

BEYOND CRITICAL THINKING AND DECISION MAKING: TEACHING BUSINESS STUDENTS HOW TO THINK

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Teaching students how to think is a universal goal of educational institutions. Business schools have addressed this goal by injecting critical thinking activities into their programs, and by offering courses on managerial decision making. This paper reviews these efforts, and concludes that they are not adequate to the challenge of teaching business students how to think effectively. It proposes a comprehensive thinking skills program that includes critical thinking and decision making content, but also addresses the many other thinking tasks managers perform. The paper discusses programmatic issues and provides pedagogical advice pertaining to the teaching of thinking skills in business schools.

Keywords: *critical thinking; decision making; management education; problem solving; teaching of thinking.*

A consistent finding and concern raised by studies of the American educational system is that students at all levels are unable to think effectively (National Commission on Excellence in Education, 1983; U.S. Department of Education, 1990). They cannot understand challenging texts or complex issues; their reasoning is often illogical and they do not critically assess

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JOURNAL OF MANAGEMENT EDUCATION, Vol. 27 No. 1, February 2003 24-51
DOI: 10.1177/1052562902239247
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arguments; they solve problems in a rote formulaic way, rather than through creative strategies grounded in sound analysis; and their decisions reflect biased appraisals that satisfy no plausible norms of rationality. This concern is echoed in studies of management education (Porter & McKibbin, 1988) and business school disciplines (cf. Accounting Education Change Commission, 1990) that urge programs to develop students' higher order thinking skills.

Although conscious, high-level thinking goes by many names (reasoning, problem solving, and decision making, among others), it is essentially mental processing that uses one's knowledge and intellectual capacities to achieve certain goals. The importance of thinking for humankind can hardly be disputed: Language and thought, conjoined in a mutually reinforcing relationship, are the twin foundations of our success as a species (Pinker, 1997). The lesson that good thinking, informed by knowledge, promotes goal achievement is continually reenacted in our personal lives, in matters that range from planning a vacation to repairing a clothes dryer to buying a car. The lesson applies to organizational affairs as well, though here there has been, at times, a tendency to overstate the power of thought, ignoring human cognitive limitations and the complexity of our environment (Weick, 1983). These limitations notwithstanding, effective thinking is a key to management success, being implicated in virtually every task or function managers perform. Indeed, thinking is especially important to management, an organizational role that requires incumbents to deal with exceptional cases, incidents that cannot be handled by established procedures, and situations that necessitate deliberative, and often innovative, thought.

Business schools that have accepted the challenge of teaching their students how to think typically address this task in one of two ways: by teaching critical thinking and through courses in managerial decision making. Mirroring its rise to prominence throughout the educational system, critical thinking has emerged, during the past several decades, as a salient element of business school pedagogy. Though rarely taught in dedicated courses, critical thinking suffuses management education. Decision making, on the other hand, has long been an established part of business school curricula.

There is considerable value in teaching business students how to think critically and make decisions. It is argued in this article, however, that the best available treatments of these subjects, even when conjoined, are inadequate to the task of teaching business students how to think effectively. Much of what is taught in managerial decision-making courses is specialized technical material that can rarely be applied in organizational contexts. On the other hand, most of what business students are taught as critical thinking is so nebu-

lous that there is little content to be applied at all. The most serious inadequacy by far is lack of breadth: There is much more to effective managerial thinking than has been recognized by the decision-making and critical-thinking perspectives. Neither approach responds to many important thinking tasks that managers encounter.

One purpose of this article is to create awareness of the need to teach business students how to think. The limitations of the critical-thinking and decision-making approaches to managerial thinking are also demonstrated in this article. A final purpose is to present a thinking-skills program for business students that possesses the necessary comprehensiveness and depth of content.

In the next section, critical thinking and the way it has been taught in business schools is discussed. The section following does the same for managerial decision making, discussing the virtues and limitations of this material from a thinking-skills perspective. With these approaches as backdrop, a comprehensive account of what business students need to know about thinking is presented. This account is organized around content area topics, each encompassing relevant concepts, skills, methods, and heuristics. This account is followed by a section where programmatic and pedagogical aspects of thinking-skills instruction in business schools are discussed. The article's contents are summarized in a short concluding section.

Critical Thinking

During the past several decades, critical thinking has become a ubiquitous presence in educational programs at all levels of instruction. Critical thinking is a form of higher-order thinking—consciously controlled reflective thought that draws on, but can be distinguished from, lower-order cognitive processes like perception, attention, and memory. Ennis (1991, p. 6) defined critical thinking as “reasonably reflective thinking that is focused on deciding what to believe or do.” Widely cited in the critical-thinking literature, this definition is suitable for current purposes.

THINKING CRITICALLY

Scholars agree that critical thinking has both cognitive and attitudinal dimensions: One must know how to think critically, and one must be inclined to do so on appropriate occasions. Knowing how involves possession of certain skills (as for analyzing arguments) and related knowledge of strategies, methods, heuristics, concepts, and principles. The attitudinal side of critical

thinking is referenced by Siegel's (1990) notion of the "critical spirit." It also is expressed in claims that critical thinkers exhibit certain mental dispositions (Ennis, 1996b) or "perfections of thought" (Paul, 1989)—for instance, thinking that is clear, precise, relevant, deep, fair, and complete.

Critical thinking is a familiar presence on college campuses, typically being taught in general education programs or through philosophy or communication courses. The prevalence of courses is matched by an abundance of critical-thinking texts (e.g., Barry & Rudinow, 1994; Ennis, 1996a). Although these texts have varying orientations—Halpern (1996) features psychological material, whereas Fogelin (1982) emphasizes informal logic—there are strong commonalities of content. Instruction centers on the following four topics (Adler, 1991):

- reasoning, with logic being taught as a normative standard;
- argumentation, reason-giving discourse on an issue;
- fallacies, common mistakes in reasoning; and
- language, the medium in which reasons and arguments are expressed.

