Implementing Innovation

Ronald J. Bennett, Ph.D.

Engineering and Technology Management
University of St. Thomas
St. Paul, Minnesota

ABSTRACT

In 2002, a paper was presented at the ASEE Annual Conference titled "Selling Innovation." (Bennett) The content related to a course taught to working adult graduate students in the Master degree programs in Engineering and Technology Management at the University of St. Thomas. These students are employed in a wide range of innovative organizations, including 3M, Medtronic and Andersen Windows. The objectives of the course include increasing the student's ability to think like an executive and demonstrate leadership and innovation in a business setting.

The course has now been offered three times with modifications for continuous improvement. This paper documents the results as measured by surveys of students who have completed the course and have had time to apply it to their work environment, showing the degree to which they have internalized innovative behavior and the ways they have implemented this learning in their jobs.

Introduction

How much a student actually learns, and is able to apply, from any course is always a question. Course assignments and end-of-course evaluations attempt to assess this learning, but there are many pitfalls in this process. It may take months, years or longer for much of the learning to "sink in" and for students to more objectively assess how they have actually benefited from the course.

To look at longer-term results, a survey was conducted of students who have completed the "Implementing Innovation" course at the University of St. Thomas. As reported earlier, these are graduate students in Master degree programs in Engineering and Technology Management. They are employed full-time by local industries, varying from Medtronic and 3M to the Hennepin County Medical Center, who have emerging leadership responsibilities in their organizations. In their positions, they have the opportunity to use the workplace as their "laboratory" to test their learning in real organizational settings.

The survey was based on the learning objectives for the course. It was sent to all former students of the course.

Structure of the Course

It is with the Mission of our programs and the desire to enhance innovation leadership skills in our students that we created a new course on Implementing Innovation for our graduate students in Engineering and Technology Management at the University of St. Thomas. These students are working adults in industry with extensive experience. They are creative, motivated and want to be innovative. They know their companies and industries. What they need is to become consciously competent in selling their ideas. This course was designed to assist them in that goal.

MISSION: We provide a practical, values-based learning experience that produces well-rounded, entrepreneurial engineers and technology leaders who have the technical skills, passion and courage to make a difference.

The course is taught in a seminar format. Students identify their projects and relate them to the business objectives of their organization. They interview and identify the social styles of their "buyers".

Students are provided a variety of readings and must seek other relevant materials on their own. Each class session begins with a short lecture, but the real benefits come from the rich discussion of the concepts in the readings and their personal experience with "selling" their project in their company. During the semester, each student gives many presentations to demonstrate their ability to apply the learning. The class critiques these presentations, and all are videotaped. At the end of the semester, each student has a video record of her or his progress. This approach has been very effective at building student engagement and passion, and development of conscious competence.

Innovation Leadership

Innovation leadership involves developing the ability to think differently, to look at a given situation and view it from several points of view. In addition to the technical perspective, innovation leaders need to think like an entrepreneur, like an executive and like a salesperson.

In his Distinguished Lecture to the ASEE 2003 National Conference (Bordogna), Deputy Director of the NSF Dr. Joseph Bordogna spoke on the subject of educating engineers. He noted "From an engineer's point of view, we are the ones responsible for getting things done and out the door in our society." He went on to raise the question, "How do we make the *right engineers* for our times and for the future?"

He continued, "…engineers are expected to foster progress toward a daunting array of ends – stimulating economic development, creating wealth and jobs, sharpening the nation's competitive edge, raising our prospects for more productive and satisfying lives, caring for the

environment and strengthening our national security." He challenged the audience of engineering educators to "make the *right* engineers for our times and the future."

Among the characteristics Dr. Bordogna identified as needed in these engineers were trusted innovators, change agents and master integrators.

It was the intent of this course to help students develop the leadership characteristics that would enable them to become those trusted innovators, change agents and master integrators of which Dr. Bordogna spoke. Many have good ideas, and some have a vision of the future, but it is one thing to have ideas and vision, and quite another to have the ability to convert these into reality. It is this ability to create the ability to actually *implement* innovation that this course is all about.

Course Learning Objectives

The Learning Objectives for the course were:

Develop and demonstrate an understanding of the innovation process and its critical elements
Demonstrate improved powers of observation
Demonstrate increased openness to new ideas
Develop acute "listening" skills
Develop the ability to present to the interests of the client
Demonstrate the ability to get results in selling an idea
Demonstrate an understanding of the theory of individual and group behavior that underlies decision making and affects new idea acceptance
Demonstrate personal courage and passion in a business setting

Student Responses

As part of the course and instructor evaluation conducted at the end of the class, students made the following comments.

"The class enabled me to really see a different side of the business world than I have been exposed to. The learning has already become important to me in meetings to be able to concentrate on understanding people and how to deal with issues."

"I have improved the ability to read the readiness of my engineers to accept the direction that I am pushing them. I have also gained a better understanding of how to interpret what individuals say given the knowledge of their social style."

