From Worst to First: The Anatomy of an Innovative MBA Decision Science Course

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Dr. Brightman was selected as the 1984 College of Business Alumni Distinguished Professor. He has also received the CBA award for teaching and for service. Dr. Brightman was chosen the Alumni Distinguished Professor for Georgia State University in 1992. In 1994 he received the Dennis Grawoig Distinguished Service Award from the Decision Sciences Institute. In 1998 Dr. Brightman was one of three faculty in the state of Georgia that received the Regents' Teaching Excellence Award. Dr. Brightman is a past president and a Fellow of the Decision Sciences Institute.

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Robert Elrod *(shown here with his wife, Nancy) is retired from Georgia State University after 31 years in the classroom. He received his Ph.D. in agricultural economics from Clemson University in 1969. His research and teaching interests included mathematical modeling, decision support, and cognitive style as it affects problem solving behavior. In the last six years of his professional career, he traveled extensively to Poland, Azerbaijan, and the Republic of Georgia teaching in MBA programs in each of these countries.*

Dr. Elrod and his beloved wife, who will retire this June, plan on wandering around the world for a few years while Robert continues to teach in programs abroad. Their immediate plans are to spend the inheritance of their son, Joshua.

Having been in the classroom for over thirty years, Dr. Elrod anticipates taking life to its fullest and keep in mind that family and friends are truly the only lasting capital.

The original version of the EMBA Decision Science course was a simulation game in which teams using faculty-developed decision support systems competed to maximize stock price. The course's goals were to develop effective decision makers and provide a survey of decision science tools. Although we made course improvements over the years, we never achieved the former goal and rarely achieved the latter goal.

The course suffered from four weaknesses. First, the simulation game was too complex and used outdated technology. It was almost impossible to determine what factors influenced the game's yardstick—stock price. Furthermore, the game was so complex that there was little time for decision science topic content. Worse still, we were using DOS-based decision support systems several years after the introduction of Windows 3.1. Second, the simulation course was in the second quarter of a six-quarter program and thus came too early in the program. A simulation game with wider scope might have made sense for the program's capstone course. Third, because of the complexity involved, students used but did not build models—even though decision support modeling was (and is) the department's central focus. Finally, the course omitted logic and creativity from the decision-making process. As a result, EMBA students rated the course as the least valuable after the quarter's end and upon exit interviews at graduation.

Figure 1 displays the average perceived course value by students under two instructors along a one (no value) to five-point scale (outstanding value). Note several important features. First, the course's value varied from 2.8 to 3.8. A rating of 2.8 to 3.0 placed the course in the 10th to 20th percentiles in terms of perceived value for all graduate core courses in the business school curriculum. During that period the course achieved the only sub-3.0 course-value ratings in the EMBA program and three of five 3.0-3.5 course-value ratings. Second, the course's value remained low even though two different and very effective teachers taught the course. In fact, the instructors' ratings in the course were in the 4.0 to 4.3 range, so the problem was not with the instructors but with the course's content.