Many texts include chapters on inquiry, especially the scientific method, and problem solving and decision making. Major topics are elaborated and taught in the form of concepts, principles, strategies, methods, heuristics, and skills. Thus, by taking a critical-thinking course, students come to understand concepts from deductive logic, they develop skills used to analyze arguments, they learn to recognize when an argument "begs the question" or makes a fallacious "appeal to ignorance," and they see how linguistic vagueness and ambiguity can result in mistaken conclusions.

In addition to its prominent curricular status, critical thinking derives prestige from being an intended effect of instructional activities: Educational institutions want their graduates to be critical thinkers. Consequently, even when critical thinking is not explicitly taught, it is encouraged. Instructors foster in-class discussions and debates on the grounds that these promote critical thinking. They devise student projects and write open-ended exam questions with the same intent. Texts in many fields include critical-thinking questions, exercises, and cases at the ends of chapters. Indeed, critical thinking has become an honorific—a term of approval, similar to a field being regarded as "scientific"—that is employed in and used to commend, texts, courses, programs, and other instructional activities. When a concept has this aura, it tends to be overapplied. The educational system's extolment of critical thinking has resulted in critical-thinking artifacts and activities that have no discernible effect on higher-order thought.

CRITICAL THINKING AND MANAGEMENT EDUCATION

What role has critical thinking played in management education? For the most part, its presence has been in spirit rather than content. No critical-thinking text has been written specifically for business students. Though a few schools may include critical-thinking courses in their curricula, this is the exception, not the rule. Indeed, critical-thinking content is rarely taught explicitly in dedicated instructional modules or lessons. Instead, business school faculty integrate critical-thinking material into content-area courses, developing student thinking skills through assignments and classroom activities. Clabaugh, Forbes, and Clabaugh (1995) used case studies to develop critical-thinking skills in a professional selling course. Ronchetto and Buckles (1994) taught total quality management techniques to promote critical thinking in a service-marketing course. Malekzadeh (1998) used writing assignments to promote critical thinking in a course that introduced undergraduates to the world of business.

Arguably, current business school efforts are aimed primarily at developing the critical spirit (encouraging students to be reflective and evaluative) rather than at teaching critical-thinking content and skills. Though potentially beneficial, these efforts are unlikely to develop students' critical-thinking capacities to their fullest. And in an educational environment that promotes critical thinking as "a good thing," there is a danger that this label will be employed indiscriminately so that, at some point, critical thinking becomes an empty educational gesture.

Is critical thinking, as traditionally conceived and taught, adequate to the needs of managers? If not, how might it be developed toward this end? One line of development, focused on the critical spirit, argues that business students must acquire a skeptical, inquiring attitude that challenges prevailing worldviews and assumptions. Within the critical-thinking movement, this approach is exemplified by the work of Richard Paul (1993). Paul de-emphasizes content knowledge (as of formal logic and the fallacies) taught in traditional critical-thinking courses, trying instead to help students think "dialogically": One must overcome personal and cultural biases and fairly consider issues from multiple points of view. Paul's distinction between weak- and strong-sense critical thinkers reflects his dissatisfaction with the mainstream critical-thinking approach.

CRITICAL MANAGEMENT PEDAGOGY

More directly concerned with helping business students develop a critical attitude, critical management pedagogy (CMP) (Reynolds, 1997, 1999b) is

an emerging program that calls for a fundamental reorientation of management education. It is closely associated with critical management studies (Alvesson & Willmott, 1992), research that subjects management and other business functions to the kind of critique theorized by Jürgen Habermas (1971).

CMP is opposed to the vocationalism and instrumentalism of traditional management education (Reynolds, 1999b). Mainstream management education teaches concepts and techniques that are intendedly instrumental toward the goal of organizational effectiveness; students learn how to help companies become more profitable. CMP has little interest in such instrumentalities, claiming that management education should focus on organizational ends, not the means of achieving them. Although a primary intent of CMP is for students to become more critical, this goal is not to be understood in conventional critical-thinking terms. Beyond the desire, shared with Paul and others, that class time be filled with student questioning and dialogue, CMP helps students problematize their experiences so they question assumptions about existing social practices and arrangements (Grey, Knights, & Willmott, 1996). CMP endorses a skepticism fueled by postmodernist dissatisfaction with the dominant institutions (science and corporate capitalism) of Western civilization.

Although quite different from critical thinking, CMP is an attempt to promote the critical spirit. If assessed as a program for improving managerial thinking, how does it fare? Its claim must be granted that people, managers included, should be more conscious of the ideological assumptions entrenched in Western culture. At the same time, one can disagree with CMP's contention that such consciousness-raising should be a major task of management education. Arguably, such matters are better addressed in general education courses. Another concern is CMP's sketchy, programmatic state of development. Though several courses have been taught from this perspective (cf. Mingers, 2000; Reynolds, 1999a), it has not been implemented more broadly in a degree program. Questions about content and substance follow naturally. For instance, although CMP's intent of focusing on ends rather than means seems high-minded, what exactly would replace all the instrumental knowledge jettisoned from business school curricula? Similarly with CMP's focus on the need to challenge assumptions. It provides no real methods for surfacing and challenging assumptions, merely taking the status quo as a target of criticism. At bottom, CMP is more an expression of ideology than a means of thinking critically. Perhaps, as the movement develops, it will produce more substantive material for the improvement of student thinking.

THE LIMITATIONS OF CRITICAL THINKING

Although beneficial, attempts by Paul, CMP, and others to promote the critical spirit are not sufficient to the task of helping managers become effective thinkers. Certainly it is necessary that managers be reflectively skeptical of conventional wisdom, of information and reports they receive, and of taken-for-granted policies and practices. It is equally necessary that they manifest other cognitive virtues—as of clarity, precision, and rigor in thought. But these things are not sufficient. Skepticism is a negative disposition, valuable for keeping one from error, but unable by itself to generate needed conclusions. More positive cognitive virtues are equally devoid of content. One must learn of common threats to clarity, appropriate standards for precision, and rigorous methods of thought; matters that can vary considerably across topics and domains.

