Combining Cases and Computer Simulations in Strategic Management Courses

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ABSTRACT. In this study, the author compared the effectiveness of two different strategic management course designs: one centered on case discussions and the other combining a computer-based simulation with some cases. In addition to evaluation of the research literature, the study involved experiments with six course sections composed of 130 students, Both course designs produced statistically equivalent learning outcomes; there were no significant differences between the two course designs in any of the nine outcome measures, including objective measures and student perceptions.

A strategic management course is required for graduation in almost all colleges of business, usually as an integrating "capstone" course. Use of cases and computer simulations of a competitive industry are a major part of such courses. Although cases have a long and established history in strategic management courses, simulations have received attention more recently for both their increasingly sophisticated designs and their promotion of student interest. Consequently, I undertook this experimental research study to investigate how combining a computer-based simulation with cases affected student performance against learning objectives. This investigation involved evaluation of the research literature and then experimental testing of the relative effectiveness of two strategic management course designs: a traditional design centered on case discussions and a more novel one combining a simulation with some cases.

Cases and computer simulations are used widely. For example, one survey (Alexander, O'Neill, Snyder, & Townsend, 1986) showed that about 94% of instructors use case discussions at least to some extent in undergraduate strategic management courses. Another survey (Keefe, Dyson, & Edwards, 1993) found that almost 50% of a random sample of Academy of Management members currently teaching strategic management had adopted use of a computer simulation. Faria (1998) reported that 28% of a random sample of professors across all business disciplines were using a business simulation game during the semester in which the survey was conducted; however, 52% of those surveyed had used a simulation at some time, and only 7% of those reported stopping because of dissatisfaction with business games. Among schools accredited by the Association to Advance Collegiate Schools of Business (AACSB), 97% have used simulations in some way. Further, Faria found a trend of increased use of simulations compared with his results in an earlier (1987) survey.

Both case discussions and computer simulations are intended to provide active learning, in which students apply knowledge to practice. Both are consistent with John Dewey's (1966) injunction that "careful inspection of methods which are permanently successful in formal education . . . will reveal that they depend for their efficiency upon the fact that they go back to the type of situation which causes reflection out of school in ordinary life. . . . They give the pupil something to do, not something to learn, and the doing is of such a nature as to demand thinking" (p. 154).

There has been continuing debate about the relative effectiveness of cases and computerized simulations. However, the debate is less grounded than is desirable: Keys and Wolfe (1990) concluded, "Many of the claims and counterclaims for the teaching power of . . . games rest on anecdotal material or inadequate or poorly implemented research designs" (p. 311). Lundeberg, Levin, and Harrington (1999) stated, "Up until the mid-1990s, the match between the claims of case users . . . and a solid empirical research base was remarkably weak. . . . Essentially, the conversations about case-based instruction over the last two decades have been full of heat, but with very little light" (p. xiv).

Some professors and researchers prefer case discussions over simulations; some prefer the converse; and still others advocate an integrated mixture of

both. The research on the relative effectiveness of cases and computer simulations is limited and conflicting. Keys and Wolfe, in their 1990 review, cited several studies that conclude that students learned more from simulations than from case studies in strategic management courses; they also cited several studies in which cases were found to be the more effective approach. Examples of recent articles advocating simulations include Faria (2002), Prensky (2000), Tompson and Dass (2000), and Wolfe (1997); articles by Barnes, Christensen, and Hansen (1994); Levin (1999); Lundeberg et al. (1999); and Lynn (1999) advocate cases.

In Tables 1 and 2, I summarize some of the comparative advantages of cases and simulations, as articulated by various researchers and professors. In Table 1, I note similar advantages cited or inferred for both cases and simulations; in Table 2, I mention different advantages cited for each. This information, which is based on the work of various researchers and professors, shows many common positive factors or themes, along with a number of comparative advantages cited individually for case discussions and computer-based simulations.

