

Instruction of Manufacturing as an Honors College Seminar

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Abstract

As elsewhere, our Honors College attracts in its programs some of our brightest students. A major component of its curriculum is HON 403: Honors Seminar. Most students in this course are liberal arts major. Driven by my fascination of manufacturing's impact on modern living, I suggested manufacturing as a possible topic for the seminar. The College liked the idea, and soon I found myself facing the question: How to teach manufacturing to a group of bright college students whose knowledge of manufacturing may be rudimentary? This article presents an account of my efforts. One-fourth of the available time was used on the basics of manufacturing, especially of discrete manufacturing, and on current developments and trends. The remaining time was devoted to group-supervising the enrollees toward self-initiated projects that culminated in individual reports and class presentations. The projects covered a wide variety of topics, namely powder coatings, breast implants, baseball bats, the Harley Davidson company, ISO 14000 at Ford, nanotechnology in medicine, and robot-aided surgery. The instruction of manufacturing as a honors college seminar proved to be a unique experience.

Introduction

Like several institutions of higher learning, The University of Southern Mississippi offers an honors program for its bright students. An important component of the honors curriculum is HON 403: Seminar. Driven by my fascination of manufacturing's role in everyday life, I suggested manufacturing as a possible seminar topic. My proposal to the Honors College described the course as:

The seminar examines the *world of manufacturing* and challenges students to comprehend its role in our lives. The impact of manufacturing on present civilization is the theme. Possible seminar topics are: Can we continue to pursue growth in manufacturing indefinitely, or is there a *limit to growth*? Will environment degradation (pollution and natural resources' depletion) prove to be the stumbling block? Is manufacturing following in the footsteps of farming? What will be the ramifications of computer-based automation such as robotics on society? Can we remain a superpower even when our economy is becoming service-based?

The college approved the proposal, which enabled me to instruct a group of very talented, mostly liberal-arts-major students on manufacturing. This article presents an account of my efforts.

Objective

What can you teach about manufacturing in forty hours of scheduled meetings, especially to those majoring in liberal arts? And how do you do it? Obviously, one cannot cover too much technical material. After some pondering I came to the conclusion that my goal should be to “get them excited” about the role of manufacturing in their lives and in the life of a nation such as ours. I set my objective to be threefold:

1. Introduce the students to the *world of manufacturing*,
2. Guide them to *self-learn* through individual projects, and
3. Offer an *environment* so that they learn from each other.

Pedagogy

The course began with an enrollment of ten. In the first meeting, I introduced myself and the course. Each enrollee introduced themselves to the class, mentioning specifically their majors and technical background and interests. This was essential for promoting mutually beneficial interactions among them during the ten weeks of the semester. To set the tone of the course coverage, a video entitled *The Challenge of Manufacturing*¹ was shown to the class during the first week. This video was prepared by the Society of Manufacturing Engineers (SME) to entice college-bound students to manufacturing.

The course handout distributed at the first meeting explained that the first hour of each week would be devoted to lectures on basic concepts of manufacturing, while the other three hours to informal interactions among students and the instructor as a group to learn through seminars. Students were to report the progress of their individual seminar studies each week. They could ask each other questions, and/or respond to such questions, to learn through informal discussions.

Lectures

My lectures focused on the basic aspects of manufacturing. To stimulate their interest, I began with Adam Smith’s historical struggle to convince the eighteenth century Britons that manufacturing creates wealth since it creates utility. Data² on wealth created by the various sectors of the U.S. economy during the last ten years were presented. They showed that the contribution of manufacturing has been declining, but still is fifteen percent of the gross domestic product (GDP). However, if *indirect* contribution is taken into account, it is as high as one-third. It was emphasized that though we are fast moving toward a service-based economy, especially under the influence of information technology, manufacturing will continue to remain important to the U.S. as long as we are a superpower.

Standard Industrial Classification (SIC) codes were introduced to highlight how we keep track of the contribution by various sectors of the economy to the GDP. The codes pertaining to manufacturing were also discussed.

Next, the meaning of the term manufacturing was explained. After differentiating *continuous production* as in chemical industries from *discrete manufacturing* as in automobile industries, the concept of batch size was presented. They were surprised to know that forty percent of

manufacturing is of the batch-type; they had thought that most goods were mass produced. They were equally surprised to learn that seventy-five percent of batch production is in batch sizes under fifty.

Students were very interested in knowing how manufacturing has been and is being impacted by computers and communications. They enjoyed and were fascinated by my scenario³ of future job shops operating like a laundrette where you can bring a broken part in the morning and collect a replacement part manufactured by the afternoon. The advent of the Internet is bringing the consumer closer to the manufacturer. We shall be able to eliminate the entire middle layers of wholesalers and retailers. Soon it will be possible to order your car (with delivery in days) the way you order your pizza (with delivery in hours).

Seminars

Each enrollee did an individual study culminating in a report and presentation. A unique feature of this study, leading to the seminars, was group learning through interactions among students in an informal class environment where they shared their progress, and the hurdles they encountered and the ways around them. The interactions also helped them in learning how best to utilize the Internet and in discovering relevant websites. The individual seminar focused on a narrow topic of interest to the student. The topics related to a product, process, or company.

The seminar topics, given below, were finalized during the second week, again in a novel way. Each student brought in a one-page draft proposal containing title, objective, and the research methodology, and discussed face-to-face his or her draft with two students sitting on either side. The drafts were then openly discussed in the class so that any sensible suggestions from others could be incorporated. The available time and the resources required were closely scrutinized to ensure plausible objectives. I acted both as an advisor and a facilitator during the topic selection process.

Student	Seminar Topic
John Anderson	The Harley Davidson Company
Chris M. Bagwell	Baseball Bats Manufacturing
Jeremy L. Braswell	ISO 14000 at Ford
Bethany C. Mangum	Did Dow Corning Keep Women Abreast about Silicon Breast Implants?
Robert H. Morrow	Artificial Intelligence Applications
Lisa Smith	Nanotechnology and Medicine
Judith Turner	Surgeons and Robots
Todd Williams	Powder Coating

The final report was to be prepared professionally. Students could include with the report up to twenty pages of additional resource material. They were specifically asked: "Do not copy from the resources; Read them, 'digest' them, and then write in your own words about what you learned." Each student made two formal presentations, one mid-semester and the other at the end. The grades were decided based on 100 points for weekly oral reports, 100 points for mid-semester presentation, 100 points for final presentation, and 100 points for the written report. The scale for converting the points to letter-grade was A>360>B>320>C>280>D>240>F. I did

face a unique situation while grading them--being honors college students they performed so well that the grade distribution, rather than being normal, was heavily skewed toward the high end..

Concluding remarks

The instruction of manufacturing to honors college students-- mostly liberal-arts major--as a seminar has been a unique experience. The discussions in this article illustrate how the education of manufacturing can be broadened to unconventional students. It seems that manufacturing can be a popular college course. I intend to offer again the course discussed in this article.

Bibliography

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