Letting the Course Follow the Topic

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Abstract

This paper builds on an earlier paper which chronicles an experiment in teaching a graduate level seminar in engineering management. In the original experiment the students developed the syllabus details to include which subjects to address and the grading scheme. Thus the course addressed topics of interest to the students and for which they were in turn required to find appropriate reading and research material. A different but similar course using this technique is reported as well as the use of the techniques in non-similar courses.

Background – The First Experiment

As previously reported (Peterson, 2001) in the winter semester of 2000 I was assigned to teach a graduate seminar in engineering management for the first time. The course was an elective in two overlapping master's programs – one in industrial engineering and one in engineering management. The course was offered off-campus over a 12-week period. Each class was a three hour and twenty minute block that was to start at 6:00 PM. The catalog's course description (Western Michigan University, 2000) of the course was as follows:

> "ISE 622 Industrial Supervision Seminar (3-0) 3 hrs
> An analysis of the writings, literature, and philosophy concerning line supervision and employee direction in manufacturing industries. Prerequisite: IME 600 or permission of the instructor"

The course's title had been changed to Engineering Management Seminar since the catalog was published and its description had been expanded to include advanced engineering management topics such as change management. The course's coordinator normally taught both the course and its prerequisite. Typically there was a reading packet for this course but as no specific topics needed to be covered during the course each instructor was free to take a different approach.

With the ground rules for the course established, the standard next step was to develop a course plan - course objectives, a syllabus, a grading scheme, and a reading plan for the course based on what should be taught. But by stepping back and applying engineering management and adaption of new technology principles, the first step became to rethink the course's presentation. What is a seminar? Webster's (Neufeldt , 1988) defines it as:

> "seminar…**1** a group of supervised students doing research or advanced study, as at a university, **2** a) a course for such a group, or any of its sessions b) a room where the group meets **3** any similar group discussion"

Discussion, research, and advanced study seemed to be the key concepts in both the course and in a seminar style of presentation.

The next step was to consider the students in the class. The typical students in these programs were working professionals with several years experience as individual contributors. Some had started supervising professional employees but many had not. The students seemed most interested in concepts that they could immediately apply on their current assignment.

The next step was to review those graduate courses that had appealed to me as a practicing engineering manager. An upper level course Dr. Al Miller presented at The Ohio State University started with a question about what the students wanted to cover or get out off the course which he worked into his lecture and assignments for the course. This approach made a lasting impression on me.

The final step was to review making assignments in an industrial setting to engineers and engineering managers - state my perception of the task and ask for input on solutions to address the task (or to redefine the problem and thus the task). The team who would be assigned the task would then develop a plan (who, what, when) with which both the team and I could all agree. "Could this be done effectively in an academic setting?" became the experiment's question. I thought it could be done. I saw several potential benefits and several potential pitfalls. The benefits included student buy-in to the course, higher student satisfaction, practitioner-relevant topic selection, reduced instructor workload in reading-material preparation, and increased student involvement in classroom discussions. The potential pitfalls included inappropriate topic selection, increased preparation to cover student-selected topics outside my expertise, an unreasonable evaluation plan, and a student resistance to the concept of setting their own plan of study. The potential benefits were seen to outweigh the potential pitfalls. The resulting experiment was to manage the course as an engineering manager should manage an engineering department with the team setting the goals and project plan subject to managerial approval.

The first night of class I arrived with a syllabus which contained the basics – course description, details of when the course met, my grading philosophy, my contact, and my office hours. The only class topic on the syllabus was that night's – "Introduction and Course Development". After introducing myself to the class, I offered them the opportunity to develop the remainder of the syllabus for the course based on the class's needs and desires, subject to the provisions that the class meet, accomplish the course description, and that a grade be assigned by the instructor. The option being that I could publish a traditional instructor-driven for the course. To get started in setting up the course plan I asked the students what they wanted to get out of the class besides a grade and meeting a degree requirement. This lead to a subdued discussion with the consensus that they wanted to get something they could use out of the course. From here we started listing the board topics and concepts they were interested in studying. A fairly large list was developed which was then grouped into general headings using typical brainstorming techniques.

Next we discussed how we were going to cover these topics. I offered the idea that the students pick the materials to read on the course topics. After discussion it was agreed that each student would find three articles on each night's topic and at the least one of the articles would be from a refereed journal. This required each student to do his or her own research on the topic and to find

articles they found interesting. In turn at each class there would both small group and class discussion of the topics, the articles, differing opinions, and how to apply the material at work. I agreed to supplement their research with brief presentations of material that I believed were important, such as change management. I agreed to lecture in week two and they would bring in one article on the topic. This allowed the class some time to get their articles and to try out the class format and my expectations.

I then asked for grading suggestions. After we went through the inevitable suggestion of all getting an "A", we discussed the merits of purely subjective – the instructor would somehow pick one – and a mix of objective and subjective – you do something, I'll publish expectations prior to the assignment, and I'll judge how you did. The mix was the unanimous choice. The final class decision was 30% for participation (getting the three articles, being in class, being ready to discuss the topic, and actively being in the discussions), 20% for a short report and its subsequent presentation (to allow the students to calibrate the grader), and 50% for a long report and its subsequent presentation (to allow the students to demonstrate their ability to apply what they learned in the class).