As well as evincing a critical attitude, effective thinkers know a lot about thinking. As with any activity, the development of skill at thinking entails the acquisition of considerable amounts of declarative and procedural knowledge (Neves & Anderson, 1981). Effective thinkers employ concepts, principles, strategies, methods, and heuristics, some of which are domain-specific, others being applicable across multiple fields of practice. Much useful content is taught in critical-thinking courses. Being aware of characteristics of credible sources of information, of problem-solving strategies like means-ends analysis, and of common errors in deductive reasoning helps one think more effectively. This material is highly relevant to managerial practice: Managers routinely are required to construct and evaluate arguments; their reasoning is vulnerable to fallacies; and they constantly deal with verbal accounts that are vague or ambiguous or otherwise lack clarity. Accordingly, traditional critical-thinking content should be explicitly taught in business schools, especially if students are not exposed to this material in required general education courses.

However, critical thinking encompasses only some of the knowledge about thinking that managers require. It does not address many important thinking tasks encountered in organizational (and everyday) life. Critical thinking's neglect of creativity and the generative dimension of thought has been widely acknowledged (Bailin, 1993). Its attention to elements of the problem-solving and decision-making process (e.g., problem identification and definition) is cursory at best. Other thinking tasks (e.g., diagnosis, design, and negotiation) often encountered in managerial affairs, are rarely seen in critical-thinking texts and courses. Therefore, critical thinking, by itself, is not an adequate program for teaching business students how to think.

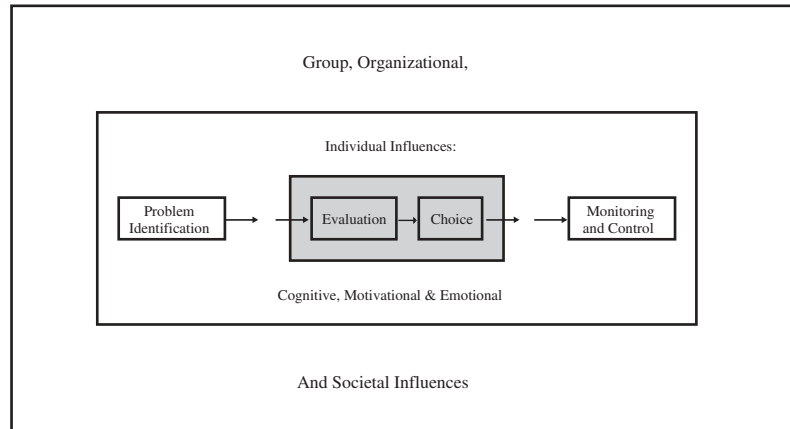


Figure 1: Decision Making

Decision Making

Managerial thinking historically has been regarded as decision making, largely because of the influence of economic theories that view consumer and firm behaviors as outcomes of rational choice. The dominance of the decision-making perspective is evident in texts (Clemen & Reilly, 2001; Harrison, 1999; Hastie & Dawes, 2001; Kleindorfer, Kunreuther, & Schoemaker, 1993) and other books used for that purpose (Hammond, Keeney, & Raiffa, 1999; Russo & Schoemaker, 1989).

Decision making is centrally concerned with the process by which alternatives are evaluated and options selected for implementation. As depicted in Figure 1, this core can be extended along two dimensions to yield a broader view of decision making. Horizontal extensions conceive a process that begins with problem identification and culminates in post-implementation monitoring and control. Vertical breadth results from considering factors that influence decision making. In addition to cognitive, motivational, and emotional influences at the individual level, attention can be paid to group, organizational, and societal influences on choice.

A popular but misleading distinction differentiates rational from other approaches—say, psychological or organizational—to decision making. Formal decision methods are said to be rational in that they prescribe choices that maximize the value of outcomes to decision makers. However, if ratio-

nality is understood as thinking that helps us achieve our goals (Baron, 1988), there can be situations in which nonformal approaches are rational. The teaching of decision making should encompass any content that helps managers and organizations achieve their goals.

FORMAL APPROACHES TO DECISION MAKING

So-called rational approaches to decision making are marked by their formality. They make extensive use of logic, with theories being derived from axioms, and they use mathematical models to represent decision situations. Because formality carries a connotation of being scientific, decision making, when viewed from this perspective, is seen as an activity that should be conducted according to principles and methods validated by scientific research. The intellectual heart of the approach is decision theory, a normative account of decision making that specifies rules people should follow if they want their choices to be rational in a utility-maximization sense. Most obviously, one should select the most highly valued alternative, that which maximizes one's preference satisfaction or utility. If outcomes are uncertain (i.e., they follow probabilistically from decision alternatives) one should heed expected utility theory (Von Neumann & Morgenstern, 1944), choosing the option that offers the highest level of expected utility.

Decision theory's principles and prescriptions have been operationalized in decision analysis, a set of theory-based tools, mostly mathematical, for use in practical decision situations. The most familiar is the decision tree, a diagram that depicts the choices, alternatives, contingencies, and outcomes constituting decision situations. As well as being problem representations, decision trees support a simple mathematical procedure that identifies preference-maximizing alternatives. The decision analytic framework can be used to consider whether information should be purchased to inform a high-stakes choice. Multiattribute utility theory provides a means of integrating many valued attributes (say, the price, location, and size of a home) into a single measure of an alternative's overall merit. Many decision-making texts and courses discuss game theory and linear models of judgment, which are other members of this family of formal methods.

The strength of formal approaches to decision making is their rigor. Working within the decision theoretic framework allows one to identify correct answers, alternatives that are optimal within that framework. Formal approaches encompass a substantial amount of educational content that is straightforward to teach and easy to test. Finally, formal decision methods appeal to faculty who maintain positivistic assumptions about the role of logic and mathematics in science.

The salient weakness of this approach is its limited applicability. Though formal methods have been used in organizations, applications are uncommon. Few of the decision situations that managers routinely face could be effectively addressed by decision analytic techniques. This shortcoming has been recognized by practitioners and some scholars (Grayson, 1973). It has not been acknowledged by decision analysts who claim that “new improved” versions of formal methods can be widely implemented (Behn & Vaupel, 1982; Ulvila & Brown, 1982).

