CRITICAL THINKING IN THE MANAGEMENT CLASSROOM: BLOOM'S TAXONOMY AS A LEARNING TOOL

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This article discusses the use of Bloom's taxonomy as a metacognitive framework for the student-centered management class, or what contemporary education researchers call scaffolding. The taxonomy is a six-level classification system that uses observed student behavior to infer the level of cognitive achievement. The article surveys thinking within general education and within management education, which draws on Bloom's taxonomy, and then describes suggested uses of the taxonomy. Empirical evaluation of its effect on student achievement follows, as do thoughts about ways colleagues might use this tool to empower their management students as self-responsible learners in the classroom.

Keywords: *Bloom; taxonomy; cognitive achievement; management education; student-centered teaching*

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The reason we began thinking about Bloom's work (1956) was that one day as one of us left campus, mulling over her dissatisfaction with the student discussion in her last class, she was cut off by a car with a bumper sticker that read, "You can send me to college, but you can't make me think." Once she overcame her considerable annoyance, she reflected that the major learning/teaching problem in her class discussion was that many students thought that their personal opinions constituted valid answers. They lacked an ability or willingness to frame interesting questions. She wondered if extending to students increased control of their learning would be a workable way to address this challenge. If so, frameworks to help them assess their progress would be helpful.

Bloom's taxonomy (1956) has evolved into much more than an assessment framework in our classes. This article attempts to capture that *much more* so that our colleagues can build on our experiment and join with us in discovering and developing more effective approaches. We think of our use of the taxonomy as a way to reinforce aspects of higher order thinking, which are critical to the quality of life and careers students will build for themselves. The aspects of higher order thinking that Bloom addresses are also fundamental to the development of managerial skills. One could argue that Bloom's higher order cognitive skills—application, analysis, synthesis, and evaluation—are inherent in the process of management and especially important as managerial complexity increases.

This article discusses our use of Bloom's taxonomy (1956) in our management classes. We have developed and evaluated a metacognitive framework—a scaffolding device (Hogan & Pressley, 1997; Smolucha & Smolucha, 1989) drawn from the taxonomy that has been useful in our efforts to build our students' critical thinking and synthesis skills and their responsibility for their own learning. We also suggest that use of the taxonomy has helped our classrooms become more student-centered, as it helps our students gain increased awareness and control of their own cognitive development. In doing so, it addresses that frustrating problem so familiar to most learners: how to figure out what it is one does not know.

Following a brief overview of Bloom's work, which includes our perception of where his contribution fits into our developing understanding of learning, is a description of his taxonomy. A section describing the taxonomy's use in management education as reflected in the literature then follows. This section is followed by a description of its application in our classes and its use in promoting student self-management. Next is a description of our empirical test of the taxonomy's effectiveness as a learning tool. Our conclusions follow, along with our thoughts on applications of what we have learned from our experiment and its implications.

Overview of Bloom and the Taxonomy

In 1948, Benjamin S. Bloom and his colleagues developed what has come to be known as Bloom's taxonomy as a method to improve the exchange of ideas among scholars who were working on ways to discuss comparisons in student achievement within a larger effort to develop standardized testing (Bloom, 1956). His general approach is called *mastery learning* (Bigge, 1982). Today, it offers the basis for the compentency-based education model. Antecedents of Bloom's general approach can be seen in the work of Johann F. Herbart (1776-1841), a German philosopher-psychologist whose apperception theory and five steps in learning had extensive influence on twentieth-century American education, well up to the challenge of behaviorism (Bigge, 1982). Herbart, who followed Immanuel Kant in the chair of philosophy at Konigsberg, Germany (Bigge, 1982, p. 38), developed a learning model with five steps: preparation, presentation, comparison and abstraction, generalization, and application. Bloom's taxonomy can be seen to take the next step, anchoring and reconciling Herbart's model to behaviorism.

Bloom's taxonomy is a six-level classification system that uses observed student behavior to infer the level of student achievement. Moving from simple to more complex, the taxonomy's levels include knowledge, comprehension, application, analysis, synthesis, and evaluation. Although the construct is hierarchical, subsequent classes of behavior include some, but not necessarily all, of the behaviors found in the lower levels. Thus, this is a hierarchical framework of conceptual sophistication and not a prescriptive model. This fuzzy characteristic may actually be part of the taxonomy's strength as a heuristic tool. That it is not lock-step allows for creativity. Figure 1 describes our interpretation of these levels and their relationships.

