

The Role of Faculty, Student Groups, Teaching Assistants, and the Web in Teaching Large Management Classes

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Paper prepared for presentation to the 2011 Research Conference of the Association of Policy Analysis and Management, November 3-5, 2011, Washington D.C.

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1. Introduction

This paper describes the differing approaches to management instruction employed by two graduate programs in two different schools at Columbia University. We address how faculty, student groups, teaching assistants, and the internet can be employed in varying ways to support different teaching methods for large management classes. Its purpose is largely descriptive, although there are some brief sections of analysis where we discuss the objectives of the courses and compare them to each other.

The first of the two courses is the Workshop in Applied Earth Systems Management (Workshop), which is an integrative capstone course for the Master of Public Administration (MPA) in Environmental Science and Policy program. The second course is Sustainability Management, a core course for the Master of Science in Sustainability Management, which is a mid-career version of the MPA in Environmental Science and Policy.

The Master of Public Administration in Environmental Science and Policy program and the Master of Sustainability Management program train students for environmental and

sustainability careers. Both programs emphasize the complex and systemic nature of environmental issues and focus on the practical skills necessary to deal with such issues. Both programs offer students an interdisciplinary learning experience, combining courses in the natural sciences with traditional management, economics and policy courses. Environmental science courses available to students in these programs include, among others: Climatology, Urban Ecology, Sustainable Water, and the Dynamics of Energy Efficiency. Further, environmental science is integrated into management and policy course materials using carefully selected data, examples, cases, and assignments.

While both the Workshop and Sustainability Management courses are the core required management classes for their respective programs, differences in the structure of the programs necessitate different methods of instruction.

The MPA in Environmental Science and Policy program is offered through Columbia University's School of International and Public Affairs and the Earth Institute while the Sustainability Management program is a partnership of the Earth Institute and the School of Continuing Education. Students in the MPA in Environmental Science and Policy program complete a total of 54 credits over the course of an intensive twelve month period and are required to enroll full-time at 18 credits per semester. The curriculum and course schedule were developed specifically for the program and allow little room for electives; only three of the program's courses are electives. The Sustainability Management program, in contrast, was developed for working

professionals, requires only 36 credits and allows students to enroll part-, half- or full-time. Most of the Sustainability Management program's students take between 3 and 9 credit points per semester. These students are often practicing sustainability professionals who take advantage of the program's evening course offerings while working full-time during the day.

Given these differences, the enrollment for the Workshop course is typically 60 students while the Sustainability Management course is approximately 150 students. This paper will discuss the teaching methods and the differing roles of faculty, student groups, teaching assistants, and the Web in these two management courses. We hope to demonstrate that management can be taught effectively in two different manners to classes of varying sizes.

2. Workshop in Applied Earth Systems Management

2.1 Introduction to the Workshop

The Master of Public Administration in Environmental Science and Policy was developed in 2002 to train sophisticated public managers and policymakers who apply innovative, systems-based thinking to environmental issues. The program's objective is to provide students with the analytic, communication, and work skills required to be problem-solving earth systems professionals. Graduates are prepared for professional careers in the roles of analyst, manager, and translator of scientific knowledge.

The program incorporates more science into its curriculum than any other MPA program currently offered in the United States. The program was designed to integrate both environmental science and practical experience into its management and policy instruction. At the core of the curriculum is the Workshop in Applied Earth Systems Management (Workshop), a sequence of three courses, totaling 12 credit points. The goal of the Workshop is to teach students how to integrate their understanding of natural science, social science, policy studies, and management through problem-solving exercises. The first two semesters of the workshop are a management simulation; the final semester is a real-world analysis for a public or non-profit sector client.

2.2. Method of Instruction: Management Simulation

The Workshop is designed to simulate a functioning organization environment with a set of specific rules and roles. In the summer and fall semesters, the Workshop emphasizes management issues. Students are placed into groups of twelve to thirteen student teams, each lead by a project manager and deputy manager, where they analyze an important public policy problem. Each of the five student groups is assigned a piece of proposed but not yet enacted state, federal, or local environmental law (or a U.N. resolution) and students develop a detailed operational plan for implementing and managing the new program. The emphasis in the summer Workshop is to develop the tools needed to manage the work of scientists and explain science to policymakers. The Workshop groups write reports explaining the environmental science aspects of a management problem to political decision-makers who are not scientists. During the fall

semester the Workshop group completes the operational plan for implementing the program. The Workshop groups create budgets, staffing plans, and performance measurement metrics for their program.

