

Negotiations and Play

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Negotiating a Nineteenth-Century Solution

Abstract

This paper describes a negotiations module within a role-playing engineering course set in nineteenth-century Worcester, Massachusetts. Our course, “Humanitarian Engineering Past & Present: Worcester, 1885,” is a first-year, general education course at Worcester Polytechnic Institute. The course includes engineering content within a humanistic frame that makes it ideal for general education. The course puts students in the roles of actual people living in a turn-of-the-century industrial city in central Massachusetts. Students learn and practice engineering concepts (engineering design, stakeholder analyses, mass balance, sewage treatment, material properties and selection, sewage properties and conveyance, statics and stress, filtration and chemical precipitation) while playing the roles of engineers, industrialists, elected officials, workers, scientists, public health officials, inventors, and city residents. In this course we introduce innovation and entrepreneurial mindset to an audience of students who may not think they are interested in the subject. Our role-playing game-based approach is intended to attract students to entrepreneurial thinking as well as other disciplinary content they may not have considered important to solving engineering problems. This paper describes a negotiations module, where students learn about negotiations, typically a highly emotional activity we engage in several times a day to reach agreements with others. In this hands-on, active learning experience, teams negotiate an employment agreement between pipe fitters and the city’s engineering department. Each team learns how to prepare for the negotiation by exploring each other’s needs, interests, and positions. Then, the students negotiate and experience the challenges of reaching an agreement that satisfies both parties. Our assessment materials include the outcomes of the negotiations themselves (whether teams reached an agreement and whether they met their own requirements) as well as student reflective essays on the experience and what they learned. We present this course module as a case study that can be adapted in different classrooms.

Introduction and statement of the problem

In 1970, Worcester Polytechnic Institute (WPI) created a unique and innovative plan to educate scientists and engineers with a strong and vital humanities and arts component. The WPI Plan reasoned that the humanities and arts would place engineering in an ethical and humane context, graduating young men and women to develop technology with an eye toward the greater good. More than forty years later, the humanistic values that have remained so important to WPI’s general education of engineers have been embraced by schools of business and by engineering programs seeking to develop entrepreneurial engineers. Two of the attributes of an entrepreneurial engineer, as defined by the Kern Family Foundation’s Kern Entrepreneurial Engineering Network (KEEN), are essentially the qualities found in a well-educated humanist: *First*, curiosity (including the willingness to “explore a contrarian view of accepted solutions”); and *second*, an integrative disposition—the ability to make connections across disciplines, domains, time, and space. In order to support the third quality, which KEEN calls “creating value,” the study of the humanities should be integrated with engineering. That combination

allows students to develop the capacities to identify unexpected opportunities to create extraordinary value and to persist through and learn from failure.¹

WPI's six-course humanities requirement, culminating in an individual supervised project, enables students to define their own course of study in the humanities and use that disciplinary training as a lens on their technical disciplinary training, the professional culture they hope to enter, or the world around them. This kind of integrative work, however, relies on students to make their own connections between the humanities and engineering. To help them learn how to integrate humanistic with engineering knowledge, WPI also offers students a first-year course addressing some complex, open-ended problem. These courses are team-taught by faculty in different disciplines, typically a technical and a non-technical discipline. In 2016, with support from KEEN, we developed a team-taught course to teach engineering within the rich context that usually surrounds complex engineering challenges, including economic, legal, political, and social constraints, and with sustained attention to the miscellaneous perspectives of diverse human beings. The faculty who designed and co-taught the course represent the disciplines of engineering, humanities, social sciences, and business, including innovation and entrepreneurship. Our aim was to develop a course that simulates a real-world engineering challenge, replete with strong societal variables, in order to enable students to learn and practice not only the technical knowledge they need to be effective engineers, but also the habits of mind (curiosity, flexibility, integrative thinking, and creativity) that are necessary for developing what KEEN calls the "entrepreneurial mindset."

This paper describes a negotiations module within a role-playing engineering course set in nineteenth-century Worcester, Massachusetts. In this exercise, students negotiate a labor contract necessary for the construction of a major sewerage project. Our goal is to introduce students to one important and difficult skill necessary for entrepreneurial thinking: the ability to apply creative thinking to ambiguous problems, particularly when the variables include human beings.