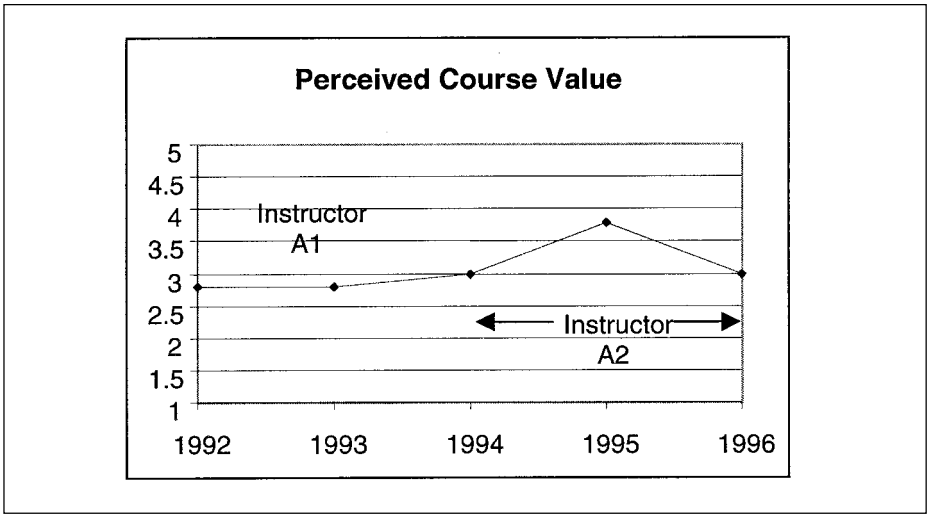

Figure 1: Course value from 1992-1996.

Three-Year Impacts of the Redesigned Course

Figure 2 displays the immediate and significant impact of the redesigned course. In 1997 Professor A2 taught the redesigned course. He had been the instructor for the previous three years. Note the immediate upward shift in perceived course value from 3.0 to 4.6. The previous high course value was 4.1 and had been achieved in the mid-1980s. Over the past two years Professor A3 has taught the course and its value remains high. Based upon course evaluations and exit interviews, it is now tied with finance as the highest-rated course in the EMBA program and among the several highest-rated courses for all MBA core, or required, courses.

The course has achieved other successes as well. EMBA students have used creative, logical, or quantitative tools in their firms. After the second offering in 1998, the EMBA students recommended that we develop a similar course for our part-time MBA program. They had found the course so valuable and wanted their subordinates (our part-time MBA students) to have decision science skills. We modified the EMBA course and it replaced our required statistics course in the MBA program. We offered four sections (under three instructors) this past fall semester. The course evaluation for all the section was 4.3 (one of the four sections was a first time ever Internet offering and was rated very low). Finally, we are considering a similar course for the undergraduate program.

Major Course Innovations

The course has three important innovations. First is the course's central theme, or unifying "glue," that connects the various decision science topics. We selected Herbert Simon's (Simon, 1977) problem-solving model as the course theme because problem solving and decision making are among the most important skills a manager must possess.

Simon's model includes three phases—intelligence, design, and choice. Intelligence activities focus on understanding and diagnosing the problem-solving environment. The course presents quantitative, creative, and logical tools for intelligence activities. Design activities include creating, designing, and modifying alternative solutions. Here creative tools are especially important. Finally in the choice phase the decision maker selects an alternative solution and implements it.

Kenneth Feldman, an educational researcher, notes that the most important factor in student learning is course and lecture organization (Feldman, 1989). And Simon's model serves as a unifying theme within the course.

The second innovation is the subject matter and focus. In addition to the traditional quantitative tools, we included problem solving logic and creativity. Dennis Grawoig, founder of the Decision Science Institute, believed that these types of tools were just as important as the quantitative tools to the discipline's success (Grawoig, 1970). Over the years we have tended to ignore these nonquantitative tools in our courses and our research. That's not all. We have also ignored Simon's first two phases and have graduated decision science professionals who have difficulty diagnosing problems and generating creative solutions. Figure 3 displays the course's subject content. The logical and creativity methods that support Simon's intelligence and design activities are in boldface.

The third innovation is the use of opening applications, or "hooks," to stimulate interest and show subject relevance for each of the course's lectures. According to Kenneth Feldman, stimulation of interest in the subject and showing subject relevance are among the top five factors that help students master the material (Feldman, 1989). A later section presents a typical opening application for a lecture.

The Intelligence Phase

The intelligence phase constitutes 40% of the course content. Here students learn multiple regression analysis, the Kepner and Tregoe method, and Van Gundy's 5Ws creative method. These topics help students understand the decision environment, diagnose problems, and develop creative decision goals.