Bloom's Use in General Education

Bloom's taxonomy has received considerable recognition internationally within the evaluation community (Lewy & Bathory, 1994) because it was used soon after its introduction at United Nations Educational, Scientific, and Cultural Organization (UNESCO) and Organization for Economic Cooperation and Development (OECD) seminars. In addition, it has been used as a basis for curriculum analysis, test construction, and data summary (Lewy & Bathory, 1994). Anderson and Sosniak (1994, p. 126) observed that the taxonomy is used widely at policy levels, sparingly in schools of education, and not at all by practicing teachers. Bloom himself noted that the original source of the taxonomy, *The Handbook*, was "one of the most widely cited yet least

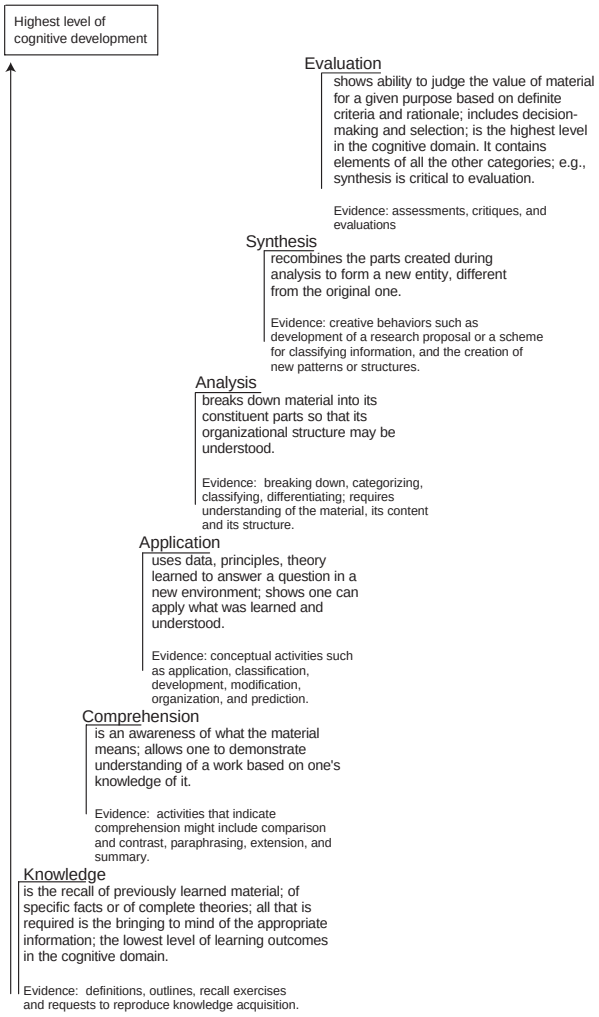

Figure 1: Bloom's Taxonomy of Educational Objectives: Cognitive Domain
SOURCE: Adapted from Bloom (1956) and Grondlund (1970).

read books in American education" (Anderson & Sosniak, 1994, p. 9). R. Putnam (personal communication, August 21, 2001) suggested that although we might expect to find Bloom used in the K-12 learning environment, its use is limited. What use it receives, especially with an emphasis in middle schools, is largely in support of curriculum development and teaching

strategies—that is, teacher-focused rather than learner-focused. Putnam suggested that this is because metacognitive skills are context-dependent and, in that sense, have limited transferability, at least within the age group for which they have been used. Metacognition has limited applicability at middle-school levels because these students cannot focus on abstractions well enough to transfer them for one context to another (Putnam, 2000). This finding, however, suggests an opportunity at the college level.

Bloom's Use in Management Education

A review of the management-education literature indicates a growing awareness of the taxonomy's potential usefulness and richness among college and university-level educators in curriculum design, student assessment, and instruction evaluation. In curriculum discussions, the taxonomy serves well as a common language to describe increasing levels of cognitive sophistication within the competency-based curriculum. These discussions include both the curriculum itself and student mastery of it (Brownell & Chung, 2001; Dehler, 1996; Hamilton, McFarland, & Mirchandani, 2000; Spee & Tompkins, 2001). Student mastery in these learning settings can involve the more traditional, faculty-centered assessment of student-demonstrated learning; student self-assessment (Ghorpade & Lackritz, 1998; Granello, 2000, 2001; Hampton, 1993; Spee & Tompkins, 2001; Van Buskirk, Kruger, & Hazen, 1995; Wolverton, 1996); or possibly both. The area of student self-assessment (Brookhart, 2001) is an especially interesting development in the use of Bloom's taxonomy, because it points in the direction of double-loop learning (Argyris, 1977), student self-responsibility and self-management, and the student-centered classroom (Harvey, 1998).

We should mention that other major applications of Bloom's taxonomy have been developed largely with a curriculum-development focus. One merits attention because it discriminates by depth of learning with the potential for increasing depth at higher levels (Biggs, 1999). Just recently, Anderson and Krathwohl (2001), both of whom served on the early taxonomy team in the early 1950s period (the latter as Bloom's graduate assistant), introduced a revision of Bloom's taxonomy, which we understand to be an application of it. Their revision eliminates synthesis as a dimension and adds the dimension of creation beyond that of evaluation. These changes are supported with the claim that the revised taxonomy is really a change in emphasis so that the document focuses more closely on "planning curriculum, instruction, assessment, and the alignment of these three" (Anderson & Krathwohl, 2001, p. 263).

In the general discussion of college teaching, Bloom's taxonomy has been used as a framework for discussing the dimensions of effective teaching (Abrami, d'Apollonia, & Rosenfield, 1997), effective faculty collaboration (Wenger & Hornyak, 1999), and effective design and implementation of international experience-based learning (Allen & Young, 1997). Wilbert McKeachie (1984) reminded us that the taxonomy's higher order cognitive levels would be the focus of an ideal assessment model. McKeachie also based his claim that students learn at higher levels during discussions than during lectures (although their attention is better during lectures) firmly on the taxonomy and on additional empirical evidence Bloom presented. This claim led us to think more fully about how we could use Bloom's ideas to support the student-centered classroom. We wanted such learning to involve student self-assessment and higher levels of student responsibility that we sought to engender in our classes.

