THE ONE SCHOOL ROOMHOUSE: AN INFORMATION AND LEARNING APPROACH TO CURRICULUM INTEGRATION

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Conceptual Foundation

The information explosion is fundamentally altering the organizational environment. The central social fact of this environment is complexity, which is a label we use to refer to the whole of change, uncertainty, and ambiguity. As a result, undergraduate business school students require a new set of skills in addition to functional area competence. To this end, we are assisting students in developing adaptive intellects for this constantly new world and instilling the general intellectual skill independent of academic domain or occupation called *learning to learn*. Thus, our undergraduate capstone management course was restructured, combining three traditionally separated domains—strategy, marketing, and management information systems (MIS). The focus of this course's innovation is on the one school lesson of learning to learn, bridging functional disciplines usually taught in the school's separate rooms and shifting educational responsibility from those functional teachers to the students. The foundation of the learning to learn theme is a metalanguage about learning based on the idea of information.

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It is becoming evident to many in education that the traditional building block of university education—the single-focus course, with the teacher as knowledge authority—has severe limitations in promoting learning (Senge, 1990). Artificially isolated, functionally oriented, teacher-centered courses tend to reinforce isolated, functionally oriented, passive thinking in students (Behrman & Levin, 1984; Harringan, 1990). Employers, students, and faculty at many institutions are demanding a more integrated experience (Zim, 1993) with emphasis on student engagement (Linder & Smith, 1992; O'Reilly, 1994). One result is a call for a more integrative pedagogy emphasizing integration of the mosaic of knowledge (Boyer, 1990).

> An intellectual sea change may be occurring, one that is perhaps as momentous as the nineteenth-century shift in the hierarchy of knowledge, when philosophy gave way more firmly to science. Today, interdisciplinary and integrative studies, long on the edges of academic life, are moving toward the center, responding both to new intellectual questions and to pressing human problems. As the boundaries of human knowledge are being dramatically reshaped, the academy surely must give increased attention to the scholarship of integration. Anthropologist Clifford Beertz, of the Institute for Advanced Study in Princeton, has gone so far as to describe these shifts as a fundamental "reconfiguration . . . .a phenomenon general enough and distinctive enough to suggest that what we are seeing is not just another redrawing of the cultural map—the moving of a few disputed borders, the marking of some more picturesque mountain lakes—but an alteration of the principles of mapping. Something is happening," Beertz says, "to the way we think about the way we think." (p. 13)

Preparing students to think differently, to think and learn integratively, and to take greater responsibility for their own learning in today's complex organizational environment are profound challenges confronting all learning institutions. To respond, a number of business schools are developing integrative curricula suitable for an information environment. A sample of these reforms reveals a variety of themes, energy of effort, and integrative reach. Quality, teamwork, and cooperative learning are integrative themes at several major institutions that grant master of business administration (MBA) degrees, and elsewhere, MBA programs are thematically coordinated by total quality management (TQM), globalization, and ethics (Downs & Grout, 1993, p. 313). Others use critical thinking, understanding contexts, and reflecting and acting as integrative themes (Bowerman, Marks, McClure, & O'Connell, 1993, p. 298). Several undergraduate schools are employing integrative case studies to enhance multidisciplinary thinking by students (O'Reilly, 1994). Closer to our theme are schools that integrate educational disciplines by shifting the emphasis from teaching to learning (Boyatzis, Cowan, & Kolb, 1994).

Our approach promotes learning to learn by emphasizing student responsibility for learning and by breaking down functional walls. Traditional teacher-centered courses are based on the idea that teachers possess an externally valid body of content that can be passed directly to students. We agree with others (see Boyatzis, Cowan, & Kolb, 1994, for more detail) that education is a self-teaching, generative process in which education occurs when students teach themselves. Elsewhere, this model has led to growth in internship programs (O'Reilly, 1994), experiential exercises (Thavikulwat & Overby, 1994), and teamwork emphasis (Katzenback & Smith, 1994).

