Is Case Teaching More Effective than Lecture Teaching in Business Administration? An Exploratory Analysis

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Case teaching is said to better motivate students and to transmit managerial information to students more effectively than lecture teaching. Field experimentation performed to quantify the effects of case teaching compared to those of lecture teaching supports the hypothesis that case teaching is more effective than lecture teaching with regard to attaining cognitive as well as motivational aims in the classroom.

Case teaching is based on an extended tradition that is epitomized by the Harvard Business School case method. In Germany, the case-teaching method was not used before the late '60s [Mertens 1971], and even today cases are used predominantly to illustrate facts or procedures taught in lectures and not as the basis of an inductive learning process [Perlitz and Vassen 1976].

The advocates of case teaching in Germany, for example, Backhaus and Plinke [1977] and Kossbiel and Seelbach [1982], hypothesize that such inductive teaching methods motivate students more than traditional lecture teaching. As a consequence, they believe, students acquire cognitive skills and managerial abilities more effectively through case teaching than through lecture teaching.

Cases as Pedagogical Tools

Universities and other training institutions use real-world case studies as pedagogical tools to bring problems and approaches from the managerial world to the classroom. Cases provide material with which one can practice decision making; therefore, cases may be classified as tools that allow one to simulate managing a company. Several teaching

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approaches use cases, for example, Towl [1969], Dooley and Skinner [1977], and Hughes [1978]. All teach cases as Bonoma [1985] defines it. However, they use cases in different ways.

Case-teaching methods can be classified according to the way they use cases. Some use cases to demonstrate real-world practices and to liven up their teaching, and others use cases as the foundation of an integrated inductively driven teaching process.

Teachers following the first approach usually try to illustrate facts or procedures taught through a deductive teaching process with demonstration cases. The teaching process is deductive in the sense that the teacher starts with general rules and derives specific recommendations from them.

Teachers following the second approach usually use a different type of case (a problem case or a Harvard Business School case) as an inductive basis for teaching. The learning process under these conditions is much more inductively driven because the students are asked to develop general rules of problem solving from specific problem-handling experiences. Because they are open ended, problem cases are much more suitable for management education than demonstration cases [Towl 1969], although both are suitable for transmitting real-world information to students. In the two approaches, the role of the students is quite different; within a deductive teaching process, students are basically passive recipients; whereas, within an inductive teaching process, students are active participants. In an inductive learning system, students regularly transmit information about their learning to the teacher and to other students; thus, the teacher is aware of what and how students are learning.

The purpose of writing a demonstration case is to show how a specific manager acted (correctly) in the past. Within such cases, all pitfalls are more or less ignored or disguised; the cases are instruments of public relations. In contrast, problem cases are not written to show how effectively management dealt with the problem; cases of this type are written to enable readers to identify and solve the problems management faced. They put the burden of analysis and decision making on the reader.

Planning case teaching follows the same steps as planning lecture teaching: formalizing overall aims and specific aims, selecting course contents, developing teaching material, designing tests and exams, and so forth. Whereas different teaching materials can easily be integrated into lectures, they cannot be so easily integrated in case teaching courses. In both methods, good integration of the course elements is important; systematically organized material is far easier to learn than unorganized material [Mednick, Pollio, and Loftus 1975].

Lectures can follow the logical structure of the material. Courses taught in an inductive way follow a somewhat different approach. The material should be arranged in a way that makes psychological sense in order to help students internalize information. The course outline should take into consideration the fact that mental problem solving does not proceed in a straightforward manner but in circles [Simon 1966], that is, through repeated

analysis of the teaching material. In deductive teaching, one problem is treated more or less exhaustively before another problem is attacked; in inductive teaching, all problems under discussion are dealt with in parallel, that is, one works on problem A, then on problem B, then one comes back to problem A, and so forth. In addition, the students and the professor share the responsibility for driving the inductive process: they must interactively gauge the ongoing flow of content and process.

The Aims and Design of the Study

My basic goal was to test the hypothesis that problem case teaching is more effective than lecture teaching. The criteria used to evaluate teaching and learning processes have been taken from the teaching goals taxonomy developed by Bloom [1969]. This general assumption led to the following hypotheses (for more detail, see Böcker and Schwerdt [1985]):

— H1: Case teaching develops the ability to reproduce knowledge and learned skills better than lecture teaching.

Standard written tests were used to quantify reproduction of knowledge and learned skills. The results have been rated on a 13-point scale from 1 to 5 (1,0; 1,3; 1,7; 2,0; 2,3; . . . 4,7; 5,0); 1 indicating the best level and 5 the worst.

— H2: Case teaching develops the ability to apply knowledge and learned skills to unknown problems better than lecture teaching.

Knowledge and learned skills are put into operation in analyzing problem cases. The student's ability to analyze a managerial problem can be tested through written case analyses in exams. The results have again been rated on a 13-point scale ranging from 1 to 5.