Building on the work done to date, our contribution to the application of Bloom's taxonomy within the management classroom may offer our colleagues additional ways to support student success in their teaching. Our use of the taxonomy suggests ways we can encourage students to develop responsibility for their learning and increase the complexity of their critical-thinking skills, the quality of written work, and the value of their in-class contributions.

Bloom's taxonomy, however, presents thorns in the bed of roses, so to speak, as well as fruitful blossoms. In addition to the criticism of Bloom's taxonomy raised by K-8 educators that it does not work, it has received several other noteworthy objections. They cluster around two basic concerns, one related to its design and the other to its lack of theory and validation. The major problems critics find with the taxonomy's design is that its levels are not always distinct, that it is not strictly hierarchical, and that the underlying structural principle—increasing complexity—is naïve. In fact, we note that Bloom's taxonomy is not, strictly speaking, even a *taxonomy*, because its *taxa* do not meet the mutually exclusive criterion demanded of them (Chrisman, Hofer, & Boulton, 1988). This set of critical arguments, summarized in an essay by Nevil Postlethwaite (1994), points to needed refinements in the taxonomy and supports Bloom's assertion of the classification as a useful beginning. That the taxonomy is developed at the behavioral level rather than at a theoretical level is also a concern to critics as is its lack of evidential basis. We admit to these concerns, as well, yet have come to think of the taxonomy as a heuristic device, valuable for what it helps us discover or reveal and essentially not provable.

Bloom's Taxonomy in Our Courses: Moving Toward Student Self-Management

A need to support further development of critical thinking skills, to communicate more effectively with our students about their levels of achievement in our classes, and to build student responsibility in our courses is what brought us to the taxonomy. We were dissatisfied with our student achievement levels and, due to that, with some aspects of our teaching. We think the taxonomy has value in helping our students to take increased control of their learning and to better understand the behaviors that constitute critical thinking. In this way, we are using it as a scaffolding device to support metacognition. *Scaffolding* is teaching that provides support to allow the learner to learn for himself or herself. Hogan and Pressley (1997) described the process of scaffolding as an instruction device that provides individual students with intellectual support so they can function at the cutting edge of their cognitive development.

Using Bloom's taxonomy as a scaffolding device requires that the student determine the level of his or her work. This self-analysis, then, allows students to use the taxonomy to support their own higher level thinking. Such an approach would seem suitable for many integrative courses, including those whose goals include critical thinking. We have found its use in introductory level management courses helpful.

Use of the taxonomy as a scaffolding device may be especially apt in courses that interpret multiple, functional areas in new contexts. Courses such as strategy, diversity management, negotiation, public affairs, organizational behavior, organizational communications, and international management, among many others, interpret multiple functional areas in new contexts and, as such, could be thought of as metacognitive. For students to capture the full extent of the richness of these courses and apply their concepts to management challenges requires complex thinking and writing. Students are challenged in these metafunctional courses and are often frustrated at being stuck in the progress of their learning.

These integrative challenges have confronted many students in their earlier high school and college coursework before they appear in management courses. Often, repeated exposure to a new approach or set of ideas is necessary for the learning to endure. It is our experience that these earlier challenges have not always been accompanied by explicit efforts to scaffold their learning so that the student becomes responsible for her or his learning outcomes. We must remember, too, that from a student perspective, a college

curriculum may be experienced as a series of unrelated courses that are largely not integrated and have no relevance beyond the grade on the transcript. In this sense, they are experienced as boxes to check off. As one of our advisees recently observed, "I might as well take ethics this semester and get that out of the way."

Specific examples will illustrate that we have used the taxonomy in two ways: (a) to help students appreciate the conceptual richness of the material and where they are in their engagement with it as a self-assessment tool and (b) as a feedback mechanism to help students appreciate the conceptual richness of their own work (e.g., case write-ups, journal entries, and other activities). These uses are often merged into one situation. Although the taxonomy helps students appreciate more fully the wide range of cognitive activities solid preparation can involve, it also functions to help students appreciate the complex conceptual activity a case can demand. For example, a case assignment in a capstone strategic-management course assumes the student's ability to operate at the taxonomy's knowledge level. The students choose and then recall the appropriate functional knowledge they have gained in courses in marketing, corporate finance, management, and accounting to process the case they have read. At the comprehension level, they use this recalled functional knowledge to give meaning to what they have read in the assigned case. In our experience, it is at these levels that inexperienced students face high hurdles. They recall appropriate concepts; if not the specifics, they remember at least the general ideas. They then tend to summarize the situation of the case, but they can get no further.

In our faculty discussions of our use of the taxonomy, we realized that this very point is also a critical point in our grading and, thus, especially frustrating for students. Cases written at the knowledge and comprehension levels, resting as they do on definitions and summaries, earn ranks at the C grade level or below because they offer little conceptual interest. Students at this level accept the world that the case presents and offer it back in its same form with altered language. These students have held on to a pattern that had worked for them in earlier environments and are, at best, befuddled that it does not produce the level of results they had achieved in the past. We call this situation the Standardized Aptitude Test (SAT)–prep trap. When challenged to use Bloom's taxonomy to describe the possible directions their case analysis might take, these students come to understand very quickly that their knowledge and comprehension are necessary but not sufficient for the achievement levels they target.

