

From Equations to Influence

Transforming Engineering Students into Leaders



Credit: Johns Hopkins University



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How Active Learning Materials Help Johns Hopkins Students Think Beyond the Technical, Collaborate, and Lead

When Professor Illysa Izenberg began teaching students at Johns Hopkins Whiting School of Engineering, she quickly realized that their technical brilliance alone wasn't enough to ensure their success at work.

"They're so book smart," she recalls hearing from industry professionals, "but they don't know how to talk to a boss, work in a team, or express ideas in ways that persuade decision-makers." Her mission became clear: equip future engineers with the leadership and communication skills they need to thrive in the workplace.

A Harvard Business School graduate, she knew the case method would be the ideal way to teach her

students. "No matter what I've studied, the case method hits all of the qualities that make learning sticky," she says. "It engages students right away in something that they can relate to—as long as you choose cases that make sense to them—and it helps them see how they will apply the learning in the future."

Rather than learning theories and frameworks through textbooks, students see these ideas come to life through the story and analysis of a case. Students are then much better equipped to remember the theory and put it into practice.

Here, Izenberg breaks down how she uses cases, as well as simulations and other exercises and activities, in her courses—and shares how this active learning approach arms her engineering students for long-term career success.



Credit: Johns Hopkins University



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WHITING SCHOOL
of ENGINEERING

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Cases: Opening Engineering Students Up to New Ways of Thinking

Engineering students, even in graduate programs, often walk into Izenberg's classroom with their own preconceived notions about the world of work. While they fully understand the technical side of things, they lack a real understanding of how to communicate their ideas and influence change in their workplaces.

"They don't yet know how to manage or work in a team," says Izenberg, adding that students have yet to realize that having a great idea for a new product isn't enough; they also need to be able to develop a reputation, work with people, and understand how their organization's policies, procedures, and incentive systems drive people's behavior.

Through the case method, students are introduced to real-life business scenarios, and as the class discussion unfolds, they start to see the policy and business structure that drives the behavior of the decision-makers. This fosters growth in their collaborative competence, including attentive listening and the articulation of ideas.

INTRODUCING CASES

In her courses, such as Engineering Management and Leadership, Izenberg always makes sure the first case she introduces students to is something they relate to—and that it grabs their attention. The case should help them "drop their previous way of looking at a story and open themselves up to thinking, 'Alright, what does this mean to me as an engineer, as an employee, as a teammate?'"

For each case throughout the term, students write a case analysis before coming to class. "I don't want them to walk in and simply repeat case facts," she says. "I need them to have already struggled with the content."

WHY ENGINEERING STUDENTS ARE WELL-SUITED TO CASE-BASED LEARNING

"They're taught to look for root causes. They're persistent. They like puzzles," says Izenberg. But engineering students are also most comfortable with problem sets that have a specific step-by-step process or formula that they can use to get the right answer. They need help navigating ambiguity and learning that problems can have multiple causes and more than one right answer—things that the case method is perfect for.

"Even if you have a brilliant technical solution, you still have to figure out how to get it implemented—and that requires other people," she says. "My whole mission in life is to ensure that we, as a society, hear the ideas in their heads; and we will never hear them if they sit quietly in a corner."

For undergraduate courses, Izenberg assigns a case every two to three weeks; when teaching graduates, she assigns a case almost every week. For all courses, students are given the learning outcomes for each case and a grading rubric to help with their analyses. She also integrates case discussions with in-class activities and games that she develops herself, for example, one where students match influence tactics to real-world scenarios. These games help students grapple with workplace issues like conflict management. They also get students out of their seats and moving around the room, whether it's to write on a board or to pick a side of a debate.

These activities generally happen after case discussions, which vary week to week from whole class debriefs to one-on-one pair shares or small groups with one person reporting back to the full class. She also always leaves five minutes at the end of every class for students to reflect on what they learned.

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THE RESULTS

Each student is graded on participation, which Izenberg calls a contribution grade. “It takes the pressure off them,” she says. “I don’t want students to just talk—we need their voice; we need their participation because they are contributing to everyone else’s learning.”

Team citizenship is important for students to learn as they prepare for their careers, she adds. “A good team citizen doesn’t just do their own work; they also create conditions that enable other people to do their highest-quality work as well. And part of that is saying, ‘Oh, I see where you are going with that’ or ‘I have a question about that.’”