But the inadequacies of formal decision methods vis-à-vis practical problems are inescapable. Decision analytic techniques assume that decision makers have far more knowledge of alternatives, contingencies, and outcomes than is usually the case. In practical applications, the rigor of decision analysis is severely compromised by the need to employ unreliable subjective probabilities as key model parameters. Decision analysis assumes that uncertainty is localized in a few easily identified contingencies, whereas in most organizational decision situations, uncertainty is highly diffuse; it is difficult to anticipate, much less model, the many different events and conditions that could significantly affect outcomes. Decision analysts admit that their methods offer little assistance for alternative generation and other front-end elements of the decision process. Yet few realize that these tasks—not the assessment of preferences—are the most critical in practical situations.

OTHER VIEWS OF DECISION MAKING

Although formal models continue to be the most academically prestigious accounts of decision making, other views have emerged from fields like psychology and organizational behavior, and from scholars more closely attuned to practice. Elements of these approaches have been accepted by the academic mainstream and incorporated into decision-making texts and courses. Indeed, the pedagogical trend is toward more of this nonformal content. Three alternative views of decision making will be discussed.

Psychological perspectives on decision making. This approach was initiated by Herbert Simon, who challenged economic theories of choice by arguing that people, possessing limited information and mental capacity, make decisions that satisfice, rather than maximize their preferences. Researchers have found considerable evidence that people routinely violate decision theoretic norms. The most important psychological studies of decision making emerged from the “heuristics and biases” research of Tversky and Kahneman (Kahneman, Slovic, & Tversky, 1982). These scientists demonstrated that human judgment, the psychological core of the decision process, employs

mental heuristics—quick-and-dirty methods—that, although useful, are prone to yield biased conclusions under certain conditions. These findings triggered a deluge of studies by cognitive and social psychologists that have identified shortcomings of human judgment and higher-order thinking. This work is of considerable pedagogical significance because, being forewarned against mental mistakes such as belief perseverance and the illusion of control, people are less likely to commit them. On the other hand, psychological studies of decision making have not generated much positive advice. For instance, few rules or guidelines have been shown to be effective in particular kinds of situations. Thus, this perspective's value from an educational standpoint lies primarily in its suggestions regarding how not to make decisions.

Group and organizational perspectives on decision making. Simon and his colleagues, Cyert and March, also were influential in initiating this approach, which views decision making as an organizational process (Cyert & March, 1963; March & Simon, 1958). Investigators have tried to discern elements of structure in organizational decision processes (Hickson, Butler, Cray, Mallory, & Wilson, 1986; Langley, Mintzberg, Pitcher, Posada, & Saint-Macary, 1995; Mintzberg, Raisinghani, & Theoret, 1976). Research findings demonstrate that decisions are shaped by an organization's policies and procedures and by political forces. The study of group decision making is even older. In addition to identifying debilities—groupthink, for instance (Janis, 1982)—to which groups are uniquely vulnerable, scientists have developed research-based guidelines for group decision processes (Vroom & Yetton, 1973).

Knowledge of effective group decision practices is worth teaching, especially in view of increased organizational use of teams. Knowledge of organizational decision processes sensitizes students to practical facts of life, easing the shock graduates can experience when they realize decisions are not made by formal methods. Nonetheless, the organizational perspective has scant prescriptive content. It has little to say about what decision makers should do, often being content to point out that decision making is more complex than theorists have recognized.

Naturalistic decision making. Skeptical of formal decision theory, this, the most recent account of decision making, is equally dissatisfied with the informal, *n*-step models/methods found in textual and training session expositions of the decision process. The naturalistic view is exemplified by the work of Klein, Schon, and Weick, scholars who regard decision making as a highly "situated" activity that cannot be described or prescribed for in general terms. Rather than using formal methods or following step-by-step

procedures, managers make decisions by reflecting in action (Weick, 1983) or having a “conversation with the situation” (Schon, 1983) that surfaces appropriate courses of action. Like research on expertise, this perspective stresses the importance of experience. Per Klein’s (1998) notion of recognition-primed decision making, expert practitioners in any field, management included, quickly recognize, based on past experiences, the kind of situation they are confronted with and the course of action required. The naturalistic view connects to claims that intuition is a powerful decision resource, especially if intuition is understood as the unconscious voice of past experience (Burke & Miller, 1999).

The naturalistic decision-making approach is valuable for its realism. Certainly, in management and elsewhere, many decisions are made by rapid, quasi-intuitive processes that are nondeliberative. However, this account only applies when decision makers address situations similar to ones encountered previously. It says nothing about conversations with novel situations, those for which action-determining recognitions are not experientially primed. Although all situations have something in common with past experiences, many problems addressed by managers are distressingly unique. Of even greater concern is this perspective’s dearth of prescriptive content (cf. Klein & Weick, 2000). If experience is the key to effective decision making, what can educators tell students, other than “Become experienced!”?

ASSESSMENT

Business schools that use a decision-making course to teach their students how to think are faced with a rigor-relevance dilemma: The formal decision theoretic approach has considerable content that is largely irrelevant to managerial practice. More realistic organizational and naturalistic perspectives, on the other hand, offer little prescriptive advice that students could use. Psychological accounts of decision making provide useful negative prescriptions—thinking mistakes to avoid—but not much that is positive. Although valuable, instruction in group decision making covers only a small subset of what business students should know about thinking. Rigorous treatments of decision making lack relevance, relevant treatments lack prescriptive content, and no perspective provides sufficient breadth.

Other inadequacies of the decision-making view of managerial thinking are at least as serious. As suggested by its name, this perspective is preoccupied with evaluation and choice. As a result, texts and courses rarely offer substantial treatments of predecisional mental activities—for instance, problem definition and alternative generation. The decision-making perspective has led scholars to assume that managers only think about decision problems,

situations in which a final decisive choice must be made. But these are far from being the only, or even the most important, thinking tasks managers perform. Much organizational effort is devoted to the solution of performance problems, situations in which an existing system is not performing acceptably (Smith, 1998b). In solving such problems (sales are below budget, a manufacturing process is producing defective outputs) the key mental challenge is diagnosis: determining the cause(s) of the performance shortfall. The decision-making perspective is of no value because it says nothing about diagnosis. Managers also must address design problems, as when a new organization structure or incentive program is devised. Again, the decision-making perspective offers no support. Thus, it is reasonable to conclude that the decision-making approach, by itself, is not an adequate means of teaching business students how to think.