Knotts and Keys (1997) concluded that, although much of strategic management may be taught with either cases or games, it is preferable to use both cases and a simulation for a variety of reasons. They concluded that simulations elicit greater responses from students than do case studies and are more effective in enhancing self-efficacy, whereas case studies are better at providing exposure to multiple industries and building written communication skills. Fripp (1993), although an advocate of simulations, concluded that "the best results are achieved when simulations are used in conjunction with other learning methods." In developing this conclusion, he makes use of his extended learning model, which he believes shows that "no one learning method is able to provide all the knowledge and skills required by managers" (p. 54).

A preliminary study by Teach (1993), using self-report questionnaires completed by business school graduates 3 to 5 years after graduation, concluded that both computer simulations and cases had made important contributions to the learning of skills important in the graduates' current jobs, with some differentiation in those skills best taught by each method. For example, his results indicated that simulations were most effective

TABLE 1. Similar Advantages Cited for Cases and Simulations

- Use previous course work in an integrated framework
- Encourage critical thinking
- Require thoughtful reasoning and analysis
- Improve decision making
- Present complexity and ambiguity, similar to real-life situations, in which there is seldom a single "correct" answer
- Involve active/experiential learning
- Facilitate skill transfer to work settings by supplying contexts built on existing knowledge
- Improve writing, with appropriate assignments
- Integrate various courses and topics into an interdisciplinary framework, allowing better application in the future
- Require critical thinking
- Improve decision-making skills
- Build skills in establishing long-run direction and selecting strategies
- Enhance interpersonal relations, learning, and teamwork experience
- Require involvement as a participant rather than a neutral observer
- Promote individual discovery in learning from the learner's own perspective

TABLE 2. Different Advantages Cited for Cases and Simulations

Advantages cited for cases

- Encourage higher-order cognitive thinking
- Introduce theoretical principles and techniques; better for acquiring theoretical and applied knowledge
- Enable students to discover and develop their own unique framework for approaching, understanding, and dealing with problems; help students deal with unstructured problems
- Provide opportunities for issue analysis, problem definition, evaluation, and comparison of possible solutions
- Help students learn from experience, including examples provided by case studies
- Help students learn about systems and situations that they may encounter in the future
- Can reflect the human side of an organization
- Encourage participation, debate, substantive discussions, and sharper support for one's conclusions with immediate feedback on one's conclusions and reasoning
- Allow students to learn from others' different conclusions and logic
- Provide extensive direct interaction among students and with the professor
- Shift attention to equal focus on content, process, and learning climate
- Avoid time loss and distraction in learning about a computer program

Advantages cited for computer simulations

- Help students develop some intuitive skills
- Produce learning on conceptual level
- Provide practice in developing alternative choices and modifying implementation
- Allow student to experience interactions among various parts of a system and decisions made considering part of the system
- Put students closer to the role of a decision maker with responsibility for results
- Permit students to test and see the consequences of their decisions, in contrast to recommending a course of action without ever knowing the results
- Adapt to changes and new situations
- Focus on current, rather than past, events
- Provide more realistic experience of making multiple successive decisions, seeing results, and receiving successive, concrete feedback
- Provide feedback (results) with internal validity and credibility
- Avoid possible embedded author biases in cases
- Provide more realism, emotional arousal, excitement, motivation

in teaching how to forecast and make decisions, plan and organize, adapt to new tasks, assess a situation quickly, and develop teams. Cases best taught how to put structure to unstructured problems, analyze problems and data, think creatively, and write effectively. Li and Baillie (1993), analyzing original data, commented that "perhaps the most interesting conclusion drawn from this study is that cases and complex games play a similar role in the business policy course" (p. 344). They concluded that "the best strategy might be to integrate both pedagogies and apply them concurrently" (p. 343).

It seems clear from the research and analysis in the literature that students in strategic management courses experience many positive outcomes from both cases and computer simulations, although there is some continuing debate about their relative advantages. However, the research shows increasing support for the idea that both have value and that a flexible combination of the two, adapted to specific course learning objectives, is appropriate.

