USING A COMMERCIAL MOVIE FOR AN EDUCATIONAL EXPERIENCE

An Alternative Laboratory Exercise

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I have used a commercial film, *Acceptable Risks*,[1] educationally for ten years. I give it to small groups of students in the timetable slot for a laboratory exercise and then have them write a report on it. It is not an educational film; it is a commercial cinema thriller—a "disaster" movie centered around a chemical plant. It is a drama involving human beings and is actually surprisingly sympathetic to those who work in the chemical industry. It is available on video for a modest price (vastly less than what is charged for some educational films). Although it did not get the media attention of *The China Syndrome*,[2] (which was about a nuclear power plant, released at about the same time as the Three-Mile Island incident), it is equally dramatic and watchable. In some respects, it resembles the Bhopal disaster, but it takes place on American soil and has characters that we get to know. Brian Dennehy plays the manager of a Citychem chemical plant in Oakbridge, under pressure from his bosses to maintain production and keep costs down. Eventually there is a toxic chemical release.

For chemical engineering students, however, there are many lessons to be learned. More than any other film I have seen (including specifically educational ones), it shows the technology and working practices of a plant, from the labeling of tanks to operating procedures; it shows what people actually do in a plant...management, operators, and technicians in particular.

There are technical issues. Understanding what goes wrong in this film and witnessing the consequences can give students insight into safety technology and techniques. Moreover, there is the human side. Perhaps one day some of these students will find themselves, like characters in the film, under pressure to speed up production and/or to save money. They see how there are conflicts and interactions between various groups, or how the company may go under if they cannot meet the price or order date, resulting in major job losses and devastating effects on the local economy, or they see the conflict between politicians and environmentalists who fight for their own agendas.

As the students themselves recognize, this exercise demands some intellectual effort and provides a different learning experience from a traditional experiment and report. Analyzing what went wrong is more complex than just interpreting experimental data.

USING THE VIDEO AS AN ASSESSED PRACTICAL EXERCISE

Typically, I give the film to second-year students in the time period allotted to a laboratory exercise. Three to six students in a room with a video player are told to watch the movie through to the end. The film takes an hour and a half, and the students have three hours for the practical. They then have to write a three-part report:

1) **Write a news item for *The Chemical Engineer* (the main UK subject journal) reporting on the events as if they had just**

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happened, remembering that the details will not yet be known and that the publication is subject to the libel laws. Their reading audience will expect to be told the company's name and the chemicals involved (so far as they are known) as accurately as possible.

2) **Make a personal assessment of what went wrong and who was to blame.**

3) **Report on how valuable the experience of watching the film was. Did it give any insight into industrial practice in chemical plants? Did it affect your ideas about industrial safety? Was it a worthwhile alternative to a laboratory exercise?**

STUDENT RESPONSES

The student response has been overwhelmingly favorable. The small number of negative comments acknowledge that the student would have preferred to do an actual hands-on practical. Some of the responses to part three of the report were:

- The film allowed me to picture the kind of work I might be involved with in the future and the quick thinking that is necessary in a chemical plant in an emergency.
- Although the film is about things going wrong, it would have been pretty dull had it not. It did not put me off working in the chemical industry. Indeed, it may have confirmed that this is what I want to do.
- In particular, it reminds us that monetary gains should not be played off against human safety. In addition, the issue of plant location is raised, something that is currently very topical because of the recent disaster in Toulouse.
- I did consider the film worth watching. I think it was an insight into the chemical industry from a perspective that I might not otherwise have had. It highlighted many important safety, economic, and social issues.
- It was a challenging exercise, and I had to redevelop writing skills, very different from those I would use in writing laboratory reports, that I have not really used since I was studying GCSE English.
- Having watched this film, my awareness for the importance of safety in industry has definitely been increased.
- In the course of watching the film, I have learned how a chemical plant operates, about industrial practice, and about the safety procedures inside a plant.

A Student's Appraisal (Janet Robinson)

Personally, I think I gained quite a lot from watching the video and writing this report. Not just about the chemical plant and industrial practice, but also about writing in a new style compared to my normal work. I actually found the task a lot harder than writing a traditional lab report. I had to think in more depth about what I was going to write and make sure that, in the first place, I did not blame anyone, and in the second place, that I contributed my own opinions and not just what I had been told. That is considerably harder than it seems because there are quite a few people who could be blamed and it was hard to sort out the correct procedures from the incorrect ones since I have never been in a situation such as that.

The film showed me just how important safety issues within a chemical plant are—even simple but very serious things such as understaffing and an out-of-date evacuation plan. That sort of thing should be high on the agenda and should be sorted out before anything is produced. It has also shown me that you should not skimp on safety procedures just because a certain amount of chemical has to be produced. Safety should always come first, no matter how much pressure you are under. I think this is a very valuable thing to know when I go into industry.

I feel the film was worth watching and it taught me a lot. I think it is an acceptable alternative to the laboratory experiment and should be made compulsory for a number of reasons. It breaks up the traditional lab report. You gain valuable new skills such as writing in a different manner. I also think it teaches a lot about the day-to-day running of an industrial plant and shows that slight errors in procedures can have disastrous effects.

CONCLUSION

Watching a commercial film can be a valid educational experience if students are required to analyze and comment on it. Chemical engineering is not just about technical processes—it is also about people. It is clear that students have gained insights from watching this film that they did not get from visiting a plant. I also find this film a useful preparation for my course in Process Safety and Loss Prevention (where I show films about Bhopal and Feyzin).

A video can be a useful back-up if some laboratory experiments are temporarily unavailable. It can also be used as a timetabled class or borrowed for a project. Other films of relevance to chemical engineering are *The China Syndrome*[2] (about problems in the nuclear industry), *Erin Brockovich*[3] (about the effects of chemical pollution), and *Thirst*[4] (about purifying water, with a real chemical engineering finale). The film *Silkwood* is briefly concerned with the 1970s nuclear industry, but has, I think, little value in this context.

Since many chemical engineering departments now have teachers with degrees in other subjects and no industrial experience, *Acceptable Risks* might be a useful primer for them also.

REFERENCES

1. *Acceptable Risks,* (film 1986, video 1992) distributed by Prism Home Entertainment (USA, NTSC, ASIN 6302447569) and Odyssey Video (UK, PAL, ODY775)
2. *The China Syndrome* (1979) Columbia/Tristar; NTSC, PAL, DVD (A particular point that is worth discussing is the human side of safety. For example, the control room staff take action believing a faulty level indicator and do not think to look at its duplicate.)
3. *Erin Brockovich* (2000) Universal Studios, NTSC, PAL, DVD (Supposedly based on a true story about people being poisoned by contamination of water supplies by hexavalent chromium. No real process information, but you could ask students to research Cr(VI) and water supplies; possibly also useful for discussion of ethical issues.)
4. *Thirst* (1997) New Line Studios, NTSC (TV movie. The hero is probably a civil engineer, but the story is about bugs in the water supply getting through filters. There are technical and environmental issues. The resolution is definitely chemical engineering.) ❐