The project-style management simulation provides students hands-on experience integrating and using the various skills they learn during the Environmental Science and Policy program. Because the program follows an intensive one-year schedule, management instruction and practical experience must be concurrent. Management instruction is coupled with group project work in an effort to encourage students to immediately apply their acquired analytic, technical and managerial skills. By allowing the groups to function as relatively independent units students garner first-hand experience managing team members and learn to work within required course deadlines and internal deadlines set by the group.

The Workshop schedule is intense with 11 specific outputs produced in 14 weeks over the summer semester and 12 outputs produced in 13 weeks for the fall semester. Exhibit A presents the summer and fall outputs.

Exhibit A: Workshop Outputs

Summer Workshop Outputs	Fall Workshop Outputs
<ol style="list-style-type: none"> 1. Project Work Plan 2. Legislative or International Agreement Summary 3. The Environmental Problem Being Addressed 4. The Science of the Environmental Problem 5. Analysis and Description of the Proposed Solution in The Legislation or International Agreement 6. Midterm Briefing 7. The Science Behind the Proposed Solution 8. Scientific Issues or Controversies Related to the Problem or Its Solution 9. Measuring the Program's Success 10. Final Briefing 11. Final Report 	<ol style="list-style-type: none"> 1. Project Work Plan 2. Literature Review (Annotated Bibliography) 3. Revised Legislative or Treaty Summary 4. Issue and Political Background 5. Program Design Options 6. Midterm Briefing/Program Design 7. Organization, Contracting and Staffing Plan 8. Budget and Revenue Plan 9. Performance Management & Management Improvement Analysis 10. Master Calendar 11. Final Briefing 12. Final Report

2.3 Group Work

Each student group is lead by a project manager and a deputy manager. The groups are also subdivided into task teams, with each team member being responsible for the production of a major output as well as assisting on one or two additional outputs.

Group members are responsible for conducting all the research, thinking, and writing necessary to complete assigned tasks as well as for forming professional and productive working relationships with one another.

Each group determines its own processes and rules as well as assigns task leads for each output. Project managers and deputy managers are responsible for developing the project work plan, chairing meetings, ensuring outputs are completed on schedule, ensuring group understanding of responsibilities, managing plan logistics, developing agendas and tracking follow-up for meetings, advising task leaders on research, analysis and group dynamics problems, and for general group coordination and group management techniques. The project managers also liaise directly with the faculty advisor on at least a weekly basis. Task leaders, with their teams of two other group members, are responsible for completion of assigned outputs, reporting progress to the project manager and group, and determining when and what advice and information is needed and how to get it.

Many students have had no prior project management experience while a number have had extensive managerial experience. This offers an important peer-to-peer learning experience and enhances the development of group processes. By the end of the fall

Workshop, it is typical for students to offer short instructive lectures to their group on management and technical topics including PowerPoint and Excel tutorials, effective time management tips, and graphic design basics.

2.4 Class Structure

At the first class session, each of the five faculty members introduces the legislation for their group and the students have the opportunity to express their project preferences. Immediately following the first class, students are assigned to a project by the faculty. The faculty also appoint the project managers and deputy managers.

The course meets regularly twice a week for a total of four formal hours per week, although informal meetings are also held for smaller task groups throughout the week. The entire class meets as a whole for one hour to receive training on project-related skills. One purpose of these class meetings is to make certain that the substantive and procedural lessons are communicated to each member of the project team. In this first hour, faculty members give seminar presentations to teach new skills and concepts or to reinforce old ones. In the summer semester these lectures include instruction on writing professional memos, presenting oral briefings, explaining science to non-scientists, and selling recommendations. In the fall semester, faculty instruction focuses on topics of budgeting, performance measurement and organizational management. Exhibit B displays the faculty lecture topics for the summer and fall.