Method

Experimental Conditions

To test two different course designs, I used six sections of a strategic management seminar taught at a large West Coast university from 2000 to 2002. One design, using the traditional case method (TCM), made primary use of comprehensive cases, which students read as homework and discussed in class. The second design, using computer simulation plus cases (CSC), replaced about half of the case work with a computer simulation.

The strategic management seminar is usually taken in the last semester of undergraduate work. The sections of this course, which are limited to approximately 25 students each, have a mixture of students from all seven majors in the college of business. The TCM course design is fairly traditional, similar to that popularized by the Harvard Business School. Cases for both course designs were comprehensive and taken from a textbook by Wheelen and Hunger (2000). The CSC course design also made use of the Business Strategy Game (Thompson & Stappenbeck, 1999), a computer-based simulation of companies competing in a global casual shoe industry. This simulation, in use for over 17 years, has been used at this university for over 5 years.

Teams of three students represent the top management team of a company in the shoe industry and make a series of eight "annual" decisions that, after being processed by the simulation software, determine the industry's competitive dynamics and each company's relative performance during the subsequent annual cycle. The simulation is fairly complex; each team makes a maximum of about 120 decisions during each cycle and must deal with variability in the environment caused by both the simulation and the effects of decisions made by the other teams.

I randomly assigned the two different course designs to sections. All six sections of the course were taught by the same professor (the author) and used the same textbook and the same cases (except for the three additional ones used in the TCM design); they all met twice weekly on the same days for classes that lasted 1 ½ hours, during semesters of 15 weeks, excluding finals. In Table 3, I summarize the allocation of class time and other background information. Approximately 11% of the enrolled students did not complete all the outcome measures (primarily because of absences on the day that most of the data were obtained) and so could not be included in the samples. The relatively small fraction of enrolled students thus excluded was about the same across the two design treatments and the six course sections, and the excluded students were very similar to those in the samples in terms of the background variables.

Course Learning Objectives

For its capstone strategic management course, a requirement for all bachelor of science (BS) degrees in the College of Business (one of the 10 largest in the country), the university has adopted the following five student learning objectives:

1. Improve skills in critical/strategic thinking.
2. Learn to think systemically (i.e., to think about the broader system involved and interactions within it when considering specific decisions).
3. Understand and integrate previous business course concepts to be able to apply the concepts in future business situations.
4. Develop the ability to analyze a complex business situation, identify key issues, and develop recommended strategies and actions necessary for implementation.
5. Improve ability to communicate (especially write) clearly, cogently, and effectively.

Other learning objectives are not listed explicitly, such as improving skills in working with others and in teams, and helping students prepare for successful

TABLE 3. Background Information on Course Sections

Item	TCM	CSC
Allocation of class time (%)		
Conceptual material and review	32	26
Case discussions	56	28
Simulation (in-class portion)	0	34
Examinations	7	7
Assessment and other	5	5
Other information		
Number of sections	3	3
Students enrolled	74	72
Students completing all measures	66	64

Note. TCM = traditional case method, and CSC = computer simulation plus cases.

careers after college. Approximately forty semester-long sections of this course are taught each year, some entirely case-based and some combining cases and computer simulations.

Clearly, decisions about pedagogy and evaluation of the effectiveness of a strategic management course depend on the learning objectives for a course, in addition to other factors such as instructor skills and preferences. Although the five objectives used in this study are associated with the author's university, they are very similar to and typical of objectives (a) mentioned in mainstream strategic management textbooks, (b) used by many other professors, and (c) cited by various researchers looking at the effectiveness of cases and simulations (e.g., Knotts & Keys, 1997; Li & Baillie, 1993).

Measures

I used nine outcome measures of two types: measures of objective learning (four variables) and student self-reports (five variables).

I used four different components as objective measures. The first three were students' written answers to questions relevant to the course, each requiring both knowledge and application of a strategic management concept: diagnosis, strategy formulation, and strategy implementation. The fourth component was the students' written response to a short business vignette, followed by a multipart question to prompt strategic thinking:

- What questions would you ask?
- What else would you want to know?
- What considerations and issues would you want to examine before making a decision in this situation?

