Live Cases in Technology Transfer

Ronald J. Bennett, PhD, Al Dombrowski, Melanie Steinborn, Thomas Wollin

School of Engineering
University of St. Thomas

Abstract

Case study methods can be an effective way to learn about complex situations and analyze topics using a systems approach. This is particularly important in our applied curriculum. In the topic area of technology transfer, there are few cases that are relevant and appropriate for our graduate students who are working professionals in the technology-based industries located in the Minneapolis-St. Paul metropolitan area.

However, we have had guest speakers in this class with extensive experience in technology transfer. Students from previous classes suggested using their experience as the basis of case studies. A method called “Live Cases” had been developed by one of the UST College of Business professors for use in Costa Rica. With his assistance, a “Live Case” method for the course “Technology Transfer and Contemporary Issues” was developed. Guest speakers write a brief case situation and provide some guiding questions. The graduate students work in teams, analyze the case, and create questions and potential solutions of their own. The following week the guest speaker presents the background, and engages the class in a sparkling discussion of the case. This has led to very energetic and fruitful discussions and very positive comments from speakers and students alike.

Two side benefits have resulted. First, the guest speakers say they get some very good ideas from the students and second, other faculty are beginning to explore this method for their classes.

Background

The Mission of the School of Engineering is the statement that guides all of our programs. It states, “We provide an applied, values-based learning experience that produces well-rounded, innovative engineers and technology leaders who have the technical skills, passion and courage to make a difference.” We strive to deliver on this promise, and students are attracted to this mission.

“Proceedings of the 2005 American Society for Engineering Education Annual Conference & Exposition
Copyright @ 2005, American Society for Engineering Education”
The Graduate Programs in the School of Engineering at the University of St. Thomas are designed for working adults in the region. These students hold a range of leadership positions in large corporations such as 3M, Lockheed, and Medtronic as well as many smaller firms. They are attracted to our programs because the courses cover theory that gives long-term durable knowledge as well as practical knowledge that can be applied to today’s burning issues. Experienced professional faculty bring a collegial relationship between teacher and student to the classroom.

Graduate students typically have ten years experience before entering our programs. These students are highly motivated to continue their formal education. Most have full-time jobs, families and other civic duties, so they have high expectations of the graduate courses. They work in many industries that cover many fields. Most have a formal engineering education, but many are practicing in other business areas such as manufacturing, information systems, finance, strategic planning and mergers. With these backgrounds, they bring a wealth of broad experience to the classroom.

To provide value to this experienced, motivated, talented group of graduate students, our programs are structured to engage the students actively in the learning process. The faculty, full-time and adjunct alike, are experienced in the industrial world, with many currently practicing at leading regional companies. They bring their relevant experience to the classroom, and often bring additional talent through guest speakers. Many modes of learning are used, from conventional lecture and readings to the use of case studies, projects and panels.

The course that is the basis of this paper has been offered for many years. It is titled “Technology Transfer and Contemporary Issues”. While the course has covered much of the same theory over the years, the specific topics and situations have changed dramatically. For example, most of the course material in the early years related to domestic US issues, while this past year it was almost completely global. This is no surprise, but has resulted in the need to change the structure of the course.

From the beginning the class has been structured with readings, some lecture, many guest speakers and a series of projects related to the subject matter and to each student’s work environment. Recently we have added case studies to the mix. However, to these industry experienced students, published case studies seemed sterile. Since we have many guest speakers who talk about their own experiences, students recommended using their examples as cases. This would bring the case to life and allow much more relevant interaction between speaker and students, and an enhanced learning experience. This is what we did.

Case Study Method
The case study method has been used for decades in many fields from medicine and law to education, business and engineering.\textsuperscript{1, ii, iii} The method has not been without controversy, with critics criticizing the difficulty of generalizing from a single case.\textsuperscript{iv} However, the contravening argument builds on the strength that case study outcomes are frequently inconclusive. This forces critical thinking, one of the goals of education at the University of St. Thomas. We have long emphasized that our programs will help students see multiple solutions, often conflicting, in any situation they encounter. The ability to identify many solutions, and then through judgment select one most applicable, is precisely what we are trying to achieve. Further, May\textsuperscript{v} notes the paradox of creative courage needed to stay alert and open to new learning. May describes creative courage as “the discovering of new forms, new symbols, new patterns…. Every profession can and does require some creative courage. In our day, technology and engineering, diplomacy, business, and certainly teaching, all of these professions and scores of others are in the midst of radical change and require courageous persons to appreciate and direct this need for change. The need for creative courage is in direct proportion to the degree of change the profession is undergoing”.\textsuperscript{vi} This, of course, fits perfectly with our Mission, and with the environment in which our students are working.