Background

"Humanitarian Engineering Past & Present: Worcester, 1885," is a first-year, general education course. The course includes engineering content within a humanistic frame that makes it ideal for general education. The course puts students in the roles of actual people living in a turn-of-the-century industrial city in central Massachusetts. Students learn and practice engineering concepts (engineering design, stakeholder analyses, mass balance, sewage treatment, material properties and selection, sewage properties and conveyance, statics and stress, filtration and chemical precipitation) while playing the roles of engineers, industrialists, elected officials, workers, scientists, public health officials, inventors, and city residents. In this course we introduce the entrepreneurial mindset to a population of students who may not think they are interested in the subject. Our role-playing game (RPG)-based approach is intended to attract students to entrepreneurial thinking and to introduce them to STEM-humanities integrative study, project-based learning, and other disciplinary content they may not have considered important to their engineering careers.

Near the middle of the term, we present students with the concept of negotiations and give them an opportunity to work on teams during a live negotiation. Negotiation is typically a highly emotional activity in which we frequently engage to reach agreements with others. In this hands-on, active learning experience, teams negotiate an employment agreement between pipe fitters and the city's engineering department. Each team learns how to prepare for the negotiation by exploring each other's needs, interests, and positions so they will be well prepared to develop options that maximize the overall value (for both parties combined) of the agreement. Then, the students negotiate, experiencing the challenges and feelings associated with reaching an agreement (or failing to do so). Our assessment materials include the outcomes of the negotiations themselves (whether teams reached an agreement, and whether they stayed within budget to do so) as well as student reflective essays on the experience and what they learned.

Theoretical considerations

In keeping with our institution's emphasis on Project-Based Learning (PBL), much of it pursued in teams, we take a problem-solving, rather than an adversarial, approach to negotiations.² We also emphasize the psychological skills required for conflict resolution: understanding and overcoming one's own emotional barriers to resolution, communicating effectively with other emotionally charged agents, and so on.³

Approach: The negotiations unit

We take a three-part approach to this unit: *first*, a conversation about history, historicism, and the different disciplinary and methodological approaches to the negotiations assignment; *second*, the negotiation exercise itself, including readings, homework, team meetings to prepare, and the in-class negotiation; and *third*, individual student reflections on the activity. The first section takes only part of a class period (20 minutes or so); the negotiation and debrief take a full two-hour class; and the reflection is a homework assignment.

I. History

Although the historical conditions we describe in the scenario are accurate and based on the influential research of Roy Rosenzweig,⁴ the premise of our assignment is patently *ahistorical*. That is, we are working within an imaginary zone in which we give late nineteenth-century laborers a plausible chance to negotiate a satisfactory labor contract with city officials. We have excellent reasons for wanting our students to understand how to conduct an effective negotiation; it is a skill that helps everyone develop feelings of self-efficacy. Moreover, we believe that by asking students to do this work in character roles, they can imaginatively inhabit the point of view of a person very different from themselves, an exercise known as *perspective-taking* and highly valuable to engineering students. However, the tradeoff we must confront when we give students this assignment within the historical context of our game is that we abandon historical authenticity. This compromise is significant enough to warrant class time for a discussion.

Unlike *counterfactual* events—occurrences in the game that never happened in reality but are historically plausible—the very premise of our negotiation is *ahistorical*, and we want our students to be aware of the historical inaccuracy and the reasons why such a

negotiation could never have occurred in the time and place of our RPG. To help them arrive at an understanding of the historical inaccuracy here, we assign a short reading, the autobiography of George Engel, one of the Chicago Haymarket Anarchists who was executed in 1887.⁵ Engel—who, most historians agree, was innocent of the crime for which he was executed—was a German immigrant and an ardent socialist when he was arrested in 1886 for an explosion in the Chicago Haymarket, the site of a pro-labor rally supporting the eight-hour workday. Although Engel had been home playing cards at the time of the explosion and no credible evidence ever tied him to the crime, he was tried with seven other men and executed in 1887. As part of an effort to steer public opinion before the execution, Engel and the other condemned men wrote their autobiographies, which were serially published in a Chicago pro-labor newspaper. Engel's is one of the briefest and plainest, so it is easy reading for students. Engel tells the story of his early life in Germany as the son of a bricklayer who died when Engel was 18 months old. The boy lost his mother at age 12 and spent his youth learning trades. When the factory system in Germany wiped out small manufacturers, Engel and his wife immigrated to the United States, where he worked ten-hour days and supported his family until illness forced him out of work and into poverty. Engel describes the conditions that mechanized labor had on the nineteenth-century workforce and explains his embrace of first the labor movement and then socialism. Our goal in assigning this reading is to help students understand how few resources nineteenth-century laborers had: the tides of new immigrants and emancipated slaves to northern U.S. cities, the lack of labor laws, and the tight network of manufacturers made it easy for employers to replace difficult workers. In other words, the possibility of negotiating a labor contract would have been hard for turn-of-the-century workers to imagine.