Related to this situation is a point Argyris (1991) made about learning in regard to managers: Students who are defensive and lacking in self-confidence often block their own learning. Our use of Bloom's taxonomy

helps students and us get beyond this challenge because it gives students the behavior exhibited by their targeted higher order thinking goals. They can address these issues in a trial environment with peer tutors (either in class or at the Academic Support Center), with teammates in reduced risk and nongraded environments, or during office hours. Such conversations with clearly disappointed and frustrated students early in the semester tend to go, "I see that I could have further explored the management challenge. All I did was summarize it. So, this what you want." We have decided to resist the impulse to comment on that last sentence and instead redirect the students' attention back to their assessment of where their achievement level is on the taxonomy. Near the middle of the semester, the focus begins to move from what the teacher wants—a teacher-focused class—to what the student realizes he or she needs to learn. "I see that I could have done more at the analysis level, and, really, there is no synthesis here at all. I need to work on my synthesis more." The focus and responsibility have shifted from teacher to student. This shift is a step toward the creation of an educational culture that focuses on student learning rather than teaching, as described in the national-level discussion on educational reform by Craig Swenson (1998).

Application in a case analysis could involve introducing theory from the strategy text or from outside reading of the case so that the case material is organized, classified, or developed in a new way. If the case involved is a struggle between the security needs of the workers and the self-actualizing needs of a change agent whose efforts to self-actualize threaten the status quo of the workers, students might apply Maslow's hierarchy of needs (1970) to their understanding of the situation. They would be introducing a theory framework from outside the case to help organize its data and understand what might be going on in the case. Student application of Maslow could also lead to a richer analysis of the case situation, consequently supporting student efforts in analysis as well as application.

Students often use application skills in their case exhibits, which use graphics to support their interpretation of the case data. For this reason, we suggest that students who are having difficulty cracking the case visually depict the quantitative information in the case using time lines, organizational charts, main character biography lines, and other visual representations of the case facts.

Analysis of the case is found in virtually every solid case write-up. At the very least, the student is able to organize the case material into several categories. The student can choose which realities or situations are critically important, which are relatively important, and which are not at all important as drivers of the case challenges. Building on this analysis, synthesis, the taxonomy's next level, is evidenced when the student can suggest a new way

of understanding the business issues a case presents. Such thinking outside the box is a sign of sophisticated cognition within the taxonomy framework and is often related to the outside theory or knowledge the student introduced at the application stage. The workers whose status quo is threatened by the change agent example discussed in relation to application might reduce their anxiety about security if other ways to meet those needs and their higher order needs, as described by Maslow (1970), are suggested. One possibility might be additional training aimed at building their skills base. Making them competitive on the external labor market and focusing their attention on their professional development might be appropriate in this context. Another approach might be a multiyear employment contract with wage levels tied to a cost-of-living index.

At the level of evaluation, the student moves from synthesis to a judgment of the reconceptualized case situation with recommendations for action based on that judgment. This is where the rubber hits the road, so to speak. The student has to commit to a course of action and justify it. We often begin our discussion of evaluation with a relaxed, seemingly unconnected, beginning-of-class discussion about films playing locally. In response to our asking, "So, have you seen any good movies lately?" someone will mention a movie that he or she liked or did not like. Our follow-up, "Why?" gets us solidly into the process of evaluation. This can serve as a hook and example in the Bloom discussion. Students engage in evaluation constantly, and Bloom has helped some to see that their evaluations are, at times, quite complex and, at other times, quite groundless.

With cases, the evaluation needs to be supported and connected to action. Going back to our example of an application of Maslow's hierarchy of needs (1970), employee resistance to recently introduced overtime limitations is because of employee fears that their earnings will be reduced when overtime is dropped. The change agent claims these cutbacks are needed to meet production-cost targets, a goal on which his bonus is based, as well. Given lower production costs incurred by local competitors, what path should students recommend and to whom? Using Maslow to justify the problem analysis and other applications to support possible options, what is the recommended action? How should it be implemented? Why?

In addition to helping students realize how conceptually rich their thinking can be, as in the above case example, Bloom's taxonomy can be used as the basis for a feedback mechanism. As such, the taxonomy speaks to one challenge every faculty member faces: how to help students comprehend in terms meaningful to them the criteria used in our assessment of their work. In management strategy, the work is written case studies and case presentations; other courses might include journals, research papers, field projects, and/or

exams. Before we began using the taxonomy, we had come to realize that students were not able to apply our critical responses to their strategy case write-ups to improve. For example, if the major weakness of a case was that it lacked development, we would note that on the case write-up along with some encouragement and some leading questions to bring home the idea of development. When such students came to see us during office hours, they would readily agree with our assessment that the paper lacked development (even though it might be a good paper), but their ability to build on this knowledge, to move to a more sophisticated cognitive level, did not evidence itself.

