from this list:
 - a. Consider the Florida vote-counting snafu in the 2000 presidential election. In the machine that held the punch-out ballots, some design decisions and some poor maintenance may have increased the difficulty in completely punching out the chad. You may wish to consider how the punching machine could be redesigned to alleviate these problems. Or you might want to let them propose an alternative way to count votes that would avoid this problem. (This may take some creativity, and also some sharp critical skills: What new and different problems are likely to spring from their proposed solutions? For example, some have proposed voting on touch-screen computers. But how much would that cost? And could a population that can't set the clock on their VCRs record their votes reliably and accurately on a computer using software they've never seen before?)

- b. One of the promises of cloning research is that we might be able to grow specific replacement parts for any given individual. You may be able to have a replacement heart, kidney, or eye grown from some cells taken from your body. What are the implications – both good and bad – of this type of development? (Obviously, longer life and better quality of life are benefits. But the cost of medical insurance might increase dramatically, and there are troubling issues about what to do for people who can't get medical insurance, or who can't pay the costs.)
 - c. Recent surveys of the composition of the asteroid Eros suggest that it contains more iron, aluminum and similar metals than could be mined from the earth's crust in all of history. So the exhaustive mining of one asteroid could furnish all the raw materials necessary for many space stations and ships, and supply earth for the foreseeable future, as well as providing billions of dollars of income. Obviously, the investment to mine it would be huge, but the payback could dwarf the investment.
 - d. *[I could use some help here! What are some other examples?]*
5. Take an item from the first list that you did not talk about, break the class into groups of 4-5, discuss for 10 minutes: What changes might this cause? Each group lists at least 4. Randomly chosen groups report.
Alternatively (particularly when close to an election year), have them consider what changes might come about with a change in government (President, Congress, even Governor). What might have been different if the other guy had won?
 6. Assignment for next class: Read newspaper, TV and/or web news sources. Bring in 2 topics from the last 2 weeks (or up to 3 months) that would probably have an impact on engineering practice. Also, find 2 sources of further information on these issues. (May want to constrain to your discipline, or even a sub-discipline.)

Day Two Dig deeper, Learn about good **sources** for this type of information. (Note: You could have a few class periods between Day One and Day Two. They could use this time for research. However, it is hoped that a couple of calendar days would give them enough time for the homework assignment.)

1. Have students report on the topics they found. (Pick 5 at random.) Ask them to explain what some of the possible impact on engineering practice might be. Ask other students to add additional implications for engineering.
2. Ask the students: How can we learn more about this issue? Where can we find the implications for the different areas of engineering? Try to generate discussion. Hopefully, they will have run across some good and not-so-good sources in their homework.
3. Point out news sources listed on page 4 of the Instructor's Guide. (This is included as a separate handout. You might want to put it on your class website.)
4. Take one of the issues they brought up, or one that you have looked into, and present the implications you expect for your engineering field.
5. Take one of the issues (perhaps the same one in item 4), and trace out a time line of developments over the last 3-5 years. Ask the students to project 2 years in to

the future. What do they think is likely to happen? (You'll have to take some care with this. Try to encourage creative thinking, but limit flights of fantasy.)

Assignment at end of class: In your teams of 4 (adjust for your class size), research and write a report on a contemporary issue you've found. (Alternatives for the type and length of the report are below.) The report should include some possible implications of the issue on the practice of your discipline. Be ready to present a 3-5 minute talk on your issue, and answer questions about it. (Their report might be a PowerPoint presentation, a 1 or 2-page report, or an outline you provide for them to fill in.)

Day Three Presentations (Note: It may be appropriate to have 1-3 other classes between Day 2 and Day 3 of this assignment, in order to allow them time to prepare.)

Students present what they have discovered. About 5 minutes for each presentation, with questions as time allows. If you have too many groups for your time, select a few at random. (A 10-sided die is a convenient randomizing tool!) It is not necessary for each student to present part of the presentation, as long as each has had some input into the research and preparation.

Last 15 minutes of class: Summarize the major issues common to several (if not all) of their presentations. Ask them to write a short paragraph answer to this question: "Why is it important to keep up with contemporary issues in [my discipline: ChemE, CS, ...]?"

Alternative questions for summation:

- If knowledge is doubling in my field every few months, how can I keep up?
- What are some habits a practicing engineer should develop to try to keep up with his/her discipline?
- What are two good sources of information to help me keep current?
- Give one example how an engineer today might miss an opportunity by failing to notice a recent development. (Preferably in your discipline)
- Give one example how an engineer might inadvertently cause a problem, a failure or even loss of life (adjust as appropriate) by failing to stay aware of contemporary issues in his/her profession.

These questions may also be good for a later exam, or may be used in a later course to check long-term retention.

Assignment (homework) given on Day One:

Using contemporary news sources (news magazines, discipline specific magazines, web sites, etc.), find 2 news items from the last (two weeks to three months) that might relate to the practice of engineering. Write 2-3 sentences describing it. Find two sources of further information in addition to the first article or story, and add those references to your homework.

Assignment (report/presentation) for Day Three:

In a team of 4, research and write a report and presentation on a contemporary issue you've found. You should be prepared to make a 5-minute presentation using PowerPoint (if available) to the class. (Selections will be made randomly in class.) Your report should fill in the following outline points:

- I. Describe the contemporary issue or event.
- II. How does it relate to your area of engineering?
- III. What are some possible adjustments an engineer might make as a result of this?
- IV. Do you see any advantages or opportunities that could come from this issue/event?
Any disadvantages or problems?
- V. What recommendations, if any, would you make to your boss based on this? (Or perhaps you would start your own company to take advantage?)
- VI. List at least 2 sources (magazine, journal, web site, ...) of further information. Rate the sources, and give their strengths and weaknesses.