Students wrote responses to each of these four components anonymously. Then a neutral outside party coded and randomized the sheets, and a different outside party, an individual experienced in teaching and evaluating strategic management materials, graded the papers. These four objective measures were supplemented by anonymous student evaluations of the extent to which the course helped the respondents learn/improve/develop (appropriate wording for the item) each of the five course learning objectives. They rated each component on a scale based on the following 5 anchors: 1 (*not at all*), 2 (*slightly*), 3 (*to a fair extent*), 4 (*significantly*), and 5 (*very much*).

Managing Researcher Bias Issues

I identified several possible sources of bias during the experimental design and took steps to eliminate or reduce their potential. One could first ask about slanted learning objectives. However, the learning objectives used for the courses and in the five self-report variables are those developed by the college, not the professor, and they are used for all of the approximately 40 sections of the strategic management course taught each year by 12 professors, each with individual choices about textbooks and course design. The learning objectives are typical of mainstream objectives in other colleges and seem to present no bias problems. Second, all six sections of the course used in the study were taught by the same professor (the author), raising the question of biased differences in the two course designs. I took the following steps to reduce this possibility: (a) using the same text, readings, lecture outlines, cases (although more were used in TCM sections), and course timing for each section of both designs; (b) avoiding case- or simulation-biased outcome measures; and (c) gathering the data only after I previously had taught each design multiple times. I did not have preferences between the two designs or pre-existing beliefs about their effectiveness. Most important, the alternative of using multiple professors would have introduced significant uncontrolled variability into the course designs, including the five variables listed in item (a) above. Third, the four objective variables were graded through a double-blind process, without my involvement. As previously explained, the students wrote answers anonymously, and then the sheets were coded and randomized by an outside party and graded by a different outside party.

Results and Discussion

I analyzed the data with SPSS version 10.1, using a one-way, between-groups (independent groups) design, with multivariate dependent measures. I summarize primary output from the analysis in Tables 4 and 5. Initially, I anticipated that a one-way multiple analysis of variance with post hoc comparisons might be necessary, with both treatment condition and class section as independent variables. The variations among sections within each of the two designs were small enough, however, that it was not necessary to retain class section as an independent variable.

One set of data analysis evaluated the potential variability among different sections with the same course design (treatment condition). In Table 4, I summarize means plus results from the analysis of variance on the three background factors and nine outcome measures for the three sections in each of the two treatment conditions. There were no significant differences for any of the background or outcome variables among the sections within each of the two course designs. As can be seen in Table 4, the smallest p values (i.e., observed levels of significance, which are the probabilities that differences as great as those observed would occur even if the null hypothesis were true) for any of the between-section analyses were .24 and .28 for the background and outcome variables, respectively. Therefore, because of this consistency among sections within each design treatment, I concluded that the data for all three sections within each of the two designs could be combined for the rest of the analysis.

In Table 5, I summarize the means and key statistical parameters for the two design treatments (pooling the sections within each treatment) on the background factors plus all nine outcome measures. The background factors were consistent for the two treatment conditions, with no significant differences (all had p values of .21 or greater). There were no significant differences in any of the nine outcome variables between the two treatments (the smallest p value was .31).

With respect to student preferences, it may be of interest that student responses in this study were strongly in favor of using a simulation as part of a strategic management seminar. The breakdown for anonymous, confidential responses to the question "What is your recommendation