In our discussions on grading, we readily admitted to each other that our grading rubrics were difficult to articulate with any measure of precision. We knew almost intuitively when we were reading a paper that merited an above-average grade. We each failed, though, in our effort to explain to the C student how his or her work fell short on a particular criterion in a way that made sense to the aspiring student as evidenced by future submissions. Initially, we tried using model papers, which we projected and analyzed in class. Our observations that the A paper is more interesting; that it takes a clearly defined position; or that it offers evidence of careful, critical thinking and knowledge of the strategy concepts were not perceived by the C student as helpful. The student request was, "Tell me what to do. I'll do it. I'll study as long as it takes." In this situation, Bloom's taxonomy provided a common language and a set of behaviors—the framework we all needed so that the student would be able to see the next steps and carry on with self-responsible and self-managed learning. When asked to highlight the portions of their case write-up that were summarized, the C-level student often began to grasp an understanding of their work relative to the taxonomy. This *ah-ha moment* allows the student to move his or her focus away from us and onto the higher level behaviors. This is a huge step toward self-management for some students. It also seems to reduce defensiveness.

Discussion in class also benefits from the use of Bloom's taxonomy. When confronted with student anxiety over both class-discussion participation and our assessment of it, we developed a self-assessment instrument based on the taxonomy that guides students to higher level thinking and allows them to measure their progress (Appendix A). Ensuing class discussions have moved away from student generalizations, based on their often limited experiences, and toward theoretical perspectives, critical analyses, and evaluations. The taxonomy also provides students with a new, shared vocabulary for their critical contributions to the discussion. We are on the verge of thinking that the taxonomy is helping us break the code of silence our students adhere to when asked to critique another student's work.

An Empirical Test

After using Bloom's taxonomy for several semesters, we decided to capture data with which to measure its effectiveness as a learning tool. In this section we detail the methods used to collect and analyze the data, and then we discuss the results.

METHOD

Our goal was to measure the effect of using Bloom's taxonomy as a feedback mechanism in an effort to build our students' critical-thinking skills. Two faculty participated. Our classes were both at the undergraduate level in the Business Studies Department at Assumption College, a small, selective, largely residential, Catholic, liberal arts college in Worcester, Massachusetts. The undergraduate enrollment is 2,500 students and the demographics are largely majority, middle- to upper-middle-class, traditional United States, undergraduate students. Seventy percent of the student body graduated in the top two quintiles of their high school class; the SAT-score average is 1,066, with 25% above 1,140; 90% receive some kind of financial aid or merit award; the average age is 20; and most students come from the New England region. The sample size included 21 students in Women, Minorities, and Diversity in the Workplace (WMD), a junior/senior-level elective course, and 21 students in International Management (IM), a junior/senior-level major and elective course.

Because we are concerned with what seems to be a universal problem, that is, that many students do not think critically and do not integrate what they are learning with what they already know, the focus of our analysis was on student behavior. We explained Bloom's taxonomy to our students and used group and individual assignments and class discussion to check that the students had knowledge of the taxonomy. A rating-scale questionnaire, known as *The Checklist*, was developed and includes six items corresponding to the six steps of Bloom's hierarchy of cognitive development. This checklist (Appendix B) was also keyed to course-specific, assignment-specific behaviors for each of the classes. It was then used to provide students feedback on their performance on required journal submissions in each of the courses.

This study used a repeated-observations, single-phase design with two independent, small samples, which were our classes. The observations were qualitative. They consisted of submitted journal entries and/or open-ended written assignments that were content-analyzed by the instructors for performance on six criteria. This content analysis provided input to each group's checklist. Thus, the content analyses were quantified.

The WMD class was required to submit their work twice during the semester (Weeks 3 and 14). The IM class was required to submit their work four times during the semester (Weeks 2, 6, 10, and 14). In each case the instructor noted on the checklist those levels of cognitive development that were manifested in the student's work and those that remained to be developed. This assessment was returned to the student along with the assignment.

The checklist data collected for each class are summarized in Tables 1 and 2. The student achievement was coded as follows: knowledge = 1, comprehension = 2, application = 3, analysis = 4, synthesis = 5, and evaluation = 6. Then, an average score of cognitive development was computed for each student per submission. Thus, for example, a student who demonstrated cognitive development that captured each of the six steps on Bloom's taxonomy achieved an average score of 3.5, whereas a student who performed only at the knowledge level achieved an average score of 0.17. To test whether students as a group tended to apply higher order thinking as Bloom's concepts were emphasized throughout the course, we used nonparametric statistics after each assignment's feedback. Specifically, we used Wilcoxon's distribution-free rank test (Table 3) (Hollander & Wolfe, 1973, p. 27).

The Wilcoxon test analyzes paired replicates data. Each set of pairs represents pretreatment and posttreatment observations. In this study, the pretreatment observation is the instructor's evaluation of a student's cognitive development on the Bloom taxonomy scale manifested by the student's average score computed as explained above. The treatment involves the reemphasis of the importance of achieving a high level of cognitive development on Bloom's taxonomy after each assignment. This was done through class discussion and demonstration of good examples. The posttreatment observation is the instructor's evaluation of a student's cognitive development on the Bloom taxonomy scale manifested by the student's average score computed as explained above after the re-emphasis period. For example, in the WMD class of 21 students (Table 2), Student 1 had a pretreatment score of 1.00 and a posttreatment score of 3.33. Our hypothesis is that the median average score of pretreatment and posttreatment positive differences compared to the median score of negative differences will increase after the reemphasis of Bloom's levels of cognitive development. The Wilcoxon matched-pair test computes a z statistic that allows one to infer whether such a median shift is significant.