The intelligence phase begins with a unit on multiple regression analysis. About two weeks before the beginning of the semester, the EMBA students take a six-hour preparatory module that covers univariate and multivariate exploratory data analysis. (We have built these two units into the MBA version of the course. Because of these additions we cover less material in the regression analysis unit than the EMBA version.) We cover multiple regression analysis for cross-sectional data through multicollinearity and autoregressive modeling of seasonal and meandering patterns for time-ordered data.

Our goal in the Kepner and Tregoe unit is to help students sense problems and understand root causes (Kepner & Tregoe, 1981). The method helps managers minimize the "jumping to conclusion" bias, where they immediately search for problem causes before truly understanding the problem. The method helps managers to ask diagnostic-oriented questions and then solution-oriented questions. It is an extremely effective logical problem-solving tool that is ignored in most, if not all, decision science courses.

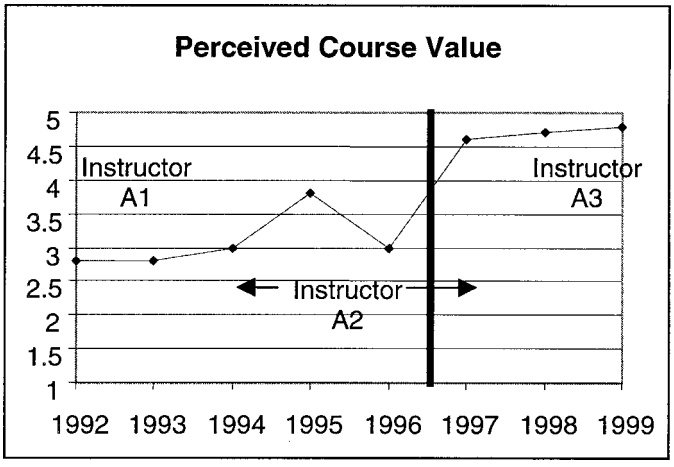

Figure 2: Course value from 1992 to 1999.

The intelligence phase concludes with a unit on Van Gundys' 5Ws creative decision goal framing method (Couger, 1996). This method illustrates the impact of decision goals on alternative generation. There are two different strategies for generating solutions. The first, and less effective, approach has managers generating alternative solutions for an initial (and often implicit) goal statement. A more effective strategy is to first generate *alternative goal statements* to the initial goal statement and then generate solutions for all the goal statements. The 5Ws method helps brainstorm creative and different possible decision goals.

Opening Application. Before concluding this section we illustrate the opening application, or "hook," to stimulate interest in the Kepner and Tregoe lecture. We present a mini-case to the students in which a textile plant suffers a major and sudden problem. Their job is to diagnose and solve the problem while the instructor plays the roles of various plant personnel. Students can ask a maximum of 12 questions. The application's goal is to show students that they "jump to conclusions," are too solution oriented, and thus ineffective problem solvers.

The results are always startling. This past semester one of the authors taught two sections of the MBA-version of the course. In one class, 10 of the 12 questions asked were solution oriented. The second class fared worse in that 11 of 12 questions were solution oriented. Unfortunately, EMBA students fare no better. Once the students experience "the jumping to conclusion bias" at work, they are truly ready to learn the Kepner and Tregoe method. (The majority of our EMBA students are experiential learners based on the Myers-Briggs Type Indicator.)

Each topic lecture begins with an opening application. A successful opening application must achieve at least one of the following goals. The hook should:

1. Show students that they already have some subject knowledge and the new material is not totally foreign. This can minimize students' anxiety about highly technical material;
2. Show students that they display poor problem solving or decision making skills; or
3. Display the power of new material—we call this the "gee-whiz" factor.

The opening application for the Kepner and Tregoe lecture achieves the second goal.