A Broader Perspective

Owing to the variety of organizational life, the range of thinking skills and activities required of managers and other organization members is huge. Engineers design, physicians diagnose, scientists conduct research, and attorneys negotiate. Managers perform all these thinking activities and more. The scope of managerial thinking has not been appreciated by researchers and has not been addressed by instructional activities.

A comprehensive program for teaching business students how to think must include two kinds of content. First, it must encompass general aspects of thinking applicable in all fields of practice. Many such topics are covered in critical-thinking courses. Second, the program must address thinking tasks commonly encountered in organizations. Decision making is only one of these topics. An appropriate conceptual framework can be developed around a broad notion of problem solving elaborated in terms of problem-solving functions. Problem-solving functions are generic thinking tasks, mental activities like diagnosis, design, alternative generation, and evaluation. Because much of our knowledge of thinking—concepts, heuristics, and methods—is task- or function-specific, these provide an effective way of organizing instructional content. Table 1 identifies 17 topics, organized into four clusters, that should be addressed by thinking-skills instruction for business students. Each topic is discussed below.

Conceptual foundations. To be an effective thinker, one must understand thought and its relationship to reality (Bailin, 1999; Siegel, 1989). Good thinkers realize that their cognitive efforts try to develop mental

TABLE 1
Topics for Thinking Skills Instruction

Fundamentals
Conceptual foundations
The psychology of thinking
Language and thought
Critical thinking
Inquiry
Reasoning
Inferential errors
Argumentation
Managerial thinking
Thinking in group and organizational contexts
Problem solving
Problem-solving functions
Problem identification
Problem definition
Problem analysis
Diagnosis
Alternative generation
Design
Decision making
Negotiation

representations of reality that are complete and accurate in all significant respects. They know the different kinds of issues addressed by thought (empirical, conceptual, evaluative, and interpretive questions) and that different epistemological positions (absolutism, relativism, and fallibilism) pertain to each. Business students must understand the difference between beliefs and values, and they should realize that although thinking may constrain emotional behavior, it ultimately serves the values our emotions express. Finally, students must be encouraged to develop such cognitive virtues as clarity, depth, rigor, and open-mindedness.

The psychology of thinking. Business students should understand thinking from a psychological perspective; knowing how the mind works can help one think more effectively. Thinkers should be familiar with basic mental activities (perception, attention, memory, judgment, reasoning, and imagination) as well as with the ways knowledge is mentally stored. Of special importance is metacognition, the mind's ability to reflect on and control its own functioning; scholars regard it as a key to improving higher order thought (Mayer, 1998). It is also important to know how the mind errs, mental shortcomings to

which we are vulnerable. Many mistakes identified by psychologists (e.g., the illusion of control and escalation of commitment) have been cited as explanations of ineffective management decision making (Duhaime & Schwenk, 1985). Being aware of these pitfalls is the first step toward avoiding them.

Language and thought. Good thinkers, business students included, understand how language shapes thinking. They know that concepts are the basic units of meaning, as well as ways in which a concept's meaning can be defined. Among these is the use of necessary and sufficient conditions, a powerful pair of mental tools that serve a variety of practical purposes. Students should be taught the rudiments of conceptual analysis; they can learn to recognize when terms are vague or ambiguous and they can be sensitized to linguistic fallacies, including reification and equivocation. As important, they should learn the tricks communicators use to persuade audiences (devices like weasel words, emotionally loaded expressions, and slanting) because these often appear in organizational communications and discourse.

Inquiry. Closely associated with science, inquiry or research is the task of acquiring knowledge pertaining to empirical questions. Organizational life is filled with research tasks (e.g., determining how promotional activities affect sales). Business students should know the language of science (theories, laws, hypotheses) and principles of scientific method (e.g., the need to use objective, replicable measurement procedures). They should be introduced to research methods commonly employed in organizations: observation, experimentation, surveys, and simulation. They also can be taught how to evaluate the credibility of information sources (Ennis, 1996a) and how to assess the expected value of information so that scarce organizational resources are not wasted on research activities of dubious merit.

Reasoning. Reasoning (or inference), the relatively overt mental processes by which we reach conclusions on the basis of evidence, lies at the heart of higher-order thinking. Because reasons can be communicated to others, it is especially important in organizational and other social contexts where persuasion secures agreement. Students should know basic concepts and methods of deductive logic (e.g., implication, contradiction, and categorical reasoning). Because of their importance in practical affairs, business students should know how to reason inductively (using specific instances to reach general conclusions) and by analogy (basing conclusions on similarity). Students should acquire the ability to identify good reasons pertaining to

an issue and respect for the importance of reasons and rationality in thought and behavior.

Inferential errors. A standard topic of critical-thinking courses, the study of inferential errors is a means of inoculating people against these mistakes. Traditionally, educators have focused on the “fallacies of informal logic,” a sizable set of well-known mistakes (Engel, 1980; Hamblin, 1986). Because managerial thinking is vulnerable to such errors as appeal to ignorance, poisoning the well, false cause, and bifurcation, business students should be made aware of them. Because reasoning goes wrong in more ways than anyone has been able to name, instructional efforts should help business students develop general skills in assessing the soundness of reasons.

Argumentation. Argumentation, a cornerstone topic in the teaching of thinking, is concerned with reasoned persuasion or debate regarding an issue. Business students should develop skills for constructing and analyzing arguments. They can be taught different ways of organizing reasons to support a conclusion, as well as the Toulmin framework for decomposing arguments into their constituent parts (Toulmin, Rieke, & Janik, 1979). In light of evidence suggesting that the major inadequacies of practical arguments are incompleteness and “my-side bias” (Baron, 1988; Perkins, Farady, & Bushey, 1991), business students should be taught to develop broad, unbiased perspectives on issues that take all legitimate viewpoints into account, and they should be taught the need to work thoughtfully through to the conclusion that is most strongly supported.