TABLE 4. Evaluation of Variations Between Sections Within Treatments

Item	TCM course section and statistics						CSC course section and statistics					
	1	2	3	*M*	*F* ratio	*p* (sig.)	4	5	6	*M*	*F* ratio	*p* (sig.)
Background factors												
Number of students (sample size)	23	24	19				23	18	23			
Cumulative college GPA (4.0 basis)	2.96	2.81	3.02	2.92	1.463	.239	2.87	2.82	2.84	2.85	.074	.929
GPA at current university (4.0 basis)	2.94	2.78	2.98	2.89	1.076	.347	2.82	2.77	2.75	2.78	.100	.905
Sex (% female)	52	42	47	47	.251	.779	48	44	35	42	.413	.664
Means for student perception outcome measures (1–5 scale)												
Q1 (thinking strategically)	4.00	3.87	4.11	3.98	.468	.629	4.22	4.06	4.04	4.11	.461	.633
Q2 (thinking systematically)	3.96	3.67	3.89	3.83	.855	.430	4.00	3.94	3.96	3.97	.035	.966
Q3 (integrating previous courses)	3.65	3.50	3.79	3.64	.610	.547	3.61	3.67	3.39	3.55	.501	.608
Q4 (analyzing/developing recommendations)	4.39	4.33	4.21	4.32	.393	.677	4.39	4.17	4.22	4.27	.699	.501
Q5 (improving communication abilities)	3.61	3.37	3.74	3.56	.715	.493	3.52	3.44	3.26	3.41	.514	.601
Means for objective outcome measures (0–20 scale)												
Q6 (diagnosis question)	17.6	17.4	17.7	17.6	.150	.861	17.2	17.3	17.2	17.2	.027	.973
Q7 (strategy formulation question)	17.3	16.8	17.3	17.0	.415	.415	17.4	17.1	17.3	17.3	.110	.896
Q8 (implementation question)	16.5	16.5	16.7	16.6	.062	.940	16.5	16.8	17.0	16.8	.736	.483
Q9 (strategic thinking vignette)	15.5	14.8	15.3	15.3	.630	.536	15.0	14.3	14.8	14.8	1.304	.279

Note. TCM = traditional case method, and CSC = computer simulation plus cases.

TABLE 5. Summary of Treatment Effects

Item	TCM (N = 66)	CSC (N = 64)	F ratio	p (sig.)
Background factors				
Cumulative college GPA	2.92	2.85	.941	.334
GPA at current university	2.89	2.78	1.585	.210
Gender (% female)	47	42	.297	.587
Means and statistics for student perception outcome measures (1–5 scale)				
Q1 (thinking strategically)	3.98	4.11	.959	.329
Q2 (thinking systematically)	3.83	3.97	1.043	.309
Q3 (integrating previous courses)	3.64	3.55	.323	.571
Q4 (analyzing/developing recommendations)	4.32	4.27	.210	.648
Q5 (improving communication abilities)	3.56	3.41	.856	.356
Means and statistics for objective outcome measures (0–20 scale)				
Q6 (diagnosis question)	17.6	17.2	.824	.366
Q7 (strategy formulation question)	17.1	17.3	.311	.578
Q8 (implementation question)	16.6	16.8	.579	.448
Q9 (strategic thinking vignette)	15.2	14.8	.875	.351

Note. TCM = traditional case method, and CSC = computer simulation plus cases.

regarding using this simulation in the next course?" from the 22 teams that participated in the computer simulation was as follows: seventeen (77%) for "definitely yes," 4 (18%) for "somewhat yes," and 1 (5%) for "somewhat no" (from a team finishing last in its competitive industry) on a 4-point scale ranging from 1 (*definitely no*) to 4 (*definitely yes*). These responses and additional anecdotal feedback (see Table 6 for some examples) indicate that the students generally liked having a computer simulation as part of a strategic management course, even though they also reported that it is a "lot of work" to learn and master. The positive, favorable reactions in this study to the use of a simulation are similar to those reported by Tompson and Tompson (1995) in student surveys in two types of strategic management courses; Stone (1995), in a survey of both faculty members and students; and Walter, Coalter, and Rasheed (1997) in an analysis of student evaluations.

Conclusions and Recommendations

It was encouraging that both the evaluation of the literature and the results from the field experiments in this study produced the following consistent results:

- Both case discussions and computer simulations have value.
- Neither is a panacea or has general superiority over the other.
- Among students using the two course designs (with and without a simulation), there is no difference in performance based on the central learning objectives adopted for the courses in this study.
- An instructor has considerable flexibility to choose the relative emphasis given to cases and a simulation.