"I have gained a better understanding of how to prepare to meet the needs of individuals with different social styles. I have been using the techniques interactively with my organization and I've started to see my managers moving at a faster rate toward buy-in and action to improve our training systems and business processes."

"I've learned that the subtleties of communication will make a significant difference. My take-aways from this class will give me the tools necessary to understand other people's motivations and help me predict their actions."

Students were again contacted six months after the course ended and asked "How did the Technical Selling course help them?". They responded with the following comments.

"The class has made me go into most presentations with specific expectations rather than "let's see what happens"."

"It has helped me sell a proposal rather than present information - too often in the past I would ask "what do you think?" at the end of a presentation rather than a solid "any comments on this proposal?". What a difference!

"The class was good in its practical application of the sales techniques to just about any situation – learning about predictable patterns of behavior driven by one's individual personality type is extremely helpful."

" Your class helped outline how to identify one's personality type and the best way to address that person to get the best communication chain possible. The benefits of this are NOT to manipulate, but rather to establish the best line of communication with people who often communicate differently. That distinction helped people to overcome their discomfort with the perception that these techniques were merely a way of getting what you wanted at all costs."

"The class helped me in just about every situation in and outside of work. I tend to think about it when I speak to people and there is an 'information blockade' somewhere."

"The principles taught apply in life almost everyday. In particular for me, I find myself really trying to use the personality typing and relating that to what I need to do to accomplish my goals. I truly believe that by understanding how others think/feel allows me to make accurate predictions about how they will react to a given circumstance. Then, it is also possible to change what/how I say something or when I do something to maximize the probability of getting a favorable response."

" In my work role as a sales engineer, I now use this is nearly all of my customer interactions and, according to my boss, the results are increasingly positive. I know that due to this tech selling class, I am better at my current job, and more likely to continue to be successful in any other endeavor as well."

"The class has helped me change my perspective in terms of how I approach different people. I think I've become more "in tune" with personal styles. I've gotten better with how I prepare presentations (I'm more focused, better prepared, however I still need to move around more). I have no interest in sales, but I am getter better at "selling myself." I may have a job change in the near future because of it."

Based on these responses, the goals of the course seem to have been met. Students report that thinking entrepreneurally has bolstered their passion. Becoming consciously competent fosters their courage. And, indeed, they can make a difference.

Survey Results

The most recent survey was conducted 6 months to 21/2 years after students completed the course. The survey was divided into three parts. The first two parts were to respond to a series of questions related to the course learning outcomes on a Likert scale of 1 to 5, where (1) represented "not at all", (3) represented "so/so" and (5) represented "a great deal". Students were asked to "Rate your ability" on each of the questions, then asked to "How you've changed from before taking the class to now." The third part asked for responses to four open ended questions.

	Ability to	Ability	Changed
1	Think broadly like an executive	3.60	3.80
2	Build allies and supporters	**4.00**	3.40
3	Communicate with people from a broad range of backgrounds	**3.90**	3.60
4	Demonstrate conscious competence	3.40	3.40
5	Make a difference	3.60	3.70
6	Demonstrate an understanding of the innovation process	3.60	3.60
7	Demonstrate improved powers of observation	3.60	3.70
8	Demonstrate increased openness to new ideas	3.80	3.60
9	Have acute listening skills	3.10	**4.00**
10	Demonstrate the ability to present to the interests of the client	3.70	3.80
11	Demonstrate leadership for change	**4.10**	**3.90**
12	Demonstrate the ability to get results in selling an idea	3.60	**4.00**
13	Demonstrate understanding of individual and group behavior	3.70	3.70
14	Demonstrate personal courage and passion in a business setting	3.50	3.40
15	Gain acceptance of your ideas	3.22	**4.11**
16	Understand your customer's needs	**4.10**	**4.00**

Some observations on the self-ratings:

Students feel strongest about the ability to build allies and supporters, communicate with people from a broad range of backgrounds, and demonstrate leadership for change and understanding their customer's needs. Of these abilities, they feel that the course helped them most in leadership for change and understanding customer's needs.

Students felt they've changed most after taking the course in having acute listening skills, demonstrating leadership for change, ability to get results in selling an idea, gaining acceptance of ideas and understanding customer needs. It's interesting to note that in acute listening skills and gaining acceptance of ideas, even though they've improved, students feel only slightly above so/so in those abilities.

On average, all of the responses were favorable on. However, two questions of ability had more than one (2) response: understanding the innovation process and understanding individual and group behavior. Also, five questions of change had more than one (2)

response: building allies and supporters, communicating with a broad range of backgrounds, understanding the innovation process, improved powers of observation and increased openness to new ideas.

Perhaps some of these ratings are illuminated by the student's comments to the open ended questions. Samples of responses follow:

How have you used the knowledge gained in the Technical Selling course to change your organization?