In Worcester, that possibility was even more remote, given how well organized the city's manufacturers were. In addition to George Engel's autobiography, which helps students imagine the life of one immigrant worker, we ask our class to read a chapter about the working conditions in Worcester during those years, "Workers in an Industrial City, 1870-1920."⁶ Here they learn how divided the labor community was, and by contrast how organized and united were the factory owners. In addition to giving them the necessary background to understand the historical liberties we are taking in this negotiations exercise, these readings also give students some insight into the historical trajectory of labor relations, and in particular into the immobility of wage laborers. If part of our goal is to inspire students to consider careers as entrepreneurs, it is helpful for them to appreciate the differences between working for a boss and being one's own boss. Not all employers are the same, to be sure, and we hope that today's employees have more rights than their nineteenth-century counterparts. But thinking about the lived experiences of people who work for an employer can help young people appreciate some of the personal benefits that might offset the risks of becoming an entrepreneur.

II. The negotiation

For this exercise, we appoint students to teams according to the character role they have been assigned for the course. To avoid having massive negotiating teams, we run multiple negotiations simultaneously. The two sides are laborers and city management. Not all roles match perfectly, but in general the characters who belong to the working

class are assigned to negotiate for the road crews that will dig trenches and lay pipes for the new sewer. Those who are associated with the city (its elected officials and heads of agencies) or are leaders in industry or public health are assigned to negotiate for the city. Although, as discussed above, the negotiation itself is not historically plausible, all of the details we use about the proposed sewer construction, costs, wages, and so on, are drawn from historical sources.

In the following sample team for a negotiations exercise, it should be noted that not all characters assigned to the city team are in fact city employees, while not all negotiators on the laborer team are laborers. We ran several negotiation teams concurrently, spreading the laborers and city employees out across all teams. However, the interests of the characters on each team are aligned around the two sides of the negotiation, as we explain below.

Worcester laborers

Amsted Jackson
Dr. Robert Booth
Senator George Hoar

City of Worcester

Frederick McClure
George Waring
Clinton Spaulding Marshall

Negotiating for the Worcester laborers: Not all three characters representing Worcester laborers are wage laborers, but all of them share concerns about the welfare of ordinary working people. Jackson, an African American machinist working for the Blaisdell and Wood Company, a maker of machinists' tools, is the most directly interested in fair wages. Booth, a family doctor living downstream from Worcester, retains strong sympathies for wage laborers because of his earlier experiences working in a woolen factory. Senator George Hoar, a Worcester native, has long been a champion for slaves, freedmen, and working people.

Negotiating for the City of Worcester:

Two of the characters on this team are civil engineers and therefore motivated to keep labor costs down: McClure is Worcester's elected City Engineer, and Waring is an independent engineer who hopes to win the contract to install Worcester's new sewerage system. Marshall is the Superintendent of the Washburn and Moen Wire Company, Worcester's largest employer in 1894. Because he pays city taxes as a resident and large employer, he has strong motives to support McClure in keeping construction costs low.

As common readings, students receive a case history that explains the situation and what they are expected to do; a planning worksheet that each team will use when they meet outside of class in the days prior to the negotiation; the historical readings discussed above; and two short articles about negotiations.⁷ In addition, each student receives his or her negotiating team assignments, while each team receives confidential information that the opposing team does not have.

Prior to the in-class negotiations, teams meet to draw up a list of their *positions* and *interests*. Each team must identify no more than three in each category. In their readings, students explore the differences between *positions* —the hard lines each side takes, which

often make agreements impossible— and *interests*, the underlying concerns, needs, fears, and desires that inform those positions.⁸ For instance, one *position* the team of laborers might take is a particular minimal hourly wage, while an *interest* might be to ensure that the children of workers can remain in school rather than drop out to take paid jobs. Each team meets to discuss its interests and positions and to consider the three elements of their negotiation: wages for ten laborers, length of the workday, and terms and conditions.