Thinking in group and organizational contexts. The teaching of thinking can mislead business students by suggesting that deliberations on organizational issues proceed in a logical manner toward rational conclusions. The study of group and organizational influences adds realism to this picture, preparing students for settings in which thinking is often a collective activity (Weick & Roberts, 1993). Students should understand how organizational contexts affect managerial thinking. For instance, a proposed course of action can be justified by rational standards, and yet be infeasible, hence rejected, for violating established precedents or being inconsistent with the organization structure. Students also must understand the political dimensions of organizational action, how power can trump reason in even the best-managed organizations.

Problem solving. Defining problems as situations that bear improvement, problem solving is the thinking done to improve things (Smith, 1998b). It is

commonly explicated by means of functional models consisting of steps, tasks, or functions to be performed when solving a problem. Though these models have value, students must recognize their limitations: Traditional functional models lack the detail needed to provide strong guidance, and they prescribe the same steps for every situation, even though different problems require different solution activities. Business students should be taught an appropriate set of problem types, including performance, resource allocation, and product design problems. They should learn “weak” problem-solving methods like hill-climbing and working backward (Nickerson, 1994), as well as the many heuristics that apply in practical problem situations.

Problem identification. The first step in any problem-solving process, problem identification involves becoming aware of a problematic situation. Business students should recognize the means by which organizations identify problems (performance monitoring, quality control, and auditing among others) and how individual thinking and problem characteristics affect problem identification. They should be aware of factors that make problem identification difficult (e.g., the need to evaluate complex performances) as well as common identificational mistakes. Students can be introduced to statistical process control, a special-purpose problem identification technique, and learn how customer relations and employee involvement activities promote organizational problem identification.

Problem definition. Another necessary problem-solving activity, problem definition is a matter of developing a mental representation or understanding of the situation (Smith, 1989). An adequate problem definition must be comprehensive (encompassing all relevant perspectives) and deep, (highlighting the situation’s underlying structure. Students should be warned not to treat problems and symptoms as either-or categories and warned against the danger of focusing definitions too narrowly on what is perceived to be the “real problem.” Though there are no powerful definitional methods, useful heuristics (e.g., start with the presenting problem) can be taught, as well as diagramming practices that enable the development of useful graphic representations of problem situations.

Problem analysis. Problem analysis connects the representation developed during problem definition to situation-specific thinking activities that follow. It helps one understand the problem in fundamental terms, promoting the recollection of relevant concepts, techniques, and experiential knowledge. Various analytical schemes can be used. Systems thinking, one of the most popular, involves identifying pertinent systems and related

dysfunctions (e.g., inadequate inputs, lack of feedback). Problem analysis can consider the situation's historical background and current context. Students can be taught heuristics (asking, "How did we get into this mess?") and pitfalls to avoid (confusing means with ends). They must learn to think deeply and abstractly about problem situations; such thinking is often the source of insightful solutions.

Diagnosis. Diagnosis, the task of determining a problem's cause(s), is a discretionary function performed in certain situations (e.g., performance but not design problems). Students should understand different types of causes (e.g., precipitating and underlying), the distinction between causes and conditions, and the diagnostic process: Collecting and interpreting information, generating hypotheses, and testing possible causes. Organizations use techniques like Kepner-Tregoe, cause-and-effect diagrams, and why-why diagrams for diagnostic purposes. Useful diagnostic heuristics can be added to students' mental repertoires: look for changes, make comparisons, trace through the process, swap components, and analyze the effects.

Alternative generation. Alternative generation is usually regarded as a creative process that draws on our ability to mentally imagine possibilities. Business students should understand that creative products are both original and valuable and that in practical problem solving, a solution's value derives from its effectiveness. Though hundreds of creativity techniques could be taught, students are best served by learning the underlying strategies these methods employ. For instance, one can look for analogies, use decomposition, modify known solutions, imagine unreal scenarios, rearrange components of the situation, or rely on group synergies (Smith, 1998a). Business students also should know that alternative generation can be driven by analytical thinking that develops the solution possibilities inherent in a situation.

Design. Design, creating artifacts that serve certain purposes, is an important problem-solving task that also can be viewed as a problem type. The core of professions like architecture and engineering, design figures prominently in the thinking of managers, who design organization structures, compensation systems, and new products and services. Students should be aware of the conceptual elements of design problems: goals, constraints, alternatives, representations, and solutions (Smith & Browne, 1993). They can develop skill in the top-down successive refinement strategy employed in most design practice. Knowledge of techniques (Jones, 1992) like quality function deployment will improve student performance in managerial design tasks.

Decision making. The teaching of decision making should focus on the evaluation of alternatives, an important problem-solving task in its own right. Evaluation is a complex judgmental process in which an alternative's positive and negative aspects are weighted and combined into an overall assessment of its goodness. Identifying relevant aspects is the key challenge (Dawes, 1979); bad choices usually result from overlooked considerations that turn out to be critical. Students should be taught the basics of cost-benefit analysis and should know how to use decision trees in situations dominated by a few discrete contingencies. They should be warned against common decision pitfalls (e.g., being affected by sunk costs and excessive discounting of long-term outcomes).

Negotiation. Many problem situations involve conflicts that must be resolved through negotiation, and managers must often participate as negotiators (say, by bargaining with suppliers) or as mediators when subordinates cannot work out their differences. Business students should be familiar with negotiation concepts (BATNA, the Best Alternative to a Negotiated Agreement) and principles (e.g., the need to focus on interests, not positions) (Fisher & Ury, 1981). They can be taught bargaining skills, such as how to respond to an extreme first offer by the other party, and they should be warned against pitfalls (e.g., not realizing that the other party may have special knowledge, as of a used car one might purchase). Techniques such as the one-text procedure can help graduates more effectively perform negotiation tasks.