There is, however, a weakness in written cases. While they do provide fodder for discussion, they tend to be remote from the experiences of our students and without the opportunity for follow-up with the principles involved in the case, and hence are viewed as sterile. Our students wanted a more lively form that would engage them fully in understanding the formal issues of the case, plus give them insights into the nuances of how the case actually played out.

**Live Case Method**

In researching ways to liven up the discussions, it was discovered that one of the faculty of our College of Business had used a more interactive form of the case study. Professor Al Trostel defined this form as “Live Cases”.\textsuperscript{vii} In meetings and discussion with Professor Trostel, we developed a set of guidelines for constructing live cases.

Guest speakers write a brief description of the case they would discuss, and provide some challenging questions for students to consider. This briefing was then given to the graduate students a week before the speaker was to present to the class. The students discussed the case in groups, identifying the key issues and questions, and proposing solutions. They continued this discussion during the week between classes, using BlackBoard for communication.

During the following class session, the speaker would review the background material for the case. Students led the discussion, asking for points of clarification, seeking to understand the fine points of the case and focusing in on the key issues. Students would present their collective analysis, enhanced with...
their findings during the class session with the speaker. The students would then present their recommendations. Finally, the speaker would detail what actually did happen, and more discussion would result.

In one case, the speaker was working on a new venture that had not yet been resolved. This case was presented by a venture capitalist. An inventor had proposed a radically new medical treatment with great promise but limited test data. In the due diligence process, several issues were revealed that could be deal breakers: there was technology risk, time to revenue was 3-4 years and the FDA approval path was unknown. The venture capitalist was faced with four alternatives: 1) let the project die, 2) sell the technology, 3) put a new management team together and write a new business plan or 4) form an interim team and do a phased approach with limited funds to build a prototype.

In reading the background material for the case, the students initially voted overwhelmingly to let the project die. However, after a lengthy discussion with the venture capitalist, their view shifted dramatically in favor of forming an interim team. In the process, the students pointed out what they perceived as weaknesses and suggested strategies to overcome them. The interaction between students and speaker in that case was particularly intense, and actually resulted in the speaker developing a new approach to the venture.

<table>
<thead>
<tr>
<th>Student Recommendation</th>
<th>Let Die</th>
<th>Sell</th>
<th>Restart</th>
<th>Interim Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before Discussion</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>After Discussion</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

In our graduate classes, active discussion is not uncommon. In this situation, the level of engagement of the students in the discussion was particularly enhanced, and the learning was deep. With the speaker at hand, it was possible for the students to explore many “side paths” to the main theme, some of which turned out to be key issues. Everyone, students and speakers alike, found this to be a very effective format.

Student Responses

A survey of students was conducted to get their opinion on the effectiveness of the Live Case method. They were asked to respond to the following questions:

1. How well did the Live Case method work in helping you learn? (Rank)
2. How did the Live Case method compare to other case study methods you have used in other classes? (Rank)
3. What was the strongest feature of the Live Case method?
4. What was the weakest feature of the Live Case method?

“Proceedings of the 2005 American Society for Engineering Education Annual Conference & Exposition
Copyright @ 2005, American Society for Engineering Education”
5. Any other comments on the Live Case method?

Questions 1 and 2 used a Likert scale, with 5 = excellent and 1= poor.

<table>
<thead>
<tr>
<th></th>
<th>Question 1</th>
<th>Question 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.80</td>
<td>4.40</td>
</tr>
<tr>
<td>Median</td>
<td>5.00</td>
<td>4.00</td>
</tr>
</tbody>
</table>

Question 1: “Live cases gave us a way to analyze actual cases, before knowing the outcome. They made a connection between course curriculum and real world situations of actionable relevance. Learning was enhanced by group dynamics that ensued as a result of the realization that our analysis would have tangible meaning to the live case host. They allowed me to reflect on my own industry experience and formulate questions and ideas that could be beneficial to resolving the issue.”