Each team also analyzes the situation in order to imagine the interests and positions of the opposing side. In this way, they must think from a different point of view. This exercise is both tactical (enabling them to estimate the opposing side's concerns and predict its moves) and strategic (increasing the odds that they will be able to arrive at an agreement that benefits both teams). We underscore what both of their readings also point out: that negotiations are rarely a zero-sum game.

As they prepare, each team also works to establish their “reservation price,” the least favorable offer they will accept before walking away from the negotiation. On the other end of the scale, they also identify their “best alternative to no action” or BATNA. They will learn that the stronger their alternatives are, the more power and leverage they will have in the negotiation. This exercise helps them realize that they are better able to develop creative solutions during the negotiation if they have seriously tried to estimate the position of the opposing side.

Finally, teams must determine their negotiating tactics and try to predict the tactics of the other side. How much of the confidential information should a team reveal at the outset? How much should they keep in reserve, and at what point should they reveal this? What benefits must they absolutely take away from the negotiation, and which benefits will they be willing to concede? Tactically, players may decide to make certain concessions seem very important to the opposite side, so that when they relinquish them, they will seem to have been generous in the interest of an agreement. As they think about their own tactics, they can consider the possible tactics of the other side and be aware of false posturing.

Here is what students learn before going into the negotiation:⁹

The year is 1894.

Worcester manufacturers are well organized, united, and anti-union. Their local residency, civic responsibilities, and paternalistic policies make them less vulnerable to resistance from organized labor compared to capitalists in other industrial cities. In addition, solidarity among industrialists, rooted in informal social and business networks, keeps Worcester's large employers strong. Industrialists mobilize against labor unions by creating local trade groups, such as the National Metal Trades Association (NMTA), which effectively rallies employers and the general public against unionization and maintains a citywide blacklist to drive out suspected organizers. Public schools even censor teaching about unions or economics.

At the same time, the workers are segmented into dissimilar occupations and trades, making it difficult for them to perceive themselves as part of a common working class. Ethnic and religious differences further fragment the labor force, inhibiting communication and the development of shared goals. Faced with these barriers, Worcester workers do not develop radical politics and activist trade unions, and they do not organize the worker strikes that are spectacular events in other U.S. cities.

For unskilled laborers, wages range from \$1.25 to \$2.00 dollars per day, with a typical workday of ten hours or more. In addition, working conditions in factories and outdoor labor are unhealthy and often dangerous. Labor unions are few and weak, particularly in Worcester. Although workers in other industrial cities commonly orient themselves around trade unions or political organizations, in Worcester only 10% of the workforce belongs to a union. Here, the working people organize themselves around ethnic communities, which give them a culturally familiar environment but discourage class solidarity and activism. Factory workers remain divided along ethnic lines.

Worcester's economy, though, is booming: the value of the city's manufactured products has leaped from \$1M to \$5M between 1837 and 1855. This trend continues to rise each year, and now, available jobs outnumber unskilled workers. The laborers should understand that they have options.

Worcester, Massachusetts, is expanding its sewer lines in the College Hill neighborhood.¹⁰ The plan is to extend the trunk sewer in Southbridge Street to Stearns Square. This construction must cross the Blackstone River, requiring the use of an inverted syphon about 125 feet long, constructed of 24-inch cast-iron water pipe with lead joints. The pipe must be laid with a slight grade (1 foot in 500 feet) in the direction of the flow. It will be connected with the brick sewer at each end by means of a manhole. The manhole at the lower end has a sump six inches deep to catch any solids that might otherwise obstruct the syphon. The water-line at the middle of the iron pipe will be 6.5 feet below the natural grade of the sewer at that point. The pipe will come two feet into the abutment of the bridge at the upper end, and it will clear the bedstone of the other abutment at the lower end. The pipe will run beneath the bed of the stream throughout. At this location only, work must be done at night and on Sundays to avoid the high water caused by wheels from the mills above. Lights will be placed to facilitate nighttime work.