In our approach, this emphasis on student responsibility is wed to a more unique integrative theme. Our integration is not designed primarily to improve learning within functional domains but rather to develop a metalanguage of learning common to all learning contexts and particularly well suited to the current organizational climate of complexity and change. We believe the Rosetta stone of such a language is, curiously enough, the defining environmental characteristic of our time: information. Our metalanguage is based on Bateson's (1973) idea of information as difference.

Information is the basis of learning. Bateson's (1973) definition of information as "a difference that makes a difference" (p. 318) captures the key concept that distinction and not state literally informs our understanding. This idea provides the conceptual foundation for other key metalanguage concepts, such as discernment and adaptation. *Discernment* implies being able to better observe differences among occurrences. By helping our students to increase their fidelity—that is, to notice ever finer differences that make a difference—students are more adept at knowledge acquisition, validation, and application in each and all of the three functional domains.

Adaptation is learning from differences; composition is learning from appreciation. If a student notices a difference between two nonprofit organizations based on a principle of marketing, then the student has adapted or learned an important difference that he or she may be able to apply to another context. This cycle of discrimination and adaptation, honed in exercises within the three domains, is practically endless in today's richly complex environment.

This metalanguage approach is designed to give students a model of learning. The payoff is that students are better able to understand their own learning processes and their shortcomings so that they may teach themselves. Presenting three courses within this metalanguage of learning creates a sufficiently different atmosphere that fosters both self-teaching and the use of this common transcending language. In sum, our integrative theory is a metalanguage of learning to learn; our pedagogy shifts responsibility for learning to the student, bringing theory to practice.

The course now has six primary educational outcomes or objectives. Shown here are the most current, developed after our third iteration of the course. (Each semester alters their number, and increases their fidelity.)

Objective 1: Reward and encourage students who learn to discriminate and adapt.

Objective 2: Encourage students to take greater responsibility for their learning.

Objective 3: Encourage students to learn the benefits of teamwork and how to support teams.

Objective 4: Enhance student ability to communicate effectively.

Objective 5: Be able to frame and resolve ill-defined problems.

Our course also had an objective at the domain level for each subject.

Objective 6: Be capable with the vocabulary and concepts in MIS, marketing, and strategy.

We will return to these objectives and how our pedagogy was designed and adapted to achieve them; first, we discuss the course's structure.

Organization of the Course

Our approach combines three 3-hour, senior-level, required courses—MIS, Marketing, and Strategy. These three courses happened to be scheduled concurrently. Rather than looking for three more evidently overlapping disciplines, we wanted to leverage this scheduling convenience and demonstrate that this approach is independent of discipline and could be used on any given set of classes. Lecture, seminar, field trip, case study, and case presentation were our prevailing pedagogies. As a parallel to bringing three classes together, we teach and encourage team building to bring students together to learn from each other. The section size has typically been 35 to 45 students who are in their final semester of a four-semester sequence that includes traditional courses in accounting, human resource management, production, finance, organizational behavior, organizational theory, and business law.

The course unfolds in two phases of roughly equal length—a domain-centered phase culminating with midterm exams and a student-centered phase punctuated with final case presentations. Table 1 lists the activities in these two phases.

TABLE 1
Course Activities

First Phase: Domain Centered	*Second Phase: Student Centered*
Classroom lecture	Field trip
Seminar	Case study
Midterm	Software demonstration
Database project	Business game simulation
	Final case presentation

DOMAIN CENTERED

The schedule during the first phase of the course requires students to attend a traditional lecture session followed by a seminar. Lectures to the entire class emphasize traditional functional frameworks in textbook style; seminars, which permit more discussion, explore application of domains on cases or in current contexts. A typical schedule for this phase is shown in Figure 1.