Other topics could be addressed—for instance, problem-solving tasks such as planning and prediction, and prominent problem types such as performance and resource allocation problems. However, the 17 topics in Table 1 compose a broad program of thinking-skills instruction for business students that encompasses, but extends well beyond, the critical thinking and decision-making perspectives.

Programmatic and Pedagogical Issues

The previous section outlined the content, the “what,” of a program for teaching business students how to think. This section addresses important issues pertaining to the “how” of such a program. The issues fall into two categories. The first category to be discussed is programmatic concerns regarding the overall design of a thinking-skills program for business students. This part is followed by a discussion of pedagogical matters, primarily questions as to how thinking-skills courses should be taught.

PROGRAMMATIC ISSUES

Educational scholars have been engaged in a long-standing debate regarding the teaching of thinking skills. Though focused on critical thinking, the debate pertains to any program for teaching students how to think. It centers on the question of whether thinking skills are general—apply in many, perhaps all, fields of practice—or domain-specific. The domain-specific view, championed by John McPeck (1981, 1990), contends that thinking is strongly shaped by content, what one thinks about. Because content varies with the field or discipline in question, thinking skills and practices are similarly diverse and should be taught in domain courses along with the content knowledge to which they apply. Proponents of the domains view argue that there are few, if any, general thinking skills. They assail critical-thinking courses for emphasizing deductive logic, which has limited applicability to practical affairs, and for teaching purported thinking skills—“pinpointing the problem” (Johnson & Gardner, 1999)—that lack substance.

Proponents of the generalist position, including Ennis (1989) and Siegel (1988), contend that there are useful thinking skills that apply to many kinds of content. Reasoning by analogy and evaluating sources of information are examples of general thinking skills that all students should acquire. Such skills can be taught using content from everyday life. This can best be done in thinking-skills courses that are not tied to content-area disciplines. Generalists offer three arguments for teaching thinking in this way: First, it is educationally efficient to address intensively a general skill one time, rather than repeating it in different courses. Second, there are reasons for believing that when thinking is taught in the disciplines, domain content drives out thinking-skills instruction (Halpern, 1998; Resnick, 1987). Finally, thinking skills taught as general abilities are more likely to transfer to the domains to which they apply, rather than being employed only in the particular discipline in which they were taught (Perkins & Salomon, 1989).

This debate has varying implications for business education. On one hand, if business and management is regarded as a domain and there is a sizable volume of domain-specific thinking-skills content (as evidenced in the previous section), then business school curricula should presumably cover this material with a dedicated course required for all students. On the other hand, it could be argued that business education encompasses multiple domains (e.g., marketing, finance, and information systems). If this view is accepted, along with the corollary that each field has its own domain-specific thinking skills, then thinking should be taught with functional area content rather than in the general business core.

Ennis (1989) identified three approaches to the teaching of critical thinking, each of which might be used to teach business students how to think.

1. The general approach in which critical thinking is taught in dedicated courses, separate from the teaching of disciplinary content.
2. The infusion approach, in which critical-thinking content is included in subject matter courses and is taught explicitly with disciplinary knowledge.
3. The immersion approach, in which subject matter content is taught in a deep, thought-provoking way, but critical-thinking principles and skills are not explicitly taught.

Business schools in universities that have a required critical-thinking course in their general education programs are using the general approach to teach students critical-thinking skills. Unfortunately, skills acquired in this way are unlikely to be applied in a managerial context, unless they are reinforced in business school courses. Many programs use this approach with decision making, requiring students to take a managerial decision-making course. In this case, transfer difficulties should not be significant, because the course is taught with managerial content. However, as argued earlier, the critical-thinking and decision-making perspectives, even when conjoined, do not provide the range of thinking skills and knowledge that managers need.

Few, if any, business schools highlight critical-thinking content to the degree required by the infusion approach, though some teach decision making in this way. Far more common is the immersion approach. With its lack of explicit instruction in thinking content, immersion is unlikely to be effective. A condition for student learning and transfer of thinking skills is explicit student awareness of such (Perkins & Salomon, 1989). The immersion approach does not foreground thinking material strongly enough, vis-à-vis subject matter content, to make students aware of, and able to apply in other contexts, the mental skills they have been taught.

An ideal program would require business students to take a semester-long critical-thinking course as a general education class. This course would cover the fundamentals and critical-thinking topics in Table 1. Shortly thereafter, as one of their first business core courses, students would address the remaining topics in Table 1 through a course in managerial problem solving. Dedicated thinking-skills courses are needed for the reasons cited by proponents of the generalist approach, especially the need to make thinking skills and content a salient part of student learning.

Because stand-alone instruction is not sufficient, the ideal program would extend and reinforce this knowledge through the infusion of thinking-skills content across the business school curriculum. Courses in the business core and majors would promote the application of student thinking skills through

casework, in-class exercises, assignments, and exams. The effects of these efforts could be gauged through assessment of the thinking skills of graduating students. If the university's general education program did not include a critical-thinking course, that material could be covered in the managerial problem-solving course. This, however, would necessitate expansion of the class to a 4- or 5-credit format. In any event, an effective program requires dedicated thinking-skills instruction that is reinforced across the curriculum.

PEDAGOGICAL ISSUES

A major contention in this article is that effective thinkers know a lot about thinking. The previous section offered a sampling of topics and related bodies of declarative and procedural knowledge one must possess to think effectively in organizations. Due to the abundance of content and the need to use class time to stimulate student insights, practice skills, and develop good mental habits, thinking-skills instruction makes students responsible for basic content acquisition. Through out-of-class studying, they must develop an understanding of the material. No existing text covers all, or even a majority, of the topics identified in Table 1. However, many sources provide useful treatments of one or a few topics, so reasonably comprehensive packets of written material can be developed. Instructors also might prepare traditional lectures on selected topics, making them available to students in written form, rather than via oral presentations. Some class time will be needed to review and develop difficult topics, but lectures should not occupy more than 20% of class hours.