Harrison P. Eddy, Worcester's Superintendent of Sewers, is ultimately responsible for keeping the cost of this project within budget. He answers to the City Engineer, the Mayor, the Common Council, and the Council Members who sit on the Committee on Sewers. All of these men are in turn responsive to Worcester's many industrialists and other leaders, who want to see street improvements but are nervous about the expense of all the sewerage construction that has taken place in the past few years. Fortunately, the cost of pipe sewers has dropped since last year from \$.72 per foot to \$.59 per foot, so that when the city's budget for this project was approved last year, the cost of pipe was higher than it is now. Worcester can take advantage of this savings in pipe material.

The city needs to hire laborers to dig the ditch before the pipes are laid. The project requires 1956 feet of ditch along the following streets: Southbridge Street, College Avenue, and Caro Street. The city's budget for this project includes not only the cost of labor (unskilled ditch-diggers, more skilled pipe-layers, plumbers, and foremen), but also the cost of materials: cast iron for the water pipes, lead for the joints, brick for the connecting sewers at each end, a man-hole, syphon, lights, and so on. To seek cheaper materials would be to risk buying inferior goods that won't hold up over time. However, unskilled labor is one area in which the city can keep costs low.

The streets are still piled high with snow, but in a few short weeks the thaw will set in, and once the snow is cleared and the land begins to soften, it will be time for the project to begin. Both sides are eager to begin work as soon as conditions permit. The project will likely take 9-10 months to complete. Worcester officials hope it can be finished before the most disruptive snowfalls begin in December.

The Labor Community in Worcester has its own interests to protect. The Worcester Central Labor Union, which unites different labor unions in support of common causes, is working to bring a 54-hour workweek bill (9 hours/day x 6 days/week) to the Massachusetts State House. Since 1886, workers around the country have been agitating for a shorter workday at the same daily wages. In a number of places, they have been successful. Massachusetts has a 10-hour law, but in Worcester it is not enforced and most workers don't have the status to insist on their rights. Many laborers in Worcester still work 12-14 hour days.

Worcester has never been very friendly to organized labor. P.J. McGuire, founder of the Carpenter's Union and a prominent leader in the American Federation of Labor, called Worcester "one of the scab holes of the state" (1889). Unlike some states, Massachusetts has no law prohibiting blacklisting, so an unruly employee who complains too harshly may be blacklisted and kept from other employment in the city. Although many of them are self-made men, most of the city's industrialists have little sympathy for the recent immigrants who perform the city's most difficult labor. They often attribute the anger of a laborer to spleen produced by excessive drink. Many industrialists believe that the Irish men who dig ditches are not likely to spend extra money very wisely. These men are much more likely to buy liquor than books or a sewing machine, so why worry about an extra hour here or there?

Last year, Worcester paid its ditch diggers \$.15 per hour for a 10-hour workday, 6 days per week.¹¹ In spite of sewer construction projects throughout the city, Worcester's winters limited this work to 44 weeks of the year, and that remains generally true of this kind of work. A typical laborer employed by the city to dig ditches earns only about \$396 per year, which is inadequate to cover the cost of a typical family. Therefore, a laborer must send his wife or children out to work to supplement his income as the head of household. Even when a daughter works as a domestic servant or a son finds work in a factory or as a delivery boy, these families eke out only a meager existence, with most of their expenses going to rent, fuel, and coarse food.

The Worcester Central Labor Union is meeting in three days with the City of Worcester to negotiate a contract for the expansion of sewer lines in the College Hill neighborhood. Negotiations will include the wages for ten laborers, the length of the workday, and terms and conditions based on each party's interests. This negotiation will be used as a test to develop more general labor policies.

How did the negotiation teams do?

One of the teams failed to reach an agreement, another reached an agreement but only by exceeding the city's budget, and the third team reached an agreement that satisfied both sides. One student effectively summed up these different outcomes: "Three groups negotiating with the same situation and parameters each reached distinctly different outcomes in our negotiations, demonstrating how the people involved in negotiations can affect the outcome just as much as the situation itself. Every negotiation requires preparation, but negotiation partners can have just as much influence on the outcome, thus open-mindedness and adaptability to each situation is vital to effectively negotiate."

III. Student reflections

We asked students to write a one-page essay reflecting on what they learned during the live negotiation, and how they can apply that learning to their lives today. As we will discuss below, our open-ended questions were useful in gathering preliminary data, but the openness prevented us from getting results that could be easily compared for the purposes of assessing student progress.