Question 2: “Live Cases are a better method than other case study methods since the student becomes an active participant in the problem instead of studying a case after the fact. They added a stronger Decide and Defend stage, with the business representative hearing and responding to prioritized recommendations and providing rebuttal and further challenge not possible with a traditional case study. It was a good learning experience because there wasn’t an implemented solution and allowed us to explore the unknowns. The Live Case method allowed us to study not only financial implications, but the interaction of other factors such as cultural, political or regulatory issues.”

Question 3: “The pedagogy enhanced the learning experience by introducing an unarticulated student commitment level. The perceived consequence as a contributor that the analysis had value to the case host was the strongest feature; we were solving a current real life issue. The interaction with the presenter and the discussion of lessons learned was also a strong feature.”

Question 4: “Some cases were viewed more relevant than others and had greater learning potential. Case selection must be done carefully. Cases that have already been solved are less stimulating and interesting than cases that have not. Formulation of the case statement, preparation by the presenters and the style of presentation also need to be fine tuned.”

Question 5: “The Live Case method was an excellent way to learn the technology transfer concept and its many applications as well as use other problem solving skills. Student discussion before and after the presentation provided an opportunity to discuss details and review lessons learned. It was suggested that students using a case analysis methodology such as the structured 5D method “Describe, Discern, Display, Decide and Defend” would focus the class and create an even more valued learning experience.”
As seen from the above comments, students felt that the live case method was very beneficial to the depth of their understanding of technology transfer due to the increased level of detail provided and professional nature in which they were conducted. They commented that the case study discussion provided greater insight surrounding the actual events of the case. The broad spectrum of cases studied provided multidimensional learning and understanding, and the immediate feedback comparing the student’s solution with the actual solution was very effective. The practical information in the case gives them something to use immediately.

The interactive class participation creates a more meaningful learning environment, and increased interaction between students and speaker provides a more thorough understanding of the concepts. Students commented that the learning opportunity helped them become as successful and knowledgeable as their classmates, instructor and speakers. They also liked having control, making the discussion as brief or long as necessary to cover student questions and comments.

**Speaker Responses**

Speaker responses to the same questions submitted to the students gave similar results.

<table>
<thead>
<tr>
<th></th>
<th>Question 1</th>
<th>Question 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean</strong></td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td><strong>Median</strong></td>
<td>5.00</td>
<td>5.00</td>
</tr>
</tbody>
</table>

**Question 1:** “The Live Case provided many different viewpoints from many different backgrounds. Students seemed very engaged and genuinely excited in providing possible solutions to an actual case. Diverse ideas from many different backgrounds and experience helped me look at the problem from many different viewpoints.”

**Question 2:** “Typical case studies have a predetermined answer which hampers creative problem solving. The Live Case method is open ended with the solution yet to be determined. The learning is based on real time events. As in our professions, we have to be able to solve problems that are a moving target.”

**Question 3:** “Some of the best answers come from outside the industry in which the Live Case study is based. Just as some of the greatest disruptive technologies come from outside one’s industry, some of the best solutions do as well. In short, 25 students thinking from 25 different perspectives is far better than 25 students trying to think from the same perspective.”
Question 4: “Writers and presenters of Live Case studies need to give a detailed background summary of the industry so students have a concrete understanding of the industry.”

Question 5: “As a presenter, it was a wonderful experience. Live Case studies forced the student to think outside the box with no historical solutions to fall back on. The Live Case study also provides fresh real life situations that help to engage the whole class.”

Not only did the students view this as a positive learning experience, so did the speakers. One noted that the live case study gave them a chance to get fresh outside viewpoints from qualified professionals. Viewpoints from professionals from other industries allow companies to see fresh innovative ideas. One student shared how they got their customers involved in joint development projects that helped them keep their products from becoming obsolete. Another suggested trying to maximize the return on current product development costs and focus on products outside current business strategies, but that use existing production platforms.