— H3: Case teaching motivates students to learn managerial information more than lecture teaching does.

Motivation is commonly considered a prerequisite for any cognitive process [Berlyne 1960]. To get diagnostic indicators on the motivational level of the students in the four classes, I subjected them all to the thematic apperception test devised by Murray [1938] and reformulated by Heckhausen [1963]. This test is well accepted in pedagogical research [Derner 1984]. Six standard pictures (transparencies) showing difficult personal situations are shown to the respondents who are then asked standard questions. From the results, net hope and gross motivation indices are derived. The respondents are exposed to the pictures through a standard procedure (tachistoscope, six seconds per transparency) described by the test authors [Murray 1938; Heckhausen 1963] who also provide exact coding advice. After looking at the transparencies, the respondents were asked four questions: "What is happening there?" "How did this situation develop?" "What are the individuals considering?" "How will the process go on?" The respondents' answers were coded by an experienced researcher and condensed to the indices "hope to succeed" (HS) and "fear to fail" (FF) with both rated between 0 (no hope or no fear) and 7 (maximum hope or maximum fear). Finally, I developed a net hope index *NH* and a gross motivation index *GM*. $NH = HS - FF$ and indicates how much positive motivational forces exceed negative. Gross

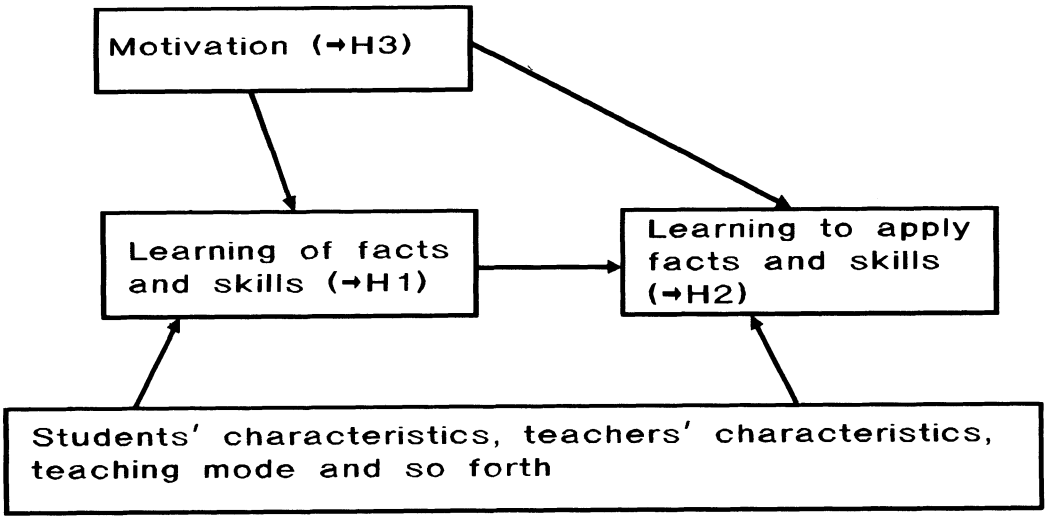

Figure 1: System of theoretical constructs used.

motivation is given by $GM = HS + FF$. Both factors are thought to be positively correlated to learning progress [Heckhausen 1963].

The three hypotheses we used are parts of the overall theoretical system shown in Figure 1. If all three hypotheses are confirmed, we can conclude that case teaching is more suitable than lecture teaching for teaching business administration; at a minimum this conclusion should be valid for the courses evaluated. I tested all three hypotheses in a parallel group experiment at the University of Regensburg: two groups of graduate students worked with problem cases (with a high level of student-teacher interaction) and two groups heard lectures (with a low level of student-teacher interaction). The course topic for all groups was marketing planning and control. Each course ran for 40 hours. The 62 students involved were divided into classes of 17, 15, 18, and 12. No students had prior experience with case analysis. The aims, the reading lists, and the teacher for all four classes were identical.

Since I was interested in the improvement in the students' ability to reproduce knowledge and their ability to apply knowledge or learned skills, I used their test scores at the beginning and at the end of the course for both traits. The two differences were used as interesting dependent variables for the cognitive variables. Development of the ability to reproduce or to apply knowledge is supposed to be dependent upon the teaching method (either lecture teaching [1] or case teaching [0]), students' motivation at the beginning of the course, students' bachelor's exam grades, and students' intelligence levels. Intelligence was quantified using Amthauer's intelligence structure test with four indicators [1955]: verbal intelligence, associative intelligence, mathematical intelligence, and visual intelligence. The design of the study is shown in Figure 2.