To better understand this schedule, consider a typical student. Student Jones attends the MIS lecture on Lesson 15 from 8:00 to 9:20 a.m. She then chooses between the marketing and strategy seminars at 9:30 to 10:50 a.m. On Lesson 16, she first attends the strategy lecture. Then, based on information not shown, she happens to be scheduled for the breakout session from 9:30 to 10:50 a.m. Because she is attending this session, she does not choose a seminar on Lesson 16. Lesson 17 is similar to Lesson 15. Student Jones attends a marketing session from 8:00 to 9:20 a.m., then chooses between an MIS and strategy seminar. With her seminar options, she may choose to concentrate on one domain, or she may choose to sample from all three domains equally. We encourage students to share notes and study with teammates attending the foregone seminars. During this phase of the course, a typical student attends approximately 18 hours of instruction (lecture and seminar) in each of the three domains.

In MIS, students learn a commercial database program and program a knowledge database (an organized group notebook compiled from individual class and seminar notes). Students access this database on the course midterms. Using both seminar and lecture, we also cover traditional MIS topics such as design, teleprocessing, software, and evaluation of MIS. Marketing content centers on the traditional four Ps (product, price, place, and promotion), with extra emphasis on the strategic implications of marketing endeavors and the controlling role of information systems in modern marketing. Strategy highlights well-known frameworks such as strengths, weaknesses, opportunities, and threats (SWOT), competitive forces, and the value chain. These

		LESSON NUMBER			
Time	Method	15	16	17	18
8:00- 9:20	Lecture	MIS	Strategy	Marketing	MIS
9:30-10:50	Seminar 1	Strategy	Marketing	MIS	Strategy
9:30-10:50	Seminar 2	Marketing	MIS	Strategy	Marketing
9:30-10:50		Breakout	Breakout	Breakout	Breakout

Figure 1: Lesson Schedule (first phase)

general models aid interpretation and assessment of MIS and marketing programs.

It is necessary to cover these topics to satisfy graduation requirements. More important, teaching these topics gives us the opportunity to demonstrate discrimination (e.g., differentiating an effective and ineffective MIS) as well as set criteria and other metalanguage lessons. As students learn these new domains, they concurrently validate the usefulness of the metalanguage. They learn how learning is done, and with increasing ease, they move between the domain level and the metalanguage level.

In addition to domain instruction, teamwork activities begin during this phase. Students are randomly assigned to teams in an attempt to balance talent. Each team is assigned two breakout sessions. Discussions focus on team issues, such as examination of group process, exploration of the overall learning process, and discovery of domains and learning connections. It also provides an opportunity to discuss transdisciplinary issues with the metalanguage. These sessions are facilitated by a team mentor, who is one of the course instructors. Mentors also monitor student choices of seminars, present alternative ideas from students in other sessions, and ensure that team members share seminar notes.

Early in the semester, teams are given traditional exercises that reward dependence and communication. As the semester proceeds, feedback on these early, artificial exercises gives way to feedback on actual team difficulties to help enhance teamwork.

Integration of domains during the first half of the course was both programmed and ad hoc. The programmed breakout sessions used the metalanguage to discuss general learning strategies applicable to each domain.

Ad hoc instructors would refer to integrative themes during domain lessons. Themes such as organizational adaptation, managerial learning, and decision making were common.

STUDENT CENTERED

This student-centered phase of the course focuses on major activities chosen for their limited structure, ambiguity, and emphasis on student interaction. These activities include field trips, case studies, software demonstration, a business game simulation, and a final presentation. Each student group decides how many field trips and cases they want to accomplish, and their inputs are the basis of the schedule for this phase of the course.

For many of these student-centered activities, a metalanguage process was strongly encouraged. This general problem-solving process involves four steps: (a) develop criteria for the event (e.g., interesting to us, insightful for the audience, worthwhile for our careers, etc.); (b) take action (e.g., write a paper, do a presentation, conduct field trip); (c) obtain feedback information from students and instructors on actions and criteria; and (d) conduct a self-assessment of action and criteria used. This cycle seeks to apply the metalanguage lessons of discrimination on choices, subsequent adaptation, and the usefulness of information (feedback) in a complex environment. It also helps students recognize the role of information in adaptation to new contexts, and it is consistent with becoming responsible for their own learning. Use of this student-centered activity cycle was encouraged by forcing students to choose which seminars to attend, what organization to visit on a field trip, how to synthesize MIS and strategy or marketing and strategy into a case, which software to demonstrate to the class, what information they should include and exclude from a presentation, and how much effort they should put into a team task.