RESULTS AND DISCUSSION

The result of the Wilcoxon matched-pair test for the WMD and the IM classes is included in Table 3. We find that between the first and the last obser-

(text continues on p. 549)

TABLE 1
International Management (IM) Class Data

	Week 2							Week 6							Week 10							Week 14						
	Bloom's Level						Student Score	Bloom's Level						Student Score	Bloom's Level						Student Score	Bloom's Level						Student Score
Student	1	2	3	4	5	6	(IM1)	1	2	3	4	5	6	(IM2)	1	2	3	4	5	6	(IM3)	1	2	3	4	5	6	(IM4)
1	1	2	3	4			1.67	1	2	3	4			1.67	1	2	3		5		1.83	1	2	3	4			1.67
2	1						0.17	1						0.17			3				0.50	1	2	3	4			1.67
3		2	3				0.83	1	2	3				1.00	1	2	3				1.00	1	2	3				1.00
4	1	2	3	4			1.67	1	2	3	4			1.67	1	2	3				1.00	1	2	3				1.00
5	1	2	3	4			1.67	1	2	3			6	2.00	1	2	3	4	5	6	3.50	1	2	3	4	5	6	3.50
6	1	2	3				1.00	1	2	3				1.00	1		3	4			1.33	1	2	3	4	5		2.50
7	1	2	3	4	5		2.50	1		3	4			1.33	1	2	3	4	5		2.50	1	2	3		5	6	2.83
8	1	2	3	4	5		2.50	1	2	3	4	5		2.50	1	2	3	4	5		2.50	1	2	3	4	5		2.50
9	1	2	3	4	5	6	3.50	1	2	3	4			1.67	1	2	3	4	5	6	3.50	1	2	3		5	6	2.83
10	1						0.17	1						0.17	1	2					0.50	1	2					0.50
11	1	2	3	4			1.67	1						0.17	1	2	3				1.00	1	2	3				1.00
12	1						0.17	1	2	3	4			1.67	1	2					0.50	1	2	3		5	6	2.83
13	1	2	3		5		1.83	1	2	3	4			1.67	1	2	3	4	5		2.50	1	2	3	4	5	6	3.50
14	1	2	3	4			1.67	1	2	3	4			1.67	1	2	3	4			1.67	1	2	3	4			1.67
15	1	2	3	4	5		2.50	1		3	4	5		2.17	1	2	3	4			1.67	1	2	3		5	6	2.83
16	1	2	3	4			1.67	1	2	3	4	5	6	3.50	1	2	3				1.00	1	2	3	4	5	6	3.50
17	1	2	3	4	5		2.50	1	2					0.50	1	2	3	4	5	6	3.50	1	2	3	4	5	6	3.50
18		2	3		5		1.67	1	2	3	4			1.67	1	2	3			6	2.00	1	2					0.50
19	1	2	3	4	5		2.50	1	2	3	4			1.67	1	2	3	4			1.67	1	2	3		5	6	2.83
20	1	2	3	4	5		2.50	1	2	3				1.00	1	2	3	4			1.67	1	2	3	4	5		2.50
21	1	2					0.50	1	2					0.50	1	2					0.50				4			0.67

NOTE: Student achievement according to Bloom's taxonomy levels were coded as follows: knowledge = 1, comprehension = 2, application = 3, analysis = 4, synthesis = 5, and evaluation = 6.

TABLE 2
Women, Minorities, & Diversity in the Workplace (WMD) Class Data

	Week 3							*Week 14*						
	Bloom's Level							*Bloom's Level*						
Student	*1*	*2*	*3*	*4*	*5*	*6*	*Student Score (WMD1)*	*1*	*2*	*3*	*4*	*5*	*6*	*Student Score (WMD2)*
1	1	2	3				1.00		2	3	4	5	6	3.33
2	1	2	3				1.00		2	3		5		1.67
3		2	3				0.83		2	3	4	5		2.33
4	1	2	3		5		1.83		2	3				0.83
5	1	2	3	4	5		2.50		2	3	4	5		2.33
6		2	3				0.83		2	3	4	5		2.33
7		2	3				0.83		2	3	4	5		2.33
8		2	3				0.83	1	2	3				1.00
9		2	3				0.83		2	3		5		1.67
10	1	2	3				1.00		2	3	4	5		2.33
11	1	2	3	4	5	6	3.50	1	2	3	4	5	6	3.50
12	1	2	3				1.00	1	2	3	4	5		2.50
13	1	2					0.50		2	3				0.83
14		2	3				0.83		2	3		5		1.67
15	1	2	3	4	5		2.50		2	3	4	5	6	3.33
16	1	2	3	4	5	6	3.50	1	2	3	4	5		2.50
17		2	3				0.83	1	2	3				1.00
18	1	2	3				1.00		2	3	4	5		2.33
19	1	2	3	4			1.67		2	3	4	5		2.33
20	1	2	3	4	5		2.50	1	2	3				1.00
21	1	2		4			1.17	1	2	3	4	5		2.50

NOTE: Student achievement according to Bloom's taxonomy levels were coded as follows: knowledge = 1, comprehension = 2, application = 3, analysis = 4, synthesis = 5, and evaluation = 6.