The resulting class meetings were lively with small group discussions of their articles (and very seldom did two people have the same article) and opinions in those articles, class discussions of the group sense of their articles, instructor lead discussions of the topic's implications for engineering managers, and question and answer periods to the instructor on topics that grew from the earlier segments of the class. The short paper and presentation were on a "new" or "current" concept in management that the student would like to introduce into their specific company. The long paper and presentation were on how they would/will go about introducing their concept into their specific company with particular emphasis on obstacles and how they would be addressed and conditions which support implementation and how they will be taken advantage of. With one exception the papers were very good to excellent as were the presentations. Both the students and the instructor critiqued the presentations. One question asked of the students was their willingness to be involved in the presentation. This question drove home the requirement to sell a program to the audience in its presentation.

This driving home a point was discussed the last night of class. After the grades were handed out and the student course evaluations were completed, I made a brief presentation of why I did what I did during the course and what I wanted them to take away from the course. The students were then free to leave, but I offered to stay and open the floor to questions – no one left. We continued the discussion for over an hour before losing any of the students. Two students talked for about two hours.

The Second Experiment

In the 2007-2008 academic year at Arizona State University while teaching in a MS program in Technology (Management of Technology) there was again the opportunity to teach a course similar to the one in the first experiment. In this experiment the course was OMT 598, Special Topic: Seminar in Technology Management. OMT 598, Special Topics, was a placeholder course which could be just about anything but which when taught had the specific topic listed so it showed as such on the student's transcript.

The basics were a 15 week course, taught one night a week for 3 hours per night. The students were a mix of full time graduate students and working professionals. The full time graduate students were mainly international students with some practical experience in their undergraduate discipline.

Enrollments in the program were low but being rebuilt – this course was being offered as part of the rebuilding process in which the structure of the program was being repositioned and an emphasis on attracting working professionals was being implemented.

As with Western Michigan Michigan's students there was a desire for "stuff" the students could use immediately and in the case of the full time students for "stuff" that they saw a benefit from learning.

In this experiment the same approach was followed: pretty blank syllabus the first night which the students had to populate with items of interest. Unfortunately in this version of the original experiment the number of students was small (5). This small number had a negative impact on topic generation and required a significant contribution from the professor. The small size made the group breakout sessions during class less natural and somewhat impractical. The resulting class discussion was meaningful but had a larger instructor presence than in the original experiment which was less desirable than more peer to peer discussions/arguments.

Again the students were involved, rated the course high, and seemed to learn from the experience. From an instructor standpoint, a better understanding of this student group was possible and it did contribute to program redefinition and content.

Applying the Approach to Non-Seminar Courses

For the last three semesters, MET 600 at Minnesota State University, Mankato has had elements of this approach incorporated. From the graduate bulletin (Minnesota State University Mankato, 2009):

> "MET 600 (2) Manufacturing Research Methods
> Research topics and methods related to manufacturing. The course will look at the current state of manufacturing and explore the research methods and experimental design procedures that are used in the area of manufacturing. Student will evaluate past research and will design a research project in manufacturing."

The first of the three offerings of this course was a last minute assignment to cover a need – to graduate several students needed the course then. Thus the assignment went to the new faculty member since the teaching of the course was not popular. This assignment was also added within a week of the class meeting.

An analysis of the course description and the curriculum seemed to indicate that as in the two earlier mentioned courses this course has an element of flexibility as to coverage and how to get that coverage. The syllabus for this course is minimal. The details are partially provided from student expectations and the remainder is driven by issues raised in completing the unifying task

for the course. The text book is a research book appropriate to their field. The writing style manual is the one they will be using to document their capstone paper

The approach taken incorporated several elements and philosophies from the earlier experiment: immediacy of application, student need driven, learn-by-doing/applying (finding how to find and then use their own resources). Since the written goal of this course is to prepare the student to do the research necessary to successfully complete their thesis or alternate plan paper (applied project) this requirement became the basis for the course.

The students in the class have typically include a mix of majors – manufacturing engineering technology and mechanical engineering – and mix of thesis (all mechanical engineers plus a few manufacturing engineering technology student) and applied project papers. The class size has ranged from 12 to 15.

The basis for the course has become the proposal the student will need to make prior to starting their capstone research project. By using the student's own research topic we provide relevance to the research and since they need to submit a proposal soon after the course if they want to graduate in a reasonable time period (2 years or less). Since we use their topic, the research they read and report on is relevant to their study.

The use of breakout session to discuss problem statements, deliverables, and methodology give the students opportunities for peer to peer review and critiques. Since the class has some working professionals and a mix of majors, the peer to peer feedback is diverse and seems to positively impact quality.

Recommendations

This approach can work well with mature, motivated graduate students. Use this approach with undergraduates is questionable. The approach only works for those well grounded in both the theory and practice of the course topic and try to stay current via readings and conference attendance.

The class needs to be looked at carefully because as the size increases the effectiveness may suffer. On the other hand too small a size causes other problems. Groups of three to five students for breakout sessions seem best. The instructor can listen in if there are multiple groups during the breakout sessions but the peer to peer interaction is key.

Teaching a graduate level course in this manner can be challenging - the instructor has to be willing to risk getting topics, which will require research on his/her part if the students want to go outside your comfort zone. This is an inherent risk in letting the students set the agenda within a wide set of boundaries.

In the class format discussed in this paper the instructor must explain why the assignments are given, what the students should expect to get out of them, and how what we did in the class applies.

References

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