All students agreed that *hard work and careful preparation were critical* for successful negotiations. "Pulling information together was probably the most difficult part," one student observed. "It would also have benefitted our group to have done more calculations and formulated a plan before class." "Regarding the art of negotiation," another wrote, "I learned how important it is to go prepared with facts and calculations to the negotiation table." One student noticed the importance of organizing these calculations in order to respond nimbly to surprises during the negotiation: "Creating a table with different values can also let you change the course of the negotiation and handle any possible changes."

This student's observation points to another discovery for many students: that *negotiations are dynamic and therefore call on the flexibility of participants*. "The biggest thing that I learned from this is how every negotiation is different. You have to be able to adapt to new situations." Or, as another student put it, "In regular negotiations, every [one] knows different amounts of information and has different life experiences that affect how they view different problems."

The team that failed to reach a negotiation was hampered by the participants' unwillingness to be flexible. In the words of one student from a different team, "they were prepared but they were not willing to compromise." At the end of the exercise, one negotiator who failed to reach an agreement discovered a variable that his team had not considered: "We did not question each given parameter of the situation, which resulted

in a missed opportunity. Questioning each parameter in the future, no matter how unchangeable it may seem, can serve to open my eyes to solutions I may not have considered otherwise.” Another student on this failed negotiation team pointed out that hot tempers and an overly narrow focus contributed to their failure: “One of the reasons that we failed to reach a result was that each team spent too much time thinking about his own target price, and failed to find the bargaining zone for both. At the beginning, the wage proposed by the labor community representatives was more than twice the initial propositional wage from our team, the City of Worcester. Shocked by each other’s ambition, we began debating over money distribution with strong tension, and both of us would not compromise too much. If I could do something different during the labor negotiation, I would have talked to the other team more in order to identify where their wage range and ours overlap, and to keep the wish that we could figure out a result that is advantageous to both sides.”

Assessment

The failure of one team to reach an agreement, and the different paths taken by the other two teams toward an agreement, point to the dynamic nature of negotiations. We were pleased to see our students notice this as well. Here is what one student wrote in his reflection: “I have come to the realization that there are a variety of tactics used when negotiating. You have to be able to bring tangible data; be able to debate for your solution using evidence. You have to be able to see from the opposing sides and be able to think of a solution that either gives the illusion of benefitting them or one that actual[ly] is beneficial for them. You have to debate smart and not give all of your information out at one time; you want to extract as much information as you can, without giving all the information you have, from the opposing side.” In other words, even those teams that failed to reach a satisfactory agreement learned to identify (if not necessarily to practice) the most important skills needed for a successful negotiation.

In addition, students learned that even in negotiations, where two sides may feel like antagonists, it is possible to solve problems collectively. They did this by distinguishing between *positions* (what is wanted) and *interests* (why it is wanted) in order to maximize the value of the outcome for both sides. In the case of one team, the laborers knew that they could earn better wages at the iron works, so they rejected the city’s best hourly wages. Here is how a student on the city’s negotiating team described their path to a successful outcome:

Their BATNA [best alternative to no agreement—in this case, accepting work at the iron works] was better than what we could offer them at face value. We, therefore, shifted from discussing time and pay to include other job perks and benefits that could be found only in this job. We prioritized safety for workers over individual pay and added extra bonuses like skilled apprentices with industrialists and donations to community aid agencies. These strategies allowed us to stay under budget (our interest) while satisfying their desire to take care of their families. This negotiation was difficult, and at times seemed impossible. Luckily, at the end, we were able to come up with a solution that fit both sides. I

personally am proud of what we accomplished, and I feel as though both sides won.

As this account indicates, the exercise calls for synthetic thinking that is valuable not only in negotiations but in many entrepreneurial activities. Here, students assess and connect multiple sources of information, identify the interests and insights of multiple stakeholders, and take opportunities to make decisions and develop options that will satisfy as many stakeholders as possible. Of course, a successful agreement would not have been possible without persistence, another student learning outcome.