TABLE 3
Wilcoxon Matched-Pairs Signed-Rank Test Analysis

Score Comparison Between Women, Minorities, and Diversity in the Workplace (WMD) Evaluations

Cases With:	*Entire Course: WMD1 vs. WMD2*
– pairs (WMD2 < WMD1)	4
+ pairs (WMD2 > WMD1)	16
Ties (WMD2 = WMD1)	1
Total ($N = 21$)	21
z statistic's significance, 1-tailed	$p = .008$
Conclusion regarding student improvement	positive

Score Comparison Between International Management (IM) Evaluations

Cases With:	*Interval 1: IM1 vs. IM2*	*Interval 2: IM2 vs. IM3*	*Interval 3: IM3 vs. IM4*	*Entire Course: IM1 vs. IM4*
– pairs (IM[x] < IM[$x + 1$])	9	4	3	4
+ pairs (IM[x] > IM[$x + 1$])	4	12	10	13
Ties (IM[x] = IM[$x + 1$])	8	5	8	4
Total ($N = 21$)	21	21	21	21
z statistic's significance, 1-tailed	$p = .092$	$p = .074$	$p = .041$	$p = .049$
Conclusion regarding student improvement	Negative	Positive	Positive	Positive

NOTE: x = interval number.

vation for both classes the test statistic is significant at given levels ($p < .01$ for WMD and $p < .05$ for IM). Therefore, we find that in each class the difference between the median score of the students who demonstrated improvements and the median score of the students who demonstrated a decline is significant and positive. Thus, we conclude that repeated attention given by students to the steps of Bloom's taxonomy may increase their propensity to apply higher levels of conceptual sophistication to their work.

More specifically, we note that in the IM class there was an actual decrease in performance on Bloom's scale between the first and the second observation. This may be explained as learning effect. However, after each of the subsequent two periods of emphasis of Bloom's concepts, the class performance improved significantly. Though similar intermediate performance conclusions cannot be drawn for the WMD class, we can conclude that the instructor's repeated emphasis of Bloom's concepts had similar positive and significant effects over the entire semester.

Conclusions and Implications

Students respond positively to instructor emphasis of Bloom's taxonomy of cognitive development and subsequent instructor evaluation using the taxonomy. Most students in the two classes that participated in this limited study improved their skills. Students also reported on their instructor evaluations that they found the taxonomy tool useful. These comments indicate that they could begin to grasp what their work was missing and where their learning opportunities were with increased specificity because of the scaffolding effect of the taxonomy. This helped them out of the trap of not recognizing what they do not know. When in this trap, a rational approach many students follow is to try to figure out what the professor wants rather than to address issues in their own learning. One student commented, "Finally, I can understand the difference between a C or C+ and a B– and what to do about it." Other students commented that they wish they had known about the taxonomy earlier in their college careers, because, as one student said, "It's the key to letting the professors know that I get the ideas and am thinking." Another commented that it is "like a roadmap for above-average papers." Another metaphor one student used in the open-ended portion of her course evaluation to describe how the taxonomy functioned for her as a scaffolding device was, "The taxonomy has given me a closet with all the hangers for my ideas right there."

Future studies on this issue could address the methodological limitations of the present study. First, the student evaluation process should become more reliable by introducing multiple assessors of the student work. Second,

the actual assessment method should be improved to provide higher interrater reliability. Finally, the study would benefit from larger classes so that more powerful statistics can be used to measure the effects of the instructors' work. Remember, too, that this study addresses the assessment use of the taxonomy only. To measure changes in critical-thinking skills would be another possible next step.

From a practical point of view, the class size of our samples may be a limitation, too. There are several ways to address this issue. First of all, the major portion of the time-consuming record keeping described here was to provide data for our empirical study. We would welcome additional data, especially from larger classes and student bodies with varying demographics, yet we want our work to be useful in a practical way. If record-keeping results were outsourced to the learner, much administrative time would be saved and student responsibility would be reinforced. It may be the case that to use the taxonomy in class might require more time initially while building familiarity, yet we noticed that student visits during office hours to review and discuss our grading comments decreased markedly once we began using the taxonomy. This result stands to reason if use of the taxonomy is moving the locus of control from the instructor to the student. It also supports the observation that the taxonomy can be used to encourage self-assessing, self-responsible learning behavior.

This particular aspect of the taxonomy's use, as a vehicle to encourage student self-responsible learning behavior, could be stressed in larger classes. For example, an abbreviated coding system based on the first letters of the taxonomy's levels, *(k, c, a, an, s, e)*, numbers (as in the checklist), or color-coded highlighting of the various taxonomy levels on a rough draft could be done by the student or the student in collaboration with a peer to accompany work done early in the semester. In addition, peer responses could be used in combination with student self-assessment so that students have analytical feedback on their work early in the course, perhaps at the rough-draft level. The checklist could be distributed along with the taxonomy ladder and the self-assessment as part of the course syllabi.