It is important to note that each student-centered activity (except the final presentation) was graded pass/fail and that final grades were awarded based on the number of activities and the score on the final presentation. Pass/fail was used to encourage creativity and to dampen student-teacher disagreement on criteria. As a result, feedback de-emphasized evaluation and concentrated on developing a better understanding among students and teachers on criteria and self-assessment.

An excerpt of this schedule is shown in Figure 2. (Usually the entire class of students attends these activities; however, if time and activities demand, the larger group is divided to provide multiple settings for discussion and presentation.)

	LESSON NUMBER		
Time	25	26	27
8:00-8:45	Software Demonstration	Field Trip	Post Field Trip Explanation
9:00-9:45	Pre Field Trip Explanation		Case Presentation
10:00-10:45	Case Presentation		Pre Field Trip Explanation
	Simulation Decision 2		Simulation Decision 3

Figure 2: Lesson Schedule (second phase)

A summary of these student-centered activities is as follows.

1. Field trip. One of the major benefits of this course is providing a block of time for multiple student-led field trips. Guidance to student groups is simple: Find an organization that will provide a fruitful learning experience for the class. With instructor approval of their proposal, a host group makes all contacts and arrangements, develops learning objectives for the class, does an industry and company analysis in light of the three domains, and presents and contends these ideas in class prior to the trip. After the trip, teams present the learning objectives and evaluate the field trip with respect to those objectives. This discussion typically features synthesis of knowledge gained while visiting organizations earlier in the semester with the current trip. Pretrip and posttrip explanations are designed to encourage students to use the metalanguage to resolve this ill-defined task. Encouraging students to present their rationale for their selection (criteria) and what they have learned helped to focus the discussion at the metalevel of selection and refinement of ill-defined problems via model use. It also helped preclude overly factual descriptive presentations on what was observed at, for example, MCI or Coors.

2. Case study. This is traditional. Student teams study a company of their choosing. They research the company using frameworks from the course domains and present an analysis of that firm to the class. The topic of analysis is also determined by the students (again, to make the selection a result of criteria). They articulate and defend the results of their analysis in a forum of students and instructors who provide feedback designed to build toward the end-of-course final case presentation. Multidomain synthesis is encouraged.

3. Software demonstration. Each student team selects a commercially available and popular software program to demonstrate to their peers. This presentation needs to satisfy two requirements: explain the use and purpose of the program and to demonstrate how software can be learned.

4. Business game simulation. Students participate in an interactive business strategy simulation game. Each group competes against all others in a competitive marketplace environment. Teams make business decisions on production, marketing, and finance that interact with other groups' decisions and are given feedback for new business choices and decisions. This simulates the business environment to learn about the implication of strategic business decision making. The game features a nonbinding preliminary stage for students to learn without retribution, the actual series of decisions, and a written paper that enunciates team processes and decision-making strategies. This activity exercises the course objective of teamwork and discrimination.

5. Final case presentation. This culmination exercise is purposefully left ambiguous and ill defined. It minimally requires a team to present suggestions on how enterprises should respond or adapt to their environment using frameworks and knowledge developed in the course. The format of the presentation and its scope is designed to shun replication of any previous academic experience. As a result, teams determine specific objectives, purposes, and criteria with instructors early in the process. Feedback to the students is provided on both the presentation and decisions about the presentation. A common format uses strategy frameworks to discuss an industry, other functional domains to suggest responses, and finance structures to communicate cost figures.

Before closing this section on how the innovation is organized, we should discuss one guiding principle that limits our schedule. Whereas our new capstone course is very different from its traditional one-course predecessor, it is important to stress that we wanted it to fit into our institution's existing schedule. Students learn the domain-specific knowledge listed in our course catalogue, and we want their transcripts to reflect completion of three traditional courses. Moreover, we want no major change to our course structure. In short, we attempted to organize this material in such a way that existing institutional rules are not breached.