Results

The variables analyzed, the models

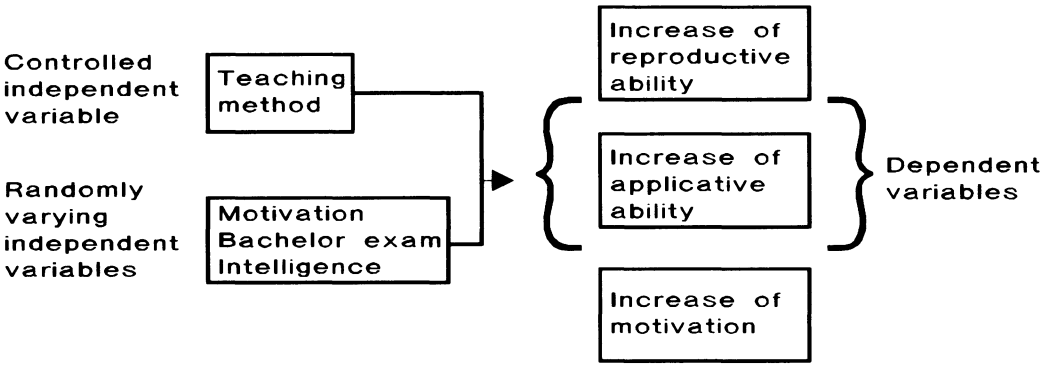

Figure 2: Structure of the study.

tested, the raw averages of the indicators and the results are shown in the appendix. The estimation results are consistent, [Churchill 1983], and easy to interpret. Here are some relevant conclusions:

— The teaching mode used has a significant effect on the students' motivation and has some impact on learning. In general, case teaching produces more effective learning than lecture teaching.

— The bachelor exam grade does have a significant correlation with motivation and learning. A good bachelor exam is favorable for learning additional facts (INCR), but unfavorable for increasing motivation (INCN) (these individuals are highly motivated from the beginning).

— Motivation favors learning to apply knowledge and skills but not learning to reproduce knowledge and skills. This result is not hard to understand since the learning constructs (learn to produce knowledge, learn to apply knowledge) are a function of the two motivational constructs (hope to succeed, fear of failure) whereby $HS + FF = GM$, and $HS - FF = NH$. From the findings stated, the *GM* and *NH* definitions and further analyses, we may draw the following conclusions: The higher the index "fear of failure" *(FF)*, the less improvement students show in learning knowledge and skills or in applying them. The higher the index "hope to succeed" (*HS*), the greater the progress students make in learning to apply knowledge and skills but the less progress they make learning to reproduce the same phenomena.

— Motivation is not dependent on intelligence (as quantified by Amthauer) in any statistically significant way.

Restrictions and Suggestions

Pedagogical research at the university level is difficult since the samples and subsamples are usually small and heterogeneous, and the set of influence factors is not completely known. As a consequence, the findings are statistically not conclusive. The following points are exploratory rather than conclusive.

One major restriction of our findings is that the variable "teacher" has not varied. Thus, the findings may be due to a teacher-method interaction: some teachers

may be better at teaching cases than others or just like the method more. To avoid this type of artifact, more extended research is necessary. We should investigate interdependencies between teachers, students, and course environment (program, graduate or undergraduate, prior experience in business and with cases, and so forth). Some subjects may be more suited to case teaching than others, for example, market planning may be more effectively taught through case teaching than marketing research.

The sample size may be too small. However, since we consider the influence of the teacher and the subject, the study's design is very big even without bigger student samples. External validity of results and the effort involved must be balanced. In the future, more attention should be paid to external validity.

There is also some problem with the validity of the theoretical constructs "ability to reproduce knowledge and learned skills."

Even given these limitations, we can conclude that problem case teaching stimulates learning more than lecture teaching. These hypotheses have been tested for a course on market planning, which included some technical sessions on planning techniques based on decision calculus models [Little 1970; Lodish 1971]. At a minimum, conclusions hold for the teacher involved and the subject taught. I suppose that the superiority of case teaching holds for most teachers pursuing a problem-based and solution-oriented teaching style, that is, teaching not primarily directed toward developing taxonomy, definitions, and so forth. I would not think that case teaching is superior to lecture teaching for all subjects and goals. Some informal experiments show that case teaching is especially fruitful in advanced courses devoted to developing the ability to apply techniques and derive solutions for ill-structured problems [Simon 1966]. This is primarily due to the fact that cases motivate students more than lectures to develop solutions.

Cases motivate students to learn; thus, case teaching yields better results. However, case teaching requires the teacher to spend more time preparing the course, and it requires more time for students to get through a specific topic. Thus, the question of teaching efficiency (efficiency = results/input) is still open.