Helps me identify personality more quickly so I can more effectively work with them
Been more successful in making changes
Net benefit has been my ability to get disparate teams to realize the potential benefits of achieving an integrated process
Promote and champion new technical tools, shared learning with coworkers
Laying out projects in a manner that sells to needs that are definite, clearly articulated and answer "why" we are doing this
I have taken more of a proactive leadership approached; encouraged staff, peers and others to actively listen. This took some time but people really opened up to it
My new approach is building confidence in our company and our ability to deliver as promised. The word "partner" now has meaning

How have your found the concepts of social style to be useful in your work environment?

Rather than allow confrontation to escalate when challenged, I am now able to try and understand the other person's perspective from a more neutral position
Most significantly, this improved understanding of other people has allowed individuals that in the past I would have likely developed an adversarial relationship with to be turned into allies
I am more able to understand what they are saying and to convey my thoughts by meeting their needs at a social style level

What is the most important thing you learned about yourself from the class?

I learned there is always an opportunity for new concepts and ideas to be accepted and realized by others
The most important part is to listen to others and have the courage to speak up
I learned that I am better that I thought when in comes to presentation and selling skills. However, I realize I have lots of new ways to make improvements. For me, it will be a long time quest
I learned not to be afraid of a NO answer but how to come back, analyze and readdress why my ideas have not been listened to
The buyers concerns are often very different, especially when dealing with senior management that is dealing with a different set of problems than the typical engineer
I've learned that greatness and business success can be taught, you don't have to be a born natural leader

Being afraid to take a chance and speak out and participate can be very harmful. By understanding how I project myself and how people see me has allowed me to work on my shortcomings
I listen much better now and am more empathetic

What other comments do you have about insights you've had as a result of this learning?

Customers require a lot of handholding. Being able to empathize with them and knowing and understanding their point of view helps to create an atmosphere of trust and understanding.
The subtlety about this learning is that you don't realize what the effect has imparted until you think about it and consider where you were previously
This is the type of class that a person will recall things they've learned over and over, and will be useful, as most of what we do is dealing with people
You have to be just as good at selling yourself as you are about selling your product or ideas
Not everyone will agree with you or want to change. Win the battles which are important, forgo those battles not worth winning, stay focused and have a goal in mind, be able to answer "why" we are doing this

Conclusions

One thing I've learned after teaching graduate students in our program for 18 years is this: they are much more capable than they initially believe themselves to be, and they are modest. The responses documented above confirm that view, and shows that they continue to learn, grow and become more aware of their competence as they use their learning. These responses are honest, sincere and show that, as a group, these students practice what they learn and strive to continuously improve. In addition, the results of this survey confirm the views of students just after completing the class, and show that they realize that mastering their ability to lead innovation is a life-long quest. These responses show that the ability to be innovation implementers is important to them and that it is helping them in their jobs and career decisions. Furthermore, they are on the road to being "conscious competents", particularly exhibited in the realization of their leadership abilities.

It is encouraging to see that learning continues long after the class ends. These students are clearly demonstrating innovation leadership, developing the ability to think differently. They are becoming the "*right engineers for out times and for the future*" that Dr. Bordogna addressed in his Distinguished Lecture. They are on the path to becoming the trusted innovators, change agents and master integrators so important to the economy and security of the future of the United States and the world. They are clearly contributing to the nation's capacity to perform.

BIBLIOGRAPHY

Bennett, Ronald J., "Selling Innovation", Proceedings of the 2002 ASEE Annual Conference, June 2002, Montreal

Bennett, Ronald J., "The Last Mile: The Technology Manager as Innovation Salesperson", 2002 IEEE International Engineering Management Conference, Cambridge University, August 2002.

Bolton, Robert and Dorothy Grover Bolton, Social Style/Management Style, AMACOM, 1984.

Bordogna, Joseph, "U.S. Engineering: Enabling the Nation's Capacity to Perform," ASEE National Conference, June 2003, Nashville, TN

Christensen, Clayton, The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail, Harvard Business School Press, 1997.

Collins, Jim, Good to Great, HarperCollins Publishers, 2001.

Kaplan, Robert S. and David P. Norton, The Balanced Scorecard, Harvard Business School Press, 1996.

Lever, O.William Jr., "Selling and Marketing of R&D", Research Technology Management, Jul/Aug 1997.

Miller, Robert B. and Stephen E. Heiman, Strategic Selling, Warner Books, 1985.

Moore, Geoffrey A., Crossing the Chasm, Harper Business, 1999.

Murray, William J., Relationship Sales Strategies, 1994.

Porter, Michael E., Competitive Advantage: Creating and Sustaining Superior Performance, Simon & Shuster, 1998.

Rackham, Neil, SPIN Selling, McGraw-Hill, 1988.

Robb, Walter L., "Selling Technology to Your CEO", Research Technology Management, 37(3), 1994.

Wilson, Larry, Stop Selling, Start Partnering, Oliver Wight, 1994.

Wilson, Larry, Changing the Game: The New Way to Sell, Fireside, 1987.

Biographical Information

RONALD J. BENNETT is Director and Chair of the Engineering Programs 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.