Not surprisingly, in view of the close connection between thinking and writing (Nickerson, Perkins, & Smith, 1985), thinking-skills courses include substantial student writing requirements. Because of the variety of thinking skills to be developed and assessed, and the focus on thinking rather than research, it is best to require students to write many (e.g., five or more) small papers (from two to six pages each) rather than one or two large ones. This creates a grading load for instructors, but one that is manageable and that can be ameliorated (say, by random selection of papers to be graded) if necessary. The grading of examinations also can be challenging, due to the value of asking open-ended essay-type questions. To be sure, instructors who hope to limit their grading exposure to objective questions on homework assignments and exams should not teach courses of this kind.

Spending less time lecturing, instructors in thinking-skills courses should spend more time guiding student-centered learning activities. They should create in-class experiences that vividly exemplify core concepts and principles. They should direct debates, lead discussions, and guide analyses,

always modeling effective thinking practices and habits of mind. Some topics identified in Table 1—notably decision making, negotiation, and group processes—are widely taught, so substantial bodies of student-centered pedagogical material have been developed. Topics concerned with thinking mistakes (e.g., judgmental heuristics and biases, the fallacies of informal logic) can be addressed by asking students to answer questions used in research on that failing (“Are there more words that begin with the letter ‘k’ or that have ‘k’ as their third letter?”) and by having them critique thinking episodes that illustrate particular shortcomings. The critical-thinking literature provides ample material concerning the teaching of reasoning and argumentation. Texts contain arguments, long and short, for students to analyze; the same can be found in articles, editorials, and letters to the editors of newspapers and magazines.

Many problem-solving topics in Table 1 have not been widely researched or taught, so instructional materials and activities are not as ready at hand. A valuable assignment for teaching problem identification and definition skills is to have students read a comprehensive case study of an organization—the kind used in business policy courses—and write a paper identifying the major problems or issues its management should recognize and address. Development of diagnostic skills can be encouraged by the use of shorter cases describing situations in which organizations must determine the causes of known problems—say, defective products. Projects requiring students to devise new organizational systems (as for order processing or the collection of receivables) will help them develop design and alternative generation skills.

Other themes figure prominently in thinking-skills instruction. One is the importance of problem-based learning. Similar to the case method popularized by the Harvard Business School, problem-based learning has been used in medicine and other fields of professional practice. It motivates students to activate and apply acquired knowledge by having them analyze and solve cases to which that knowledge pertains (DeGrave, Boshuizen, & Schmidt, 1996). For instance, cases can be used to demonstrate that when diagnosing complex organizational problems, one should look for the most proximate potential causes (say, a system design flaw) before invoking broad underlying causes—inadequate management—that are only weakly evidenced and that may not be susceptible to change. Similarly, students often offer recommendations disproportionate to the magnitude of the problem (e.g., proposing a major corporate acquisition to offset mild business seasonality), another error that is curable through problem-based learning.

Problem-based learning connects to another theme: the need to develop student capacities for abstract thinking. If experiential knowledge is, as the

naturalistic perspective claims (Klein, 1998), the essential raw material for effective thinking, abstraction is the indispensable means for putting that knowledge to work. Because no two experiences are ever the same, one must be able to conceive experienced phenomena in more fundamental and abstract terms, so past experiences of an appropriate kind are recalled when needed. To this end, students must learn to think in a language of useful abstractions, concepts that cut reality at joints that are important for practical problem-solving purposes. Some theoretical concepts featured in academic research do this; most do not. Much more valuable are everyday abstractions like goal, constraint, means, ends, cause, condition, evidence, and hypothesis. Students must learn to recognize value trade-offs, as between quality and quantity, and speed and accuracy. Like expert problem solvers (Chi, Glaser, & Farr, 1988), they must see problems as being of certain types so related past experiences and solution activities come quickly to mind when new situations are encountered. Business students must recognize patterns of structure—for instance, adverse selection, chicken-and-egg, escalation, and slippery slope (Smith, 1998b)—that can be found in ill-structured problem situations. In large part, teaching business students how to think involves helping them conceive reality through this language of practical abstractions. This is why the across-the-curriculum dimension of a thinking-skills program is so essential: Students will not acquire, retain, or employ such a language unless it pervades their business school experience.

Conclusion

The question “What should be done to improve the thinking abilities of business students?” has been addressed in this article. The article began by reviewing efforts to promote critical thinking in business schools. These efforts are often wanting in depth and substance. Moreover, critical thinking, as traditionally conceived, fails to address many thinking tasks and challenges faced by managers. A widely employed alternative, the teaching of managerial decision making, encompasses a wealth of material. However, its most rigorous content is largely irrelevant to managerial practice, and its most relevant content is descriptive, not offering advice that students can put into practice. A topic-level framework for the teaching of thinking in business schools was presented. This framework includes critical-thinking and decision-making content in a broad, problem-solving-centered view of thinking. The framework’s topics were elaborated in terms of representative concepts, skills, heuristics, and techniques. The design of a comprehensive thinking-skills program for business students was outlined in the article. This

program combines dedicated course work with across-the-curriculum reinforcement and application of acquired skills and mental habits. Pedagogical issues pertinent to the teaching of thinking were addressed, and the need to use student-centered instructional methods that employ problem-based learning and that help students learn to think in a language of practical abstractions was emphasized.

Curricular issues in business schools always seem to confront educators with a theory-practice dilemma: We can teach students sophisticated quantitative techniques that are theoretically well-grounded and easy to teach, knowing full well (at least some of us know) that this material rarely can be applied in practice. Alternatively, we can respond to the clamorings of employers and focus on developing students' "soft skills" (e.g., leadership and teamwork behaviors), recognizing that these are harder to teach and that our efforts may yield no measurable effect. The teaching of thinking lies between the horns of this dilemma. The content and skills to be taught are by no means "soft," and they are eminently practical. Though it is not easy to teach students how to think, the pedagogical task is doable. It seems reasonable to predict that within the next decade, several business schools will successfully respond to this opportunity, creating a significant reputation and competitive advantage, both for themselves and for their students.

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