In their end-of-class reflection papers, students write about what they learned in class but must note how they contributed to everyone’s learning as well, Izenberg adds. These reflections, or learning logs, are not graded, and the questions they answer might be different depending on the activity. If it’s a group discussion, they could write about how they helped the group move forward; if it’s a class-wide case discussion, they might write down a question they need clarified.

“I respond to these reflections,” she says, adding that if students reflect on a learning that is inaccurate, she sends an email explaining it; if they have a question, she answers it. “It reminds students to participate because they have a piece of paper sitting in front of them that says, *how did you contribute?* It helps me know if there are things that need clarification. And I think people remember something better if they

reflect on it right after learning it rather than if they are just cramming for an exam.”

Incorporating case discussions as well as games and activities into her course design helps Izenberg capture her students’ attention and interest and appeal to different learning preferences. Mixing things up avoids rote learning, encourages students to talk to and work with different classmates, and better aligns lessons with the realities of the workplace.

“Whatever it is, I try to do something that enables people to participate in different ways,” she says. “One, because I am grading it and it seems fair to do that, and two, because I am trying to teach them that when you’re working with different people, you’ve got to find a way for everybody to contribute.”

Learning in Community: Introducing Group Dynamics and Conflict Resolution

Izenberg puts students in learning groups early in the semester. They create team charters, set goals, and then meet regularly outside of class to debate each case. This ensures they come to class prepared to have a good case discussion, she explains. Then they might write up their case analysis as a group or individually.

Groups stay the same for the full term, and Izenberg ensures they are equipped with the skills necessary to prevent and respond to conflict, and to coach their peers. At midterm, she checks in with each team to

see how they are doing: *How did they define success for themselves and for their group? Where are they in that process? What do they want to change? Do they want to have different ground rules? Do they need to have a different meeting time? What's working? What isn't?* This reflection helps prepare them to bring a continuous improvement mindset to their future careers.

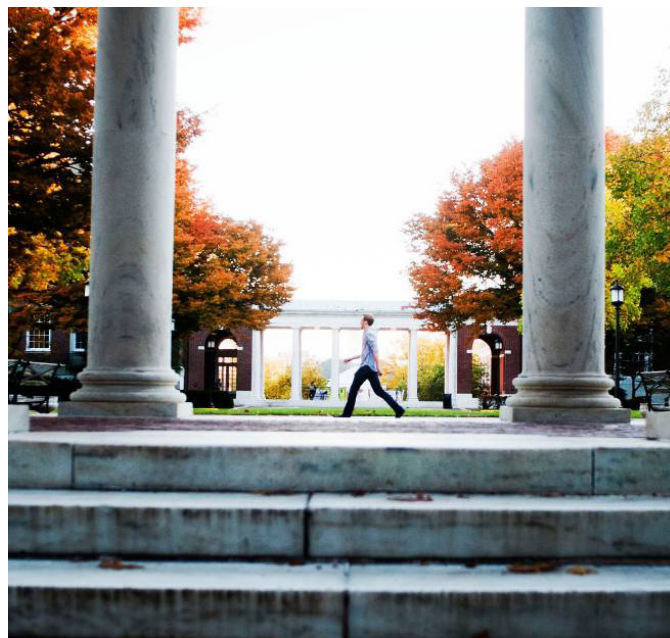
They also evaluate their contributions to the learning as well as the contributions of their peers. Izenberg then writes a report explaining the results and offering suggestions for the challenges each team faced.

Simulations: Showcasing Teamwork and Collaboration

While cases are foundational to Izenberg's teaching, she also makes a point to include one simulation in each of her courses. She likes to use *Project Management Simulation: Scope, Resources, Schedule* or *Change Management Simulation: Power and Influence* in her management theory class. In her ethics course, she uses *Organizational Behavior Simulation: Judgment in a Crisis*.

"I created a couple of games on decision heuristics that lead us astray, but it's not until they actually do the *Judgment in a Crisis* simulation that they say, 'Oh, I got totally caught up in that heuristic.' We all think we would never have a bias, and then they get into the simulation and they fall into the trap over and over again."