Our future plans for this negotiation assignment include finding ways to deepen this learning for subsequent students. We deliberately chose open-ended prompts for the reflective essays because we wanted to know what our students thought they learned from the assignment and how they experienced the negotiations. Our open-ended question served as a net to pull in a variety of responses and to help us identify any learning outcomes we had not deliberately built into the assignment. From here, we plan to develop a more focused assessment for future classes. We are considering giving students a grading rubric that includes these learning outcomes: flexibility, the preparation of multiple negotiating plans, and creative alternatives. If they know ahead of time what specific metrics of learning we are looking for, they can prepare more carefully.

When we offer this class and assignment again, we will refine the reflection essay to focus on the one particular learning outcome that we think is most crucial to entrepreneurial success while also being the most difficult to teach: interpersonal competency. In KEEN terms, this outcome falls under the category of “Collaboration”: “form and work in teams” and “understand the motivations and perspectives of others.” This outcome draws on the insights of cognitive and psychological thrusts within negotiation theory —specifically, research into the cognitive and psychological barriers to conflict resolution developed in the 1990s.¹² The Ury reading we assign in preparation for negotiating describes “five barriers to cooperation” and proposes five “breakthrough strategies” to overcome these barriers. Two of these barriers are emotional: one’s own reaction and the emotions of the other side. Ury proposes the following “breakthrough strategies” to overcome them:

- Go to the balcony: distance yourself from your emotions
- Step to their side: overcome negative emotions of the other side

These strategies involve interpersonal competency or what we might describe as effective management of human emotions.

Limitations and future directions

Although role-playing activities like the one we describe here are the most common single technique for teaching negotiations (Movius, 515-16), they are seldom evaluated beyond participant reactions.¹³ Students find them engaging, but educators have only vague notions about whether they teach skills that students can bring with them into

different contexts. As Schneider and Lewicki suggest, educators need to identify the particular skills required for successful negotiation and then teach and assess them.

For our next series of reflective essays, we will isolate the skill, “effective management of human emotion,” and guide students more deliberately in their reflections. For this work, we plan to follow Ash and Clayton (2009) in designing a mechanism for reflection based on this specific learning objective.¹⁴ According to Ash and Clayton, well designed reflective assignments, particularly when tied to learning objectives, “will help to *generate and deepen* learning in the applied learning environment” (36).

Ash and Clayton propose a model of reflection that travels from “describe” to “examine” to “articulate learning.” The first part is a simple, objective **description** of an experience, where students describe an experience objectively and in some detail. We might ask students to think about the negotiation exercise and to *describe* some moment when they had to try to manage an emotion. (What happened? What was the emotion? Whose emotion? Did the emotion interfere with your effort to reach an agreement? Did you get beyond the emotion? What happened next?).

The second move, “examine,” calls on writers to **examine the experience** with reference to the goal of developing interpersonal competency. (How was the emotion expressed? What forms of communication did I use to manage this emotion? What forms did I use consciously? Unconsciously? How did others on my team respond? How did members of the other team respond? Looking back, do I wish I’d responded more effectively, or used a different response? Why or why not? What were the most effective responses to emotion that I observed others use? Why do I think they were effective?)

Finally, students are asked to **articulate learning about the learning objective**. Here we ask them to explain what they learned about managing emotions. The learning may have taken place during the negotiation, or it may take place only now, as they reflect on that experience. We might give them prompts like these, drawn from Ash and Claypool:

- “I learned that. . .” (Express something important you learned, not just a statement of facts. Provide a clear and correct explanation of the concept; explain your enhanced understanding of the concept as a result of having reflected on the experience. Express this new insight in general terms so you can apply it more broadly to other experiences.)
- “I learned this when . . .” (Connect what you learned to the specific experience that gave rise to your learning.)
- “This learning matters because. . .” (Consider and explain the value of this learning, both for business negotiations and in broader terms.)

Conclusion

Of course, not all engineers plan to be entrepreneurs. Many of them hope to find positions within the industries and companies that have traditionally employed people

like them. At our own institution, our annual career fair is characterized by a number of large companies that recruit every year. Both employers and students hope this relationship will continue.