Exhibit B: Faculty Lectures

Summer Workshop Lectures	Fall Workshop Lectures
<ol style="list-style-type: none"> 1. Overview of Workshop Curriculum and Process 2. Team Building 3. Developing a Workplan 4. Oral Briefing 5. Memos, Report Writing and E-mail 6. Working in Groups and Legislative Summary 7. Explaining Science to Non-Scientists and Explaining Environmental Protection in the Private Sector 8. Collecting and Assessing Information for Policy Analyses, 9. Developing Options and Recommendations, 10. Performance Measurement and Management Policy Analysis 11. Selling Recommendations and the Politics of Science 	<ol style="list-style-type: none"> 1. Initial Organizational Meeting 2. Developing a Political Issue Analysis 3. Developing and Analyzing Program Options 4. Developing an Organizational Structure and Contracting Plan 5. Developing a Budget and Relating Organization and Budget to Program Design 6. Developing a Performance Management System 7. Managing in EPA: How Policy Becomes Reality and How EPA Measures Performance 8. Managing Environmental Protection in the Private Sector 9. Developing a Master Calendar 10. How to Structure and Develop a Final Report and Briefing

After the lecture and subsequent discussion, the class breaks into two concurrent sections. Three of the student groups meet as one section and the remaining two groups meet as the second section. During these sessions, the groups present 10-minute oral briefings on their outputs. The purpose of this structure is to allow the opportunity to present to classmates outside of their own group without taking the undue class time that would be required for all groups to present to the entire Workshop class. Following the briefings, the sessions separate again into individual group meetings where they have the opportunity to discuss work or group issues with their faculty advisor. Finally, each group meets again for a second two-hour session later in the week. During these sessions, groups discuss their outputs, receive comments and input from their team members on their work, and develop and improve group processes.

2.5 Faculty

One of the primary ways the MPA in Environmental Science and Policy program executes the management simulation method for such a large class is by employing multiple faculty members who each serve dual roles as instructor and project advisor. In 2010, there were three full-time faculty members and two adjunct professors. Adjunct professors come from various backgrounds across the public and private sector and bring unique expertise to both management instruction and project advising. These individuals serve to emphasize the applied work and financial aspects of the curriculum.

As part of their role as advisor, the Workshop faculty play the role of hypothetical client and are responsible for participating in meetings as needed, approving the work plan and draft outputs, and reviewing all outputs to ensure quality, identifying needed modifications, and approving outputs prior to finalization. They must also evaluate the performance and professionalism of group members and provide feedback, general advice and direction on the content of the analysis, research sources and group management techniques.

2.6 Web Use: Courseworks

An online course website, Courseworks, is utilized by faculty to post the syllabus, lectures, readings, and other relevant course materials. Only registered students and faculty have access to the site. The website enables the faculty to easily contact all students registered for the course as well as selectively email their individual student groups. Additionally, the website includes a library research guide with quick links to finding books, journal articles, current and archived news articles, databases for statistics, polls, and surveys, and various methods of accessing primary source documents including laws, treaties, and regulations. This section of the Courseworks site provides excellent data sources and is particularly helpful for those students who have not recently engaged in academic research.

3. Sustainability Management

3.1 Introduction to Sustainability Management

The Master of Science in Sustainability Management was developed in 2010 to formally train and educate sustainability practitioners. The program draws upon the most sophisticated environmental measurement tools, cutting-edge environmental science, and world class management and policy studies to help students fully understand the systematic and organizational role of sustainability in any organization.

This program provides practical training for both full-time and part-time students seeking to further their careers as sustainability professionals or transition into a sustainability field. The program, which was modeled closely after the MPA in Environmental Science and Policy program, similarly incorporates environmental science into policy and management instruction, but was created with the goal of educating current working professionals. With fewer total credits required, fewer mandatory courses, more electives, and a more flexible class schedule, the Sustainability Management program has over 250 students compared to 60 in the MPA in Environmental Science and Policy program.

3.2 Method of Instruction: Case Method

The core management class for this program, Sustainability Management, is a required course that provides instruction on the basics of management, public management, and sustainability management. In the first year enrollment reached 114 students, and in the

second year it is over 160 students. In a number of ways the style of instruction differs from the Workshop course. Since most of the students attend part time and work full time, there is no reason to simulate work processes as we do in the Workshop. Instead, we attempt to project the students into a wide variety of organizational settings and environments and ask them to address discrete management problems. Sustainability Management instruction therefore centers on the case method instead of the project-based management simulation found in the Workshop course.