Live cases also gave speakers the opportunity to get feedback on their own solutions to the case. Because of the wide variety of student experiences, speakers got feedback that was both in-depth and constructive. It was a good way to test the waters before introducing a solution to the customer.

One speaker noted there was one big surprise -- that was how quickly the group discussion became a “think tank”. Everyone seemed to get involved. The informal format helped to keep the case study from becoming too rigid. The class seemed to build energy as they went along, with each class member building on or challenging the other member’s ideas. It was very exciting and challenging.

One speaker noted, “I really believe that the live case study offers something that is very relevant and real-life, because it is interactive and focuses on actual real-life and real-time issues.

Another speaker noted his or her own continual learning from this experience. As an example, she noted confirmation that the tech transfer team did identify the important issues at hand and resolved them. She realized that the implemented solutions withstood the test of time. She also noted that the insights provided by the students gave her a fresh, objective look at how to bring new perspectives to similar projects in her own company. The energy given to her by the students was inspiring.

Still another speaker commented that they never got much out of the traditional case studies, even when discussed and facilitated in class. The real-life Live Cases cover more recent events, are not dated and are much more interesting. He
also noted that the speaker has the opportunity to get a nice set of solutions to problems that do not have the influence of any “company mindset”.

Mentioned earlier was one case that is currently under development. The speaker noted that the discussion was very timely. The students provided information from several perspectives that he had not considered, which turned out to be useful in formulating additional strategy. He stated, “Even if the outcome had been known at the time, new ideas were presented which will be useful in addressing future situations. The live case study approach lends itself to the presenter as well as the students to enhance their base of knowledge.”

**Future**

As with anything experimental, there are many improvements possible. Another benefit of this initial run of the Live Case method is that students had several suggestions for improvements in the future. Among those are:

- Increase the level of presentation consistency, setting expectations for speakers and students alike.
- Allow class time for students to dissect the case and solutions after the case is discussed with the speaker. Post mortem analysis would help students more clearly understand if the decisions made were appropriate, effective, good or bad, and also consider additional alternate solutions.
- Provide additional out of class collaboration for the teams to discuss the cases.
- Make a greater effort to align the cases with class readings, and organize into a chronological flow, with case studies grouped into categories of 1) Why a transfer? 2) Finding a technology, 3) Justification of a transfer and 4) Executing a transfer.

Overall, the use of “Live Cases” worked very well for this course. Suggestions from students and speakers will be incorporated into future use of this method. In addition, two side benefits have resulted. First, the guest speakers say they get some very good ideas from the students and second, other faculty are beginning to explore this method for their classes.

---

1. Stake, R.A. & J. Easley (Eds), “Case studies in science education, a project for the National Science Foundation”, Centre for Instructional Research and Curriculum Evaluation (CIRCE) and the Committee on Culture and Cognition (CCC), CIRCE, University of Illinois, Urbana-Champaign, 1978.

“Proceedings of the 2005 American Society for Engineering Education Annual Conference & Exposition

Copyright @ 2005, American Society for Engineering Education”
RONALD J. BENNETT is Founding Dean of the School of Engineering at the University of St. Thomas. He holds a Ph.D. in Metallurgical Engineering and an MBA. With a background of 20 years in industry, Bennett teaches and publishes on diverse topics including materials engineering, technical innovation, technology transfer and engineering education. He is an EAC of ABET program evaluator and is currently Chair of the Graduate Studies Division of ASEE.

AL DOMBROWSKI is a Manufacturing Engineering Specialist in 3M Traffic Safety Systems Division. He holds a BSEE from the University of Minnesota. Al is currently pursuing a Master of Manufacturing Systems Engineering degree from the University of St. Thomas. He has over 15 years of manufacturing experience at 3M in diverse areas such as imaging systems, pharmaceuticals and traffic safety systems.

MELANIE STEINBORN is a Mechanical Engineer at Architectural Testing Inc. She is currently a graduate student at the University of St. Thomas in the Master of Science in Technology Management program.

THOMAS W. WOLLIN is the Quality Assurance Manager for Donaldson Company, Inc. He holds a B.S. in Industrial Technology from the University of North Dakota and is currently enrolled in the Master of Science in Manufacturing Systems program at the University of St. Thomas.