Relative to the last point, it may be concluded that various factors could be considered in deciding on the use and relative scope of computer simulations and cases in designing a strategic management course. These factors might include the mission and objectives of the college; learning objectives for a particular course; instructor strengths, style, and preferences; student reactions and preferences; and logistical factors such as student access to computers with appropriate software.

Learning objectives for a specific course—which should be in alignment with objectives of the department, college, and university—clearly are the cornerstone for designing a course. Integrated course design models in common use today (e.g., Diamond, 1998; Fink 2002) typically establish the learning objectives, then identify and develop corresponding techniques for feedback and assessment, and finally decide on appropriate teaching and learning activities. It is not hard to imagine some objectives and assessment techniques that would have a definite bias toward either case or simulation activities. However, it seems clear that there is considerable flexibility in the learning activities that effectively could support mainstream learning objectives typical of strategic management courses. A professor has considerable flexibility to choose the relative emphasis given to each. Some suggestions about fits between learning objectives and use of simulations and cases follow.

More extensive use of case discussions is appropriate when course objectives and conditions such as the following are paramount:

- Learning about major conceptual concepts and models in the field;
- Establishing a close connection with student ideas and responses;
- Providing substantial interaction and immediate feedback between students and the professor about analysis, ideas, conclusions, and recommendations dealing with typical situations;
- Emphasizing individual student performance; and
- Providing students with an introduction to a number of types of organizations and situations that they possibly might encounter in their careers.

In contrast, complex computer-based simulations have advantages when course objectives include the following:

- Experiencing more realistically the role and responsibilities of a top decision maker in trying to position his or her organization in a tough, competitive environment;
- Experiencing the uncertainties and surprises produced by the unpredictable actions of competitors; and
- Promoting student emotional arousal and involvement.

Strategic management courses provide an interesting, stimulating challenge for both professors and students. Ongoing improvements in course

TABLE 6. Themes and Examples of Student Comments About the Simulation

Theme 1. The simulation helped students understand and integrate previous business course concepts in ways that enabled them to apply the concepts in future business situations.

- It was helpful in applying theories taught across different disciplines in the school of business.
- It opened up our minds to the many different subjects learned, and we had to apply them to different situations.
- It made it more enjoyable to understand other course material.
- It is an effective learning tool for students to apply what we have learned to all aspects of business management.
- It helped us apply these techniques and methods to a simulated industry with feedback and results.
- It provides an educational experience in which we can use all the different business functions . . . and learn how they relate to one another in a competitive environment.

Theme 2. The simulation provided a real-world, hands-on experience in strategic thinking and dealing with competition and uncertainty.

- It allows students to think for themselves and apply theory to real-world situations.
- It aided in obtaining a tangible feel for running a major operation against aggressive competitors.
- The uncertainty about the future, as well as not knowing what position competitors would take, forced us to more carefully analyze our strategic decisions.
- It offered an interesting way to learn competitiveness in the business environment.
- It realistically simulated the operations of a global company and incorporated many of the major problems that face a business.
- It exposed us to real-world situations in which ratios and decisions made a difference in the end result.
- It is a very unique way to grasp a hands-on experience of conducting a business.

Theme 3. The simulation provided more experience in team work and working with others.

- It allowed us to work in groups and forced us to organize our time wisely.
- Deadlines had to be met; work had to be organized; getting along and doing the best you can were a must.
- It is based on group activities, and it is helpful for critical thinking.
- It is a good way to integrate learning, team-building politics, and competition.

Theme 4. The simulation was interesting and fun.

- The game is exciting, far more than sitting and listening to a lecture.
- It is a fun and interesting way to learn about the management of a company and how different strategies can be applied.
- It was very interesting to play the game and see where our decisions led our company.

design and process require effective use of a variety of pedagogical techniques. This study provides data-based support for the conclusion that a professor has considerable flexibility in choosing between course designs based on case discussions and designs that combine a computer simulation with case discussions. In other words, both designs are equally valuable in achieving mainstream learning objectives.

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