The case method involves presenting students with a real life management situation and provides background details including relevant stakeholders, events, and additional pertinent information. This method of instruction puts the students in the role of decision-maker, allowing them to apply the skills and knowledge they have learned in the course to the specific problem presented in the case. The course uses a total of 17 cases throughout the semester to demonstrate course topics, elicit discussion and debate, and provide material for group work. In order to address the issues presented in the cases, students read several basic management books, including *The Effective Public Manager* and *Sustainability Management*. These books provide perspective and instruction on the management and sustainability concepts needed to address the issues presented in the cases. Exhibit C presents the full list of the fall 2011 case studies.

Exhibit C: Sustainability Management Case Studies

Group Case Studies	
Week 2	Group Case 1: "Maintaining New York City's Parks in the Face of Budget Cuts"
Week 3	Group Case 2: "Congestion Pricing in New York City"
Week 4	Group Case 3: "Case of Leaking Underground Storage Tanks"
Week 5	Group Case 4: "The Business of Sustainability: What it Means to Managers Now"
Week 6	Group Case 5: "Nuclear Power and the Japanese Earthquake of 2011"
Week 6	Group Case 6: "Lessons from the Oil Spill in the Gulf of Mexico"
Week 7	Group Case 7: "Mexico City: Opportunities and Challenges for Sustainable Management of Urban Water Resources"
Week 8	Group Case 8: "Nestle: Sustainable Agriculture Initiative"
Week 9	Group Case 9: "Climate Change Adaptation in New York City: Building a Risk Management Response"
Week 10	Group Case 10: "Starbucks Corporation: Building a Sustainable Supply Chain"
Week 11	Group Case 11: "Competitive Environmental Strategies: When Does It Pay to be Green?"
Week 12	Group Case 12: "When Contracting Really Doesn't Work: Atlanta's Water Contract"
Week 13	Group Case 13: "Global Sustainability: The Case For Collaboration"

Individual Case Studies	
Week 2	Individual Case 1: "The Problem of Tom"
Week 5	Individual Case 2: "Wal-Mart's Sustainability Strategy"
Week 8	Individual Case 3: "Waste Concern: Turning a Problem into a Resource"
Week 11	Individual Case 4: "Management Innovation in New York City: The Case of the 311 Complaint Processing Center"

Every student is required to read and analyze four individual cases, for which they write a two page memo addressing various issues raised in the case. They are expected to draw upon readings, lectures, and material presented in the case to answer questions posed by the instructor. This allows students to apply management theory and sustainability instruction to the real-world situations presented in the cases.

One of the primary ways that faculty manage the large class is by limiting the length of both written memos and oral briefings. Page limitations and time constraints are strictly adhered to, both to provide the simulation of a professional organization with precise rules and real time constraints as well as to allow enough time to cover all the material necessary. Students receive instruction at the first class session on professional communication including memos, work emails, and oral briefings.

3.3 Group Work

Another way that the program manages such a large class is by distributing most of the case work into groups. In addition to the four individual memos, each student must

participate in one group case. There are 13 group cases, each illustrating a different lecture topic including Strategy, Communication, and Information; the Centrality of Energy; and Sustainable Water. Each group case is assigned to two student groups, for a total of 26 groups. Prior to the first class meeting, each student is emailed the course syllabus which lists and describes all of the case studies. Students indicate their case preferences and the instructor and teaching assistants assign each student into a group and assign a project manager for each group.

Each group consists of five to six students and is led by a group manager. The manager is responsible for coordinating the group's work as well as developing and submitting a work plan which details responsibilities, outputs and schedules. In addition, there is an oral presentation team that develops presentation materials and presents the 10 minute briefing to the class, and a written memo team that outlines, researches, and writes the required memo. The groups divide their own members into these two teams.

Group work for cases serves a number of purposes in Sustainability Management. For one, dividing the cases into groups substantially reduces the time required to evaluate student performance for each case, without reducing students' exposure to the cases. More importantly, it allows students to apply their management skills in ways similar to the Workshop group dynamics. Students must manage their own work and time, develop effective group processes and deal with group or individual problems. This provides students with the opportunity to apply their management and technical skills. In class, the two briefings on the case typically vary enough that the instructor can

compare and contrast and make the point that management is a craft and not a science. There is no right answer to the questions posed about the case, just a series of difficult trade-off choices.