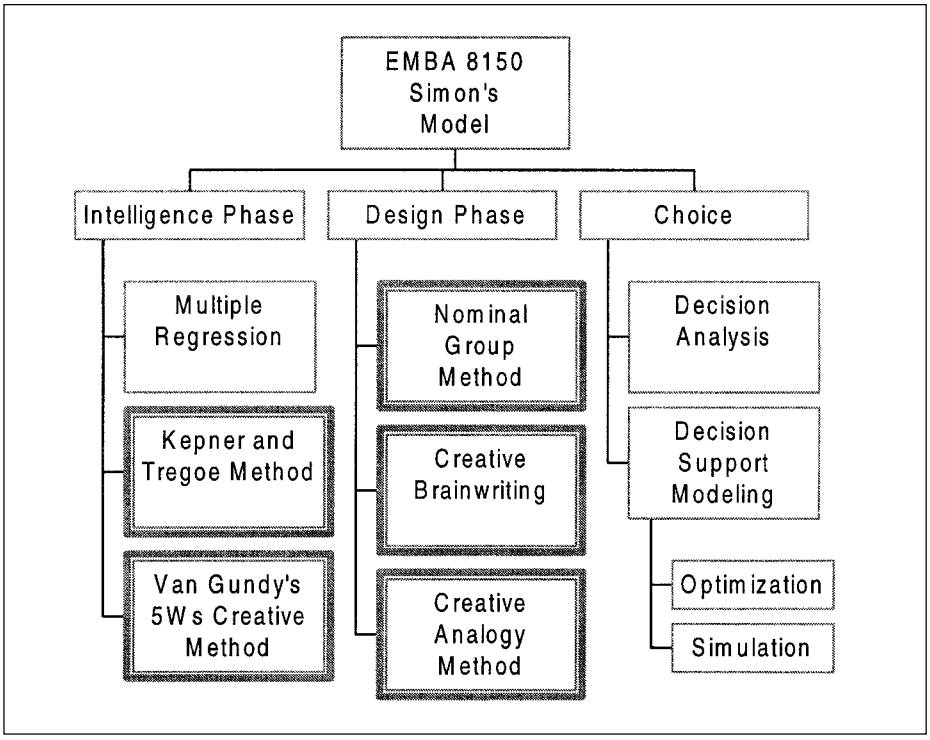

Figure 3: Hierarchical display of the course content.

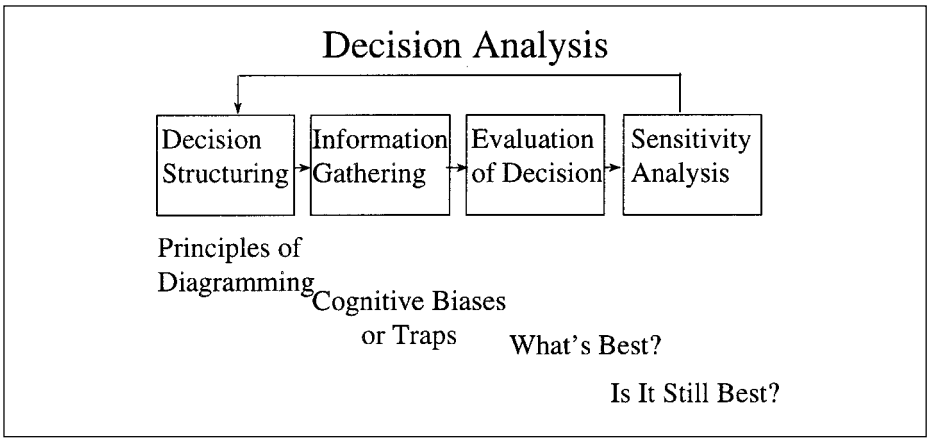

Figure 4: Layout of decision analysis lecture.

The Design Phase

The design phase constitutes 15% of the course content. Here students learn why individuals and groups have difficulty generating creative solutions. We focus on individual contributing factors such as one's Myers-Briggs profile (Myers & McCaulley, 1985) and group factors such as groupthink (Janis, 1972). Students then learn three creative methods to generate creative alternative solutions. Students learn how to modify these methods to appeal to decision makers with differing problem-solving styles based upon the Myers-Briggs Type Indicator. (We present the MBTI at the residency program prior to the beginning of the EMBA program; the Organizational Behavior course in the first semester further discusses problem-solving style.)

