Constructing Classroom Role Playing Exercises

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Abstract

Role playing exercises in the classroom can be used to bring vitality and the feel of realism to discussions of the impact of technology on society. The key to success is creating a realistic structure for the exercise and giving the various roles depth and realistic attributes.

I. Introduction

The particular class is *Steam Power and Electricity Generation,* a second semester freshman tutorial course in the Plan II honors program at the University of Texas at Austin. This course focuses on the impact of technological development and is one of several "substantial writing component" courses in the curriculum. Students in the Plan II program are purposefully chosen from a wide range of degree programs in Natural Sciences, Engineering, Social Sciences, Liberal Arts, Public Policy, Languages and Performance Arts. The classes are intentionally composed of mixed majors to provide a broad perspective in the discussions. I found the style of teaching required a refreshing change from my usual classroom experience. The standard engineering lecture format is, of necessity, used very sparingly during the course. Nonetheless, a core subset of very basic lectures on introductory electric circuits, thermodynamics and structural mechanics is essential. The key message of the lectures is that the ability to calculate, predict and quantitatively evaluate the performance of machines is an essential component of engineering design — and this ability is what makes rapid progress possible. The downside is that new technology invariably seems to create new problems, both social and environmental.

In this class I use the hind-sight experience of 18^{th} to 20^{th} century technological development to illuminate trends and effects in recent technological innovations. After all, the impact of the development of railroads, high capacity steam prime movers and electrical power generation and distribution created the most significant changes in social fabric in all of history. The in-class texts [1., 2.] present effective summaries of the nature and origins of the technological innovations. The number of close parallels in events between the industrial revolution in the past and information technology today is striking, to say the least. Students in technologically-oriented majors readily relate to those aspects of the issues, but often do not have a clear perspective on the social implications. Students in non-technical majors find the technical aspects boring. Both types of students can benefit from perspectives gained in role-playing exercises.

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A role playing exercise more effectively involves students in the material than either a group discussion or a team negotiating exercise: the students are individually required to adopt a particular *persona* and to present their point of view from that perspective. My inspiration for this type of classroom exercise came from a series of parlor games, *How to Host A Murder* [3]. In these games each of the (usually) eight participants plays a prescribed role and the story is revealed in layers (chapters) until a conclusion can be reached. The games are cleverly designed to hide the identity of the culprit from even the host(s) of the game, and each character is fully sketched with both overt and covert motivations.

The classroom role-playing problem is designed to approach a hypothetical situation from at least three separate and often contradictory (or at least potentially adversarial) points of view. The class was divided into instructor-selected groups and individuals were assigned roles within the groups. Each group was provided with common information about their collective situation. Individual students were given specific information which they should reveal, about themselves and others, and information about themselves which they do not want to be generally known. Clues designed to lead the students to inquire into the motivations and practices of strategic members of the other groups were placed in the information. The exercise depends critically on interaction among the individual characters, and is only practical in relatively small classes. Character development is a key issue and depends, in turn, on the inspiration of the faculty.

There are several important requirements to make the exercise vibrant and effective. First, each exercise must be a realistic civic and/or social problem. Second, the problem situation must be designed to convey a sense of jeopardy on the part of the participants. That is, the consequences of poor decision-making or poor problem resolution should be obvious and non-trivial. The groups know that they are being graded individually and collectively on the quality of their participation. Third, each role should include both positive and negative character traits and motivation factors: no character should be completely heroic or villainous. In fact real people are seldom either heroic or villainous, but rather disagree on which factors or values are the most important. All are motivated by different concerns rather than by moral or ethical lapses in these exercises. If this is not the case the exercise runs the considerable risk of quickly becoming "cartoonish". I provided background information for individual characters which they both do and do not want to be made public. Other characters are given clues intended to provoke questions to bring out their negative actions.

II. Example Problem: Steamboat Explosion, *ca*. 1850

The specific example exercise is a fictitious boiler explosion on a steamboat in the Ohio River in 1850. The time setting is purposefully just prior to promulgation of Federal boiler safety regulations (1852). The boiler safety code marks the first time that a government imposed safety regulations on private enterprise. The scene is testimony before a board of enquiry composed of government officials from both Ohio and Kentucky. Witnesses include steamboat company

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officials, town citizens and manufacturers (from Cincinnati) and rural residents (mostly from Kentucky).