Another limitation in our assessment of the levels of student work in the taxonomy is that precision is not possible. At times the level of the student work appeared fuzzy to us. That the goals of the taxonomy do not yield to precise specification is a given. In other words, "It appears quite difficult to separate the process studied (method variance) from the content used (trait variance)" (Kottke, & Schuster, 1990, p. 27). This required our judgment calls. A control for intergrader reliability would be helpful in this regard.

In thinking about these issues, the question arises as to what role previous courses might play in developing our students' critical-thinking skills, espe-

cially with our increasing concern that integration and complexity be central to college and university courses. When most students reach our management classes, they will have studied, in addition to some of their core functional business courses, philosophy, history, literature, art and music, and science. One might suggest that certainly they have already learned to think. They have, but oddly enough, this ability tends to be course- or discipline-specific. It does not appear to readily transfer. We suggest that the missing linkage here may have to do with the locus of control. In many classes the student figures out the assessment behavior the instructor rewards and then delivers it, receiving a good grade in return. The locus of control may tend to lie with the instructor unless the student has transitioned beyond the "just tell me what to do" stage. Our use of Bloom's taxonomy encourages the locus of control to move to the student. This sort of student-centered learning may facilitate transfer. These issues also raise the question, Exactly what would a learner-centered institution look like? Would there be departments and intellectual silos? Would assessment be largely by examination? What role would student initiative play? We also think that Bloom's taxonomy may have much richness to offer the current discussion on teacher evaluation, whereby teaching and its scholarship might become a more valued contribution to the professional development of faculty and, thereby, to the tenure process. Bloom's taxonomy could be applied to an assessment of the cognitive level of the instruction, for example. We note efforts to explore these possibilities at several recent conferences at the University of Washington, Cabrillo College, Arizona State University, and St. Edwards University. We suggest that these are areas of exploration we all might further consider.

This study does provide preliminary evidence that suggests that, even though the bumper sticker suggests otherwise, students can be encouraged to think at higher levels of cognition using the taxonomy. Such thinking is also among the educational goals of every faculty member with whom we have discussed curriculum issues. This study also suggests that use of the taxonomy provides students with a practical tool by which to evaluate their own performance and understand what behaviors indicate that higher order cognition is occurring. In these ways, our use of Bloom's taxonomy supports the development of student responsibility and a student-centered classroom. We think of our efforts as a faculty attempt to learn more about how to be effective and how to more effectively build on the work of our faculty colleagues in other disciplines. We are reinforcing our collective realization that learning is "a search for meaning by the learner—constructing knowledge rather than passively receiving it, shaping as well as being shaped by experiences" (American Association for Higher Education, 1998) and translating this meaning into active pedagogical practice.

Appendix A
Class Self-Assessment Instrument

Name:_____

Self-Assessment of Class Participation

To ensure that we have a common understanding of the level and quality of your class participation, please complete this form and return it to me. I will enter my own assessment and return this form to you. Then, if there is a material difference in our respective positions, please discuss these differences with me. Circle the appropriate number next to each of the following items to indicate how you assess your frequency of participation from *extremely frequently* (7) to *never* (1).

	Extremely Frequently						*Never*
When a colleague offers her or his view on aspects of cases discussed in class, I expand the class discussion by elaborating on her or his perspective.	7	6	5	4	3	2	1
When the instructor offers a view on aspects of a case discussed in class, I expand the class discussion by elaborating on this view.	7	6	5	4	3	2	1
My assessments and critiques of colleagues' and the instructors' views on cases and on current events indicate evaluation.	7	6	5	4	3	2	1
I successfully offer ways to recombine the views created during class discussion of cases and of current events to form new perspectives or new ideas, different from those offered by the original views.	7	6	5	4	3	2	1
I help the class break down case or current-events material into its constituent parts so that its structure may be understood and its important issues may be emphasized.	7	6	5	4	3	2	1
I steer class discussion toward the use of data, principles, and theory learned to answer a question or shed light on an issue in a new context.	7	6	5	4	3	2	1
I share my understanding of what the class material means.	7	6	5	4	3	2	1

I offer my recollection of previously learned material to my colleagues in class to enhance class discussion. This may involve recall of specific facts or of complete theories.	7	6	5	4	3	2	1
Other:	7	6	5	4	3	2	1

Appendix B
The Checklist

_____1. Did you summarize the concepts we have covered in class or in the text? If yes, what may this indicate about the cognitive level of your work? (Knowledge)
_____2. Did you demonstrate that you understood what this material was about by comparing it or contrasting it with other material, current events, etc.? (Comprehension)
_____3. Did you connect the ideas from this material to other readings, class discussions, and your work or other experiences? (Application)
_____4. Did you examine the reading or case so that you identified the author's theories, assumptions, fallacies, or ways of organizing his or her ideas? (Analysis)
_____5. Did you explore the material and use this exploration to build a new understanding of the material or to formulate new ideas or solutions? (Synthesis)
_____6. Did your work clearly demonstrate a critique using course concepts, data, and theories rather than personal opinion as a criterion for evaluation? (Evaluation)

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