Again, Izenberg notes that simulations mix things up, help capture varied learning preferences, and show students how to get a team to work well together. "It's yet another way for students to get completely absorbed in a story, and then they start getting those learning outcomes without even realizing it—until we



Credit: Noah Scialom

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debrief at the end and they fill out their learning log. That's when they realize what they took away."

Simulations aren't graded; students run through the simulation and then there is a class debrief that dives into the learning objective. Depending on the simulation, they might run through it a second time. Often, there is assigned reading ahead of the simulation play. For example, Izenberg might have students read "Leading Change: Why Transformation Efforts Fail" by John P. Kotter before coming to class to run through *Power and Influence*.

At the end, she asks, "If this had been graded, how would you have done it differently?"

Student Transformations: Connecting the Dots and Gaining Confidence

At first, many engineering students resist Izenberg's approach. "They complain about the workload, especially all the reading and having to speak in class," she quips. But at some point in the term, they understand.

At the end of the term, Izenberg gives students back their learning logs—they read them and then submit a final log that reflects on their learning across the term, often expressing surprise at how much they've grown. One former skeptic even emailed her two years later to say that speaking up in class helped him land a promotion.

"I get to see what they are taking away; what's important to them," she says, adding that she often sees dramatic growth as well. "They walk in with various degrees of confidence about their ability to understand an intellectual problem as opposed to a technical problem," and they leave with the ability to connect strategy and strategic thinking with new product development, innovation, and project management.

Active learning materials like cases help students connect these dots and truly understand how to coach, influence, and overcome conflicts with others. "It's not just theory," she adds. "They're making meaning out of it themselves. It becomes something they own."

And what she hears back from students reinforces how lasting the learning can be. They describe situations at work where they were thinking about *Beech-Nut Nutrition Corp. (A1)*, or referencing *Martha McCaskey*, or recalling a simulation that helped them overcome a challenge. "The learning is memorable," she adds. "It sticks with them; they're

part of it. They're not just going to class and having someone tell them what to think."

Choosing the Right Course Materials

Izenberg chooses course materials in the [Harvard Business Impact](#) catalog by first considering her learning outcomes.

"Every learning outcome for my courses has at least two to three different ways of getting there so that different learners have a way to get that outcome by the end of the semester," she says.

She looks for cases, simulations, or articles that support a specific learning outcome, generally gravitating toward cases that tell a good story—something she values in her teaching. "Students tell me later that the stories make the learning feel real and that it matters," she says, reflecting that she also often tells personal stories in addition to relying on the storytelling of a strong case or simulation.

"Most educators were 'front-row' students," she continues. "But we have to reach the people in the way back. Who came in late? Who is mad? Who thinks this class is a waste of time? We have to reach them all. We can't just lecture. Stories, cases, simulations—these are all ways to make the lesson stick."

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CONTRIBUTOR

Illysa Izenberg
Professor



Professor Izenberg's Favorite Cases and Simulations

We asked Illysa Izenberg to share some of the top cases and simulations she uses to teach engineering students.

BRIEF CASES

- Medisys Corp.: The IntensCare Product Development Team
- TerraCog Global Positioning Systems: Conflict and Communication on Project Aerial

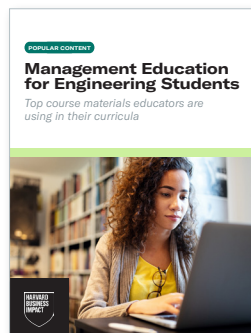
CASES

- Beech-Nut Nutrition Corp. (A1)
- Fate of the Vasa
- Army Crew Team
- The Volkswagen Emissions Scandal
- Ford Motor Company: New Shades of Green Through Soy Foam
- Arup: Building the Water Cube

SIMULATIONS

- Project Management Simulation: Scope, Resources, Schedule V3
- Change Management Simulation: Power and Influence V3
- Organizational Behavior Simulation: Judgment in a Crisis
- Leadership and Team Simulation: Everest V3

Resource Spotlight



WHAT'S POPULAR IN MANAGEMENT EDUCATION FOR ENGINEERING STUDENTS

Download this compendium of course materials from the Harvard Business Impact catalog that educators use most often to effectively teach business skills to engineering students. Course materials featured here include engaging case studies, foundational readings, and interactive simulations to prepare students for business challenges and project success.

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