Effectiveness

Assessment of educational effectiveness is always difficult. It is made more difficult by a lack of time to establish well-developed assessment

procedures and by ambiguous educational objectives. Because we are currently in our fifth semester with this approach, we are still learning about the process of evaluation and assessment in a novel context.

As has been discussed, we conceived this innovation and offered it as a developmental technique in an emerging curriculum intended to foster adaptive capacity. Notice the recursive relationship here. We are demonstrating the process of learning to learn as a curricular and pedagogical tool so that the students learn to learn; we are practicing what we teach.

At the most general level, the course appears to be effective with both teachers and students. Using a faculty-wide, standardized course evaluation form, students rated this course more highly than the average elective course in a student's chosen area of study on 95% of the common questions during a 2-year period. Another encouraging sign was the response to the prompt, "Would you recommend this course to another student?" Responses were 55% positive after the first offering, and 94% after the second. Qualitative comments on the course as a whole were positive; negative student comments about specific aspects of the course are presented in later sections.

> When I was in High School, I was an active thinker. I sought out further information on subjects. . . . When I entered school, I lost some of that ability. I fell into the trap many, if not all, do. I stopped actively thinking for myself and began following the predetermined steps for each class. . . . I began to equate the steps to the grade to learning. I feel as though I was merely connecting the dots and I hoped I connected them better than others. This is not learning. . . . This semester I took a management class in which we were told to come up with our own methods. We were confused to say the least. Our class spent the first part of the semester asking questions like, "What do they want us to do? How should we do this? Why don't they just tell us?" Imagine, we were actually asking the questions which make your mind seek out information. I look back and I am glad I took this class.
>
> I doubt that any outsider could truly appreciate the special nature of this learning environment. My final hope is that someone, somewhere . . . is able to understand what a wonderful opportunity a class like this can be. Learning to learn truly was a fantastic end to our undergraduate studies.

Furthermore, of the eight instructors who have participated, all encouraged dropping the traditional offerings of these courses and requiring that all students take this capstone course. As a result of these student inputs, the positive response of the eight instructors, and the receipt of a national instructional innovation award, our faculty administrative board approved our request to make this course the required capstone experience for all management majors.

TABLE 2
Objectives and Activities

	Activities					
Objectives	*Field Trips*	*Case Study*	*Software*	*Business Game*	*Final Presentation*	*Three Domains*
Discrimination				*		*
Responsibility	*		*		*	
Teamwork				*		*
Communication	*	*			*	
Ill-defined problems	*				*	
Vocabulary		*	*			*

Assessment of Objectives/Outcomes

A sequential examination of the course objectives and how our atypical pedagogy supported each outcome may provide better understanding of why the pedagogy was chosen and a clearer assessment of this course. For the sake of clarity here, we discuss the objectives individually; however, achievement of them in the course is quite often indistinct. Because of this limitation, Table 2 provides a framework that indicates the activities that can be linked to each objective. Many of the objectives, such as teamwork, were a part of many activities. For clarity, we identify in Table 2 only the top two or three activities for each objective.

OBJECTIVE 1: REWARD AND ENCOURAGE STUDENTS WHO LEARN TO DISCRIMINATE AND ADAPT

As mentioned earlier, this objective requires a complex environment. A simple deterministic environment requires little discrimination and adaptation. By emphasizing the interrelatedness of the disciplines, students are taught early that complexity becomes more manageable with a framework of information. The existence and use of this general metalanguage encourages looking for differences, discriminating, and adapting. Students practice employing this strategy of information to reconcile complexity during the second phase of the course.

Combining domains may help students enact these metalanguage strategies in the three domains as well as outside these functional boundaries. Another key design of the course promotes individualization of learning. Students become noticeably different by selecting from a menu of competing seminars and making choices about field trips. Rewarding the exercise of

discrimination by students making these choices reinforces the objective that students actively discriminate and adapt.

The result is that by the end of the semester, students to varying degrees demonstrate an appreciation of complexity and attempt discrimination strategies to deal with it. On ill-defined assignments, they seek more information not just about a domain or company but about criteria of discrimination and comparison and about evaluation of that subject. Several teams have adapted field trip choices in midcourse to better discriminate between companies.