However, even students who are satisfied with the best positions and careers generally available can benefit from the skills of an entrepreneur, that person who is not satisfied with *what is* and wants instead to bring some different vision to life. As we continue to refine our negotiations assignment, we hope to contribute to the development of the *Engineer of 2020*¹⁵: engineers who exhibit “**practical ingenuity**,” “skill in planning, combining, and adapting” (54-55); **creativity**, that “indispensible quality for engineering” (55); **good communication**, the “ability to listen effectively as well as to communicate through oral, visual, and written mechanisms” (55); “the principles of **business and management**” (55); and the “**dynamism, agility, resilience, and flexibility**” necessary to respond to an uncertain and changing world (56). The immediate goal of our negotiations activity is to demystify “The Art of the Deal,” to help students see the value of preparation and emotional maturity and control. To that end, we offer our negotiations module to any instructor who wants to use it, and we would be pleased to help them implement and assess it as we continue to refine and assess it at our own institution. Our longer-term goal is to help students develop the confidence, competence, and sense of purpose they need to respond effectively to ambiguous problems and to become lifelong learners.¹⁶ If nineteenth-century working people inherited roles that were largely scripted for them, our twenty-first-century students have access to tools and skills and learning experiences that can make their lives much less constraining —provided they are able to imagine something more than the actual circumstances in front of them. Our hope is that, by stepping briefly into the shoes of people separated from them by more than a century, today’s students might learn that they can indeed envision and realize a better world.

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¹ <http://engineeringunleashed.com/keen/>

² See, for instance, Carrie Menkel-Meadow, editor, *Foundations of Dispute Resolution*, vol. I. New York: Routledge, 2016.

³ See Robert Cialdini, *Influence: The Psychology of Persuasion*. New York: Morrow, 1993; Douglas Stone, Bruce Patton, and Sheila Heen, *Difficult Conversations: How to Discuss What Matters Most* (New York: Penguin, 1999); and Roger Fisher and Daniel Shapiro, *Beyond Reason: Using Emotions as You Negotiate* (New York: Penguin, 2005).

⁴ *Eight Hours for What We Will: Workers and Leisure in an Industrial City, 1870-1920*. Cambridge University Press, 1983.

⁵ Engel's autobiography, like those of his seven co-conspirators, was originally published serially in 1886 in the *Chicago Knights of Labor*. They were reissued in a single volume, edited by Philip S. Foner in 1969. Engel's short autobiography is available online:

<https://libcom.org/library/engel-george-autobiography>

⁶ Chapter one in Rosenzweig, 1983.

⁷ These two anachronistic readings are "Breaking through Barriers to Cooperation," a chapter in William L. Ury's 1991 book, *Getting Past No*; and "Thinking Rationally about Negotiation," a chapter in Max H. Bazerman and Margaret A. Neale's 1994 book, *Negotiating Rationally*.

⁸ Ury, 6.

⁹ The information about Worcester's laborers is drawn from Rosenzweig.

¹⁰ The information on the sewerage project that follows is drawn from the 1894 *Annual Report of the Worcester, MA Superintendent of Sewers*.

¹¹ This material about the economic conditions of Worcester laborers comes from "Conditions of Workingmen's Families" in *Sixth Annual Report of the Bureau of Statistics of Labor* (Boston, 1875).

¹² See Kenneth J. Arrow, editor, *Barriers to Conflict Resolution* (NY: W.W. Norton and Company, 1995); Max H. Bazerman and Margaret A. Neale, editors, *Negotiating Rationally* (Free Press, 1994); and Andrea Kupfer Schneider and Roy J. Lewicki, "The Past and Future Challenges of Negotiation Theory," *Ohio State Journal on Dispute Resolution* (2016), p. 2.

¹³ Hal Movius, "The Effectiveness of Negotiation Training." *Negotiation Journal* (October 2008): 509-531.

¹⁴ Sarah L. Ash and Patti H. Clayton (2009). "Generating, Deepening, and Documenting Learning: The Power of Critical Reflection in Applied Learning." *Journal of Applied Learning in Higher Education*. Vol. 1 (fall): 25-48.

¹⁵ National Academy of Engineering. *The Engineer of 2020: Visions of Engineering in the New Century*. Washington, NAP, 2004.

¹⁶ In their classic work on motivation (1995), Edward Deci and Richard Flaste identify the perceptions of both *competence* and *autonomy* as powerful motivators to lifelong learning (*Why We Do What We Do: The Dynamics of Personal Autonomy*). Derek Bruff adds the element of *purpose*, the idea that what we are working toward has some larger goal that will make life more meaningful (Coursera, "An Introduction to Evidence-Based Undergraduate STEM Teaching.").