APPENDIX

The variables analyzed follow:

INCR = increase in ability to reproduce knowledge and learned skills;
INCA = increase in ability to apply knowledge and learned skills;
INCN = increase in net hope;
TM = teaching method (*TM* = 1: case teaching; *TM* = 0: lecture teaching);
IQ1 = intelligence factor 1 ("verbal intelligence");
IQ2 = intelligence factor 2 ("associative intelligence");
IQ3 = intelligence factor 3 ("mathematical intelligence");
IQ4 = intelligence factor 4 ("visual intelligence");
GMB = gross motivation at the beginning of the course;
GME = gross motivation at the end of the course;
NHB = net hope at the beginning of the course;
NHE = net hope at the end of the course; and

Variable	Groups							
	1		2		3		4	
	Lecture Teaching		Case Teaching		Lecture Teaching		Case Teaching	
INCR	0.65	(0.77)	0.70	(0.89)	1.18	(0.64)	1.47	(0.99)
INCA	1.09	(0.97)	1.56	(0.46)	1.28	(0.85)	1.51	(1.23)
INCN	0.00	(2.50)	1.75	(3.21)	–6.00	(5.29)	2.50	(2.52)
TM	0	(0)	1	(0)	0	(0)	1	(0)
IQ1	111.2	(3.03)	107.5	(4.77)	111.4	(6.70)	107.5	(8.53)
IQ2	109.8	(4.63)	111.7	(5.81)	108.6	(4.39)	105.5	(0.50)
IQ3	110.9	(7.89)	112.1	(10.19)	108.6	(7.20)	103.2	(5.84)
IQ4	108.7	(6.62)	109.4	(10.16)	106.7	(7.95)	107.3	(7.75)
GMB	14.00	(4.30)	11.75	(5.26)	15.50	(2.52)	12.0	(0)
GME	13.70	(4.30)	13.00	(3.87)	12.00	(2.80)	11.00	(0)
NHB	–2.60	(4.70)	1.15	(3.46)	6.0	(0)	–0.50	(2.52)
NME	–2.60	(6.54)	2.90	(7.17)	0.00	(5.29)	–3.0	(0)
BG	2.91	(0.34)	2.94	(0.70)	3.48	(0.37)	3.60	(0.32)

Table 1: Mean and standard deviations (in parentheses) of the relevant variables.

BG = bachelor exam grade (1 = best; 5 = worst).

The models tested were

$$\left.\begin{matrix} INCR \\ INCA \end{matrix}\right\} = f(TM, IQ1, IQ2, IQ3, IQ4, GMB, GME, NHB, NHE, BG);$$

$$INCN = f(TM, IQ1, IQ2, IQ3, IQ4, GMB, NHB, BG).$$

The mean and standard deviation (in parentheses) of the relevant variables are shown in Table 1. For all the variables except *BG* (bachelor's exam grade) the higher number indicates more or better. The slight superiority of the case-teaching style is apparent.

The three hypotheses were tested using covariance analysis [Green and Tull 1978] with the teaching mode as the fixed effect independent variable and the bachelor's exam grade, the four intelligence coefficients, and the students' motivation indices as random effect independent variables. The differences between the students' entrance and exit scores on exams were used as dependent variables.

I ran ordinary least squares *OLS* estimations with 10 independent variables for *INCR* and *INCA* and eight independent variables for *INCN;* those variables with a *t*-value above 1.0 were used for another *OLS* estimation (1.0 was used for practical purposes; this selection level is less restrictive than the significance level). Two independent variables for *INCN*, four for *INCA*, and five for *INCR* were selected following this procedure. For these sets of independent variables, the number of respondents was sufficient. Since the correlation coefficients between the three variables *INCR*, *INCA*, and *INCN* was at a maximum 0.14 (for *INCR-INCA*), regression analysis was suitable and canonical analysis was not adequate. The parameter estimates and the coefficients' standard deviations are shown below. With the independent variables not correlated (maximum: $r = 0.36$), the coefficients are easy to interpret.

$$INCR = \underset{(0.539)}{0.587}\ TM - \underset{(0.058)}{0.144}\ IQ1 + \underset{(0.037)}{0.037}\ IQ2 - \underset{(0.074)}{0.190}\ GMB - \underset{(0.541)}{1.210}\ BG.$$

(** marks the significant coefficients)

$$F = 2.16\ (\alpha \approx 0.09).$$

$$INCA = \underset{(0.732)}{1.000}\ TM - \underset{(0.120)}{0.0206}\ IQ2$$

$$+ \underset{(0.058)}{0.156}\ NHB + \underset{(0.037)}{0.064}\ NHE.$$
$$\begin{matrix} *** & * \end{matrix}$$

$F = 2.61\ (\alpha \approx 0.05).$

$$INCN = \underset{(2.906)}{10.583}\ TM + \underset{(1.853)}{3.507}\ BG.$$
$$\begin{matrix} *** & * \end{matrix}$$

$F = 7.17\ (\alpha \approx 0.001).$

(*indicates a variable significant at the 10 percent level; **a variable significant at the five percent level; and ***a variable significant at the one percent level.)

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