The time, 1850, is two years before passage of enabling legislation for the first federal regulatory board, the Interstate Commerce Commission. During 1850, 277 people died in boiler explosions and in 1851 a total of 407 people died. In the problem the specific steamboat company has a higher rate of boiler explosions than other companies operating on the Ohio River between Cincinnati and New Orleans. A Board of Enquiry has been convened immediately after a local boiler explosion resulting in substantial loss of life and property. The Board is charged with deciding whether sufficient evidence exists to refer the matter to criminal court, the Ohio River Company should be sent into receivership and disassembled, or some form of sanctions are warranted.

Class groups consist of:
1) Board of Enquiry, elected officials and judiciary from both Kentucky and Ohio,
2) officials of the steamboat company (at least the Chief Executive Officer and the Principal Engineer in charge of construction). The Ohio River Company is the oldest operator in the area and is the least expensive, but has had 4 explosions in the past 2 years — far more than the other companies.
3) Concerned Citizens from both states; farmers, city residents and local manufacturers.

A few members of the "Board" and "Citizen" groups have had relatives injured or killed in steamboat accidents. Motivational factors include: greed, pride in workmanship, impending elections, and transportation (market access) for agricultural and manufactured products.

Ethical questions include:
1) bonus payments for steamboat crews paid for short transit times between ports,
2) some (hints of) kickback from the boiler/steam engine manufacturer in exchange for information on the company's internal design safety factor,
3) amounts of stock owned by various discussion participants (all three groups) in the company under investigation and in other competing steamboat companies.

Situational and embedded ethical dilemmas:
1) both the cargo and the boat were under-insured,
2) newspapers have fanned the flames of public resentment and public demonstrations have occurred,
3) both state and local elections are eminent, and more than half of the offices are up for re-election,
4) federal legislation regarding boiler safety is pending, of which the senator from Ohio is well aware,
5) the local economy depends heavily on river traffic for economical transport,
6) boiler safety (and safety factor) is a prime issue in Washington,
7) there is substantial ill-feeling between Ohio and Kentucky,

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8) a relative of one Board member works for a rival company and insists that the boilers are not safe enough,
9) another Board member owns a substantial amount of stock in the Company,
10) the Company has recently invested a large amount of money in upgrading their designs and their steamboat fleet,
11) the Principal Engineer does not trust management and suspects that the actual boilers delivered are below specifications as (s)he was not allowed to see the test data — but needs this job very badly due to indebtedness.

Problem Statement:
The time is 1850. There has been an explosion of a steamboat boiler. The boat sank in deep water and is a total loss. Twenty passengers and ten crew were killed in the accident. The cargo lost was valued at approximately $5,000 and the boat was valued at $25,000. The steamboat company was insured for a maximum loss in capital of $5,000 and cargo losses not to exceed $2,500. This is the fourth steamboat owned and operated by "The Ohio River Company" to explode in use in the past two years. The Ohio River Company is in competition with two other companies for river traffic between Cincinnati and New Orleans. Due to numerous newspaper accounts, the populace is extremely unhappy with the accidents, to say the least. One of the prime areas of concern is the safety factor used in the designs — i.e. how much larger the parts are than absolutely required in order to be safe because of uncertainties in construction, materials and use. Citizens groups are organizing to protest the poor safety record of this particular company. A Board of Enquiry has been impaneled by the states of Kentucky and Ohio and is meeting in Cincinnati. Approximately 400,000 citizens live in the two states at this time. State elections occur in a few months. The Board consists of upper echelon state elected officials (both state and federal government) and the upper echelon judiciary of both states (appointed, not elected).

Assignment:
The three class group teams (Board of Enquiry, The Ohio River Company and Concerned Citizens) are to deal with the problem. The Board of Enquiry must decide whether The Ohio River Company are to be cited for unsafe operating practices, serve jail time and/or pay a fine or to be sent into receivership and disassembled. The Board will listen to testimony from Concerned Citizens and The Ohio River Company.