Of the listed objectives, this one has only recently become distinct and explicit as we continue to learn about the course. Students believe that the course complexity more closely simulates the organizational environment than does a traditional class. However, discrimination and adaptation as a metalanguage learning model were not emphasized in early versions of the course as much as the less discriminate general learning notions, such as setting criteria and obtaining feedback.

OBJECTIVE 2: ENCOURAGE STUDENTS TO TAKE GREATER RESPONSIBILITY FOR THEIR LEARNING

A simple environment led by a teacher/authority encourages students to learn what is important to the teacher. On the other hand, a complex environment without well-defined problems encourages student responsibility for learning because it provides a more robust and meaningful feedback environment. Furthermore, an environment without well-established or common criteria encourages students to actively resolve complexity and choice by developing their own criteria against which to evaluate information and learn.

This learning objective plays out in iterated course assignments, a good example of which are the field trips. As stated earlier, this requires students to contact organizations, visit them, develop learning objectives, and brief the class for each trip. After each trip, they conduct a session on what is observed, noting significant differences from functional area knowledge and earlier field trip and class activities. Student teams have the key responsibilities of developing the criteria, assessing success based on the criteria, and adapting the feedback to the next field trip cycle. Instructors lead discussions that give student teams feedback on both the trip and the criteria established for the trip.

Students comment that the ambiguous, unusual course assignments—conducting field trips, the final presentation, and selecting, learning, and demonstrating software—help them to recognize that they had the ability and the need to teach themselves. They recognize the absence of teachers, books,

and other artificial educational scaffolding and notice that they are initiating the learning process, establishing their own criteria, and seeking attainment of their own goals. Delightfully, they even question the efficacy of teachers.

Following are comments from students on the end of course critique:

> The lack of a prescribed way to do everything makes us take initiative and be creative.
>
> [The second half of the course] was the best part of any class I've had at the Academy. The most valuable part of this class was that it taught us to take responsibility for our own learning.
>
> The uniqueness of the class has fostered a learning environment different than any other class I've taken. It has really helped my group in that we constantly encourage each other to take responsibility for our own learning.
>
> One problem was that some of the objectives and criteria were not well explained.

OBJECTIVE 3: ENCOURAGE STUDENTS TO LEARN THE BENEFITS OF TEAMWORK AND HOW TO SUPPORT TEAMS

We want students to understand the benefit of teams and how to support teamwork and different but complementary talents. Randomly assigned to teams, students formalize goals and communication policies early in the semester. Teamwork concepts such as commitment, goal coordination, communication, and assessment are stressed. One benefit of teams in this course is that groups can exploit individual differences to better discriminate information as a team. We emphasize other advantages of teamwork, such as requisite variety and problem discovery, particularly in this setting of ill-defined problems and high complexity (Katzenback & Smith, 1994). Teams used feedback-intensive, scheduled breakout sessions with mentors to surface discussion of individual contributions to teamwork. Conceptually, teamwork and individuals within teams support the multilevel epistemology of metalanguage and individual courses and activities within the metalanguage.

Student teams cut their teeth on relatively structured, limited problems, such as how to study together for the midterms and submitting business game simulation decisions. As teamwork develops, we introduce software demonstrations and final presentations that were less well-defined, encouraging teams to discuss and to work together at learning. Students increasingly come to realize that their peers and teammates know more about specific software, their field trip company, and their final presentation criteria than do the instructors. In addition to assignments, evaluation is designed to foster teamwork. Student teams remain intact throughout the semester, and students

receive only team grades in the second half of the course (no points are awarded to individuals).

Finally, discord within teams occurs and is usually surfaced with the mentor; if unresolved, the entire team of instructors becomes involved. The military's reliance on teamwork even with strangers and with difficult members is usually sufficient to help overcome most difficulties. Some members of one particularly dysfunctional team resolved to make things work out just to see what they could learn from that process.

A number of students' comments seem to indicate a conceptual appreciation for teams. However, few students comment on the behavioral aspect of team membership.