3.4 Class Structure

The course meets once a week for two hours and incorporates presentations, discussion, and instruction into each session. Following a brief introduction by the instructor, each class begins with presentations by two student groups on the case study for that week. This is followed by class discussion, led by the instructor, where the class identifies the similarities and differences in the groups' approaches to the case. Further, students debate how they might have responded themselves. If there was an individual case due that week, that case is also discussed and debated. Following a short break, the instructor then presents a lecture on a specific management theme and concludes the class with questions and discussion on the material. Exhibit D presents a typical class agenda.

Exhibit D: Typical Class Agenda

Sustainability Management Class Session Agenda
6:10-6:15 - Class Overview
6:15-6:25 - Group Presentation A: "Maintaining New York City's Parks in the Face of Budget Cuts"
6:25-6:35 - Group Presentation B: "Maintaining New York City's Parks in the Face of Budget Cuts"

6:35-6:50 - Discussion

6:50-7:05 - Individual Case Discussion: "The Problem of Tom"

7:05-7:15 - Break

7:15-7:55 - Lecture: Internal Organizational Management: People, Work, Money and Information

7:55- 8:00 - Conclusions and Next Steps

3.5 Faculty and Teaching Assistants

In contrast to the five-member faculty team for the Workshop class, Sustainability Management is taught by a single faculty member with the aid of teaching assistants.

Because the groups do not work on semester-long projects, nor are there five concurrent groups, there is less need for multiple faculty members for advising purposes. Rather, group presentations are distributed throughout the semester, allowing for easier support and advice from a single instructor.

However, while page limitations help to reduce the workload on the instructor, 26 presentations and memos plus four individual memos from each student is still a substantial workload to evaluate and grade. For this reason, teaching assistants are relied upon heavily. There are typically four teaching assistants, or approximately one for every 30 students. One of these teaching assistants is always a staff member at the Earth Institute at Columbia University, which co-administers both the Environmental Science and Policy and the Sustainability Management programs. The remaining teaching assistants are graduate students in programs throughout the University and

typically include students who have previously taken the course. Collectively, the teaching assistants serve as the first point of contact for students, answering questions via email, an online discussion board, by phone, and in person. They attend all lectures and are able to field most inquiries allowing the instructor to focus on preparing lectures and developing instruction materials. For roughly every 20 questions, typically one requires the teaching assistant to go to the instructor for further guidance.

3.6 Web Use: Courseworks

The online course website, Courseworks, is utilized by faculty and teaching assistants to post lectures, readings, case studies, and other relevant course materials. Only registered students, faculty, and teaching assistants have access to the entire site. The website enables the faculty to easily contact all students in the class. Additionally, an online discussion board accessible to all students is managed by teaching assistants to provide insight and answers to questions and concerns from individual students that are applicable and relevant to all students. This message board helps facilitate answers to questions that get asked repeatedly and provides an easily accessible archive of comments for students to review.

4.0 Analysis and Conclusion

When engaged in management education to professionals or those aspiring to be professionals there are a variety of techniques that can be used to deliver high quality instruction despite large numbers of students. In these two management courses at Columba we utilize:

- A team teaching environment that combines practitioners with full time faculty.
- The use of student managed work groups in the capstone Workshop that deliberately combines students of varied experience levels.
- Differently sized sessions for different functions. In the Workshop we teach some sessions to all 60 students, some to sections of 25 or 35, and some to teams of 12-13. Faculty also meet with task teams of 2-4 members and hold weekly private meetings with student team managers.
- In the large Sustainability Management course we use self-managed groups to do case analysis and brief the class on their findings.
- Full time staff is used in large classes to coordinate grading assistants. Very detailed grading rubrics are used to guide grading and provided to students to facilitate the use of grading as a teaching tool. Grading criteria are completely transparent to students.
- Many cases and other instructional materials are provided online. All lecture power points are on the web.
- Case teaching classrooms include banked, semi-circular seating arrangements.

The goal is to use the large class setting as a way to create excitement, peer pressure and motivation to perform well and learn. Groups facilitate informal, out of class learning. Faculty are asked not to complain about the size of the class, but to seek to use it as a way to energize the class and inspire learning. The PhD model of a small, highly participatory seminar is only one way to learn. In professional education these types of classes are less and less common. Large classes, taught in the right type of room, with competent audio visual support, and sufficient grading assistance can

provide a superb teaching environment to the right kind of instructor. At Columbia, it is the principle way we provide management instruction.