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Improving Performance in Accounting: Evidence for Insisting on Cognitive Conflict Tasks

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ABSTRACT: In spite of continual demands for higher-order thinking skills in accounting graduates, accounting educators have resisted emphasizing these skills in courses on the assumption that doing so would jeopardize students' grasp of traditional accounting knowledge. We offer experimental results indicating that this fear may be unwarranted. We found that instruction developing higher-order skills was associated with a significant increase—rather than the feared decrease—in traditional knowledge. We obtained this result by comparing the exam scores in a junior financial accounting course of students who previously completed either traditional accounting principles courses or principles courses with higher-order learning objectives. In traditional courses, instructors focus on instilling mastery of concepts and procedures through tasks that have demonstrably correct answers, tasks known as intellective tasks. In contrast, cognitive conflict tasks for developing higher-order skills have no correct answers because of inherent conflicts of viewpoints. Compared to intellective tasks, cognitive conflict tasks entice learners to make more elaborations and inferences to resolve conflicting aspects. They produce richer, longer-lasting situation models in memory. Cognitive conflict tasks were staged with business simulation episodes that prompted students to create rich situation models in order to comprehend and respond to business dilemmas. To support their advice to clients, learners built spreadsheet models, analyzed the effects of assumptions on decisions, and resolved competing viewpoints. In addition to the performance effect on exam scores, we found that significantly more higher-achieving students enrolled