> This [teamwork] afforded us with the opportunity to learn from each other, as well as giving us the opportunity to present ideas and results from research to our peers. The feedback we received from the other groups as well as our mentor, was invaluable.
>
> The basic organization of the course is designed to foster teamwork to a level we, as students, have never really been asked to achieve.
>
> Teamwork is a very important aspect of this class. Without it, the class would be impossible!
>
> I think teamwork follows from collective magic, a sort of synergy. . . . Teamwork comes from being united in goals.
>
> I feel that you learn more and in a more effective way. Just from talking to others in the regular classes, it seems like I know more about the three subjects. Also, [you] get a chance to learn from students as well as teachers.
>
> The course should reward more individual performance as some students carried their teams.

OBJECTIVE 4: ENHANCE STUDENT ABILITY TO COMMUNICATE EFFECTIVELY

Writing and speaking opportunities are intended to be iterative and realistic. The process begins during the first phase when instructors in the three domains use similar writing assignments and exams. The open-book midterm exams typically require application of domain models to cases—a process that repeats in the presentation of cases in the second half of the course in which model selection is also an aspect. Writing assignments in the first half of the course are limited, but when used, they are typically case summaries, once again employing the model application framework. The second phase emphasizes informal student presentations as the prime communication venue.

The communication aspect of MIS provides a framework that requires all final case presentations to employ presentation software, such as PowerPoint. As a result, students iteratively use the software for informal presentations throughout the semester in anticipation of that final exercise. This immersion into a new presentation medium is an impetus for many students to hone effective communication skills, such as advantages and disadvantages of presentation software, information manipulation and presentation, importance of message and medium, and impact of information selection and display on an audience.

E-mail, which is another computer technology application, amplifies these communication lessons. With fluid schedules and constantly new experiences, a number of students used the school's local area network (LAN) to communicate with professors and each other, learning about time lag, certification of receipt, LAN etiquette, information timeliness, and content. These two communication vehicles—presentation software and e-mail—permit students to extricate communication lessons previously buried in speaking and writing contexts, enabling more precise understanding of message rather than medium. This contrast harmonizes the metalanguage lesson of the course, which is to observe information or difference independent of medium. Emphasis on message (information) within a medium (information technology) is echoed in an MIS theme that encourages students to discriminate among various aspects of the information age.

Students extolled the frequency and opportunity for practicing presentations as a very obvious benefit of the course. Furthermore, they seemed to recognize and appreciate the more natural speaking opportunity before and after the field trips in which they present as colleagues, knowing as much about the application of a subject as their audience (including the teacher).

> What this course did well for us was the experience that was received in the area of briefing. We were given many opportunities to be able to become better briefers and this is one area we will be using a great deal [after graduation].

> I think that I have also gained a better understanding of what is expected in a formal briefing and I have gotten a great deal of practice doing them. I think this has given me more confidence and self-possession.

OBJECTIVE 5: BE ABLE TO FRAME AND RESOLVE ILL-DEFINED PROBLEMS

In our view, ill-defined problems emphasize ambiguity, interactiveness, and constant change. Two venues within the course bring this objective to life: field trips and final case presentations.

As described earlier, the field trip assignment requires that students provide a meaningful learning experience for their peers, whereas the final presentation is even less defined, requiring students to produce both the objectives and the presentation itself. For these assignments, a strategy for framing and reconciling ill-defined problems is presented for iterative practice (see student-centered activity cycle presented earlier): set specific criteria, act, obtain feedback based on criteria-performance differences, assess the choice and suitability of the objectives, and repeat the cycle for subsequent assignments. Adding fuel to the ambiguity fire, we use multiple instructor/evaluators. These instructors act as critics during presentations and provide discipline-specific and general grade inputs to one instructor chosen to assess overall grades. The final presentation is evaluated independently by each instructor; ordinal ranks are discussed and final grades are developed by averaging across the instructors' assessments.

Students have experience with less vexing ill-defined problems from time to time earlier in the curriculum. The consistency of the problem space in the second phase of the course and a method for resolving these types of problems receives praise from students. One reason is that these assignments appear to match the students' perceptions of problems they anticipate after graduation. Similarly, the anxiety of multiple evaluators seems to dissipate when students recognize the multiple evaluator context of postgraduation work environments.

> As cadets, we are taught all about the fine intricacies of black and white. This course was an eye opener to us because we are no longer fooled by our naive perceptions of a black and white world. The capstone course shatters those perceptions and floods the mind with complexity, ambiguity, information, and relationships that provides a unique opportunity to gain valuable insight to the outside world we are about to enter.
>
> The ill-defined problem preached throughout the course we all agree is the type of problems we will likely see out in the Air Force. We figure as undergraduates it is the time to figure out what type of customer is out there, what do they want, how can we deal with unforeseeable problems.
>
> Having multiple instructors made it difficult to know how to prepare for each activity.

OBJECTIVE 6: BECOME CAPABLE WITH THE VOCABULARY AND CONCEPTS IN MIS, MARKETING, AND STRATEGY

During the semester, instruction, development, and use of the vocabulary and concepts of the domains shift from domain centered to student centered. The basic vocabulary and concepts of the domains are introduced by

instructors in the first half of the course during 18 hours of lecture and seminar devoted to each subject domain. Students apply the vocabulary and concepts in each domain to cases, field trips, and final presentations with increasing precision, sophistication, and unique variation.

This more traditional course objective comes to the schoolhouse arm in arm with traditional assessment techniques. One we employ is a standard pretest-posttest evaluation comparing students in this course with students in a traditional course in strategy. We are able to report that students performed on cognate areas of MIS, strategy, and marketing at a comparable level with students in the normal offerings of those courses. In addition, in the opinion of instructors who concurrently teach traditional and integrative courses, the students in the innovative course demonstrate necessary domain knowledge while also indicating at least a vestigial capacity to synthesize knowledge.

Summary

From the perspective of dynamic effectiveness, we now understand far better about the possibilities for such a course. Early on, we learned about administration—important things about how to grade group performance to encourage choice and learning and how to make many events pass/fail. Students suggested this standard to foster and support groups as a way to encourage individuals to try new and difficult things. In addition, we realized that to award a single (integrated) grade for 9 credit hours swamps other grades in a student's grade point average (GPA), especially at the extremes: An A grade virtually guarantees that the student makes the dean's list, whereas an F is the kiss of academic death. From a pedagogical standpoint, we learned how students cope with bona fide (i.e., not temporary simulated) ambiguity. We observed how students came to grips with a course in which there was no feasible alternative to making important decisions that count and no default conditions in which to take refuge. We learned from our mistakes. We learned not to emphasize administrative detail; we learned that labor-intensive software programs are not well received when ambiguity about their use is shielded from the laborers. We learned that students perceive integration from simply the administration of the combined course and that this metalanguage of learning suitable to the three domains required much more cognitive work and follow-up.

We are currently learning that the instructor team demands effort, sacrifice, and communication and that much can be learned about teamwork as we

practice this ourselves. We are learning that to maintain the ambiguity of the context, new and untried techniques must be infused constantly. Reusing activities over several semesters diminishes ambiguity for us and the students. To obtain new activities, we are using new instructors. With this turnover, our ability to agree on a constant underlying theme for the metalanguage is time-consuming. Discord in the instructors' metalanguage lessens its usefulness. Demands are high on new instructors, and suitable organizational rewards are difficult to construct.

What mattered from this perspective is that we are changing our approach in subsequent offerings based on what we are learning, and we are developing the innovation to the extent that most of our students receive it as a valid and valuable culminating chapter to their undergraduate management experience.

This course is a result of a year-long assessment of our graduates' environment. The predominant feature of this environment for the foreseeable future is sheer complexity. The information explosion and its associated complexity render the management situation almost infinitely complex and intractable to the traditional management paradigm. Organizations and professions should have a stake in our outcome, which is to produce a graduate with the adaptive capacity to learn. Complexity generated by high technologies and other information engines demands an undergraduate preparation tailored to this environment.

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