Example Character Instructions:
1) Chief Justice from Kentucky:
The company is headquartered in Ohio and seems to pander to Ohio needs and concerns, not those of Kentucky. Many times they have refused to build what you think are an adequate number of docks on the Kentucky side of the river. You are a strict constructionist and firmly believe in states rights over federal rights in any conflict of interest. Your son is an engineer for one of the competing companies and he swears vehemently that The Ohio River Company has unsafe designs. You are concerned because you own a large amount of Ohio River Company stock. Your daughter was on the boat which exploded last month and died in the accident.

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2) Senator from Ohio:
You are aware of an intense lobbying effort in Washington to establish a national board to oversee interstate transportation issues, particularly steamboat safety concerns. You think that this will happen but don't think that it is a good thing. You think that the outcome of this enquiry will influence events in Washington and you feel that the wags and power brokers there are scrutinizing these proceedings. One of the issues of prime concern in Washington is the safety factor used in boiler design. Also, your colleagues speculate that boat captains and operating crews are tying down poppet valves (safety pressure release valves) and disabling other safety appliances to get faster passages between cities. The Kentucky folk are always complaining about crooked deals and other insults from Ohio folk. They are mostly country bumpkins and a lot of whining stupid people, in your experience.

3) Ohio River Company Chief Operating Officer:
You have used older steamboats far longer than they should have been used. You had to do this because otherwise the demand for freight and passenger service would exceed your available facilities and equipment. To encourage good performance and be more competitive, you have offered bonuses to boat captains and boat engineers who have the shortest times on the river and are able to beat your company's published schedule. To save some money on construction you let the company contracted to build the equipment know that you will split the difference in cost with them. In return you revealed to them that the design safety factor was 1.25. You have heard that your competitors do the same thing. You have heard that your competitors have bribed government officials. You suspect that your competitors have planted false information about your company. You own a lot of Company stock.

3) Citizen #1, Kentucky:
You have not been able to get your farm goods to the steamboat dock without paying a barge to take them across the river. The extra freight fees have reduced your available money to the point that you cannot afford needed farm implements or enough flour, sugar and other goods for your family. You do save some money by using The Ohio River Company.

III. Conclusion

The in-class exercise was well-regarded by the students. I am always surprised and amazed by how well the students, engineering and non-engineering alike, are able to relate the topics discussed in class to the exercise problem. The exercises tell me important omissions in class material — for example, I must introduce the concept of safety factor more carefully in future. I should have discussed safety factors in design in much more detail prior to the class exercise. The importance of safety appliances, such as poppet valves, was mentioned in class — and the specific example of the explosion of the "Best Friend of Charleston", the second locomotive built in the U.S., was discussed — but their importance was not adequately stressed prior to this class exercise.

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Student feedback was revealing, as well. Representative comments included:

> "… forced me to think through how an actual investigation panel works with a healthy dose of conflicting interests and moral dilemmas. I knew I was cutting corners with my safety factor of 1.25 and telling the construction company I would split the savings in cost with them."

> "Each viewpoint presented was valid, as was the historical context of the problem. It is very refreshing to participate in active debate with my peers, instead of listening to a lecture. I felt a little under prepared in the area of actual facts: steamboat usage, revenue, research and accidents. One class period is probably not enough to discuss the problem at hand."

> "My fellow classmates and I were able to pull in information that we learned from our reading and in class to bring our characters to life. I think that by interacting with one another in this way we were to gain a better understanding of the importance of steamboats around 1850."

> "I thought the lack of full understanding of the role the safety factor played made it … difficult to answer quickly. Knowing what an acceptable safety factor should be would have helped."

In summary, the role-playing exercise was more effective, thorough and well-regarded than both the group decision and the inter-group negotiation class exercises. In fact, it may have been a mistake to put it first in the sequence as expectations were raised that were not completely realized by the two other formats. While this type of exercise requires substantially more forethought and planning than the other types, the results are far more satisfying and substantial and can justify the required effort. The parlor games make interesting and delightful laboratory exercises for anyone interested in including this type of classroom activity in their course.

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