The Choice Phase

Here we return to the more traditional tools of decision analysis and decision support model building. Figure 4 displays the lecture flow of the decision analysis.

After presenting the principles of decision diagramming, we discuss the typical information, or cognitive biases, that managers can encounter in decision analysis. These include anchoring, wishful thinking, and noncoherency (Tversky & Kahneman, 1986). The instructor and students jointly develop procedures to minimize these (and other) biases. The unit concludes with how to conduct one-way and two-way sensitivity analysis using Excel.

Figure 5 displays the lecture flow for the model-building lecture. The presentation is straightforward, although we especially emphasize the various types of model validation. Students use Excel and its features such as Auditing, Solver, Goal Seek, Data Analysis Tools, and Scenario Manager to build, validate, and run their models.

Summary

Student teams must use one of the course's techniques to solve real problems at their own firms. Table 1 show a breakdown of projects over the past three years. The reason for the lack of decision analysis and modeling projects is clear. We present these topics last in the semester and there isn't sufficient time to develop a major project. However, after the semester's end the EMBA students have used decision analysis or built support models at their own firms. We believe that is why this course is rated as among the two most valued courses in the entire program.

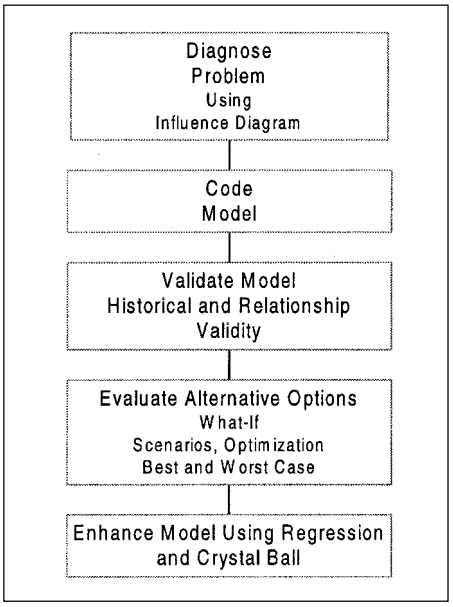

Figure 5: Layout of decision support modeling lecture.

Topic	Percentage
Quantitative: Multiple Regression Analysis	45
Logical: Kepner and Tregoe Method	30
Creative: Analogy and Nominal Group Method	25

Table 1: Breakdown of projects by decision science topic.

Table 1 indicates that the inclusion of logical and creative tools have contributed to the course's success. Fifty-five percent of the projects fall into these two categories. We are particularly pleased that one quarter of the projects have used creative methods.

Most of the creativity-based student projects have used the analogy method. (This is a simplified version of the highly effective but complicated creative method called Synectics [1981].) An analogy session begins by putting aside the true, or real, problem. The group facilitator begins by selecting an analogy that is an action-packed concrete dilemma that is totally unrelated to the real problem. Our two most effective analogies are getting a cat off of a roof and getting into a sold-out sporting event. The facilitator then has the group brainstorm about 50 solutions to the analogy. Groups often come up with outlandish ways of solving the analogy. At this point the session enters the *force-fit* phase. Here the facilitator brings back the original problem, randomly selects several analogy solutions, and asks the group to "force" the analogy solutions to solve the real problem. The group members do this individually and must write down all the ideas that pop into their minds. They are not allowed to evaluate or critique their ideas. At a later session the facilitator and the group review the force-fit solutions and flesh out the best ideas. Several semester projects built around the analogy method have reported major successes even when the participants in their companies entered the session with extreme skepticism.

In summary, the course's goals have always been to develop effective decision makers and provide the broadest possible survey of decision science tools. The innovative course has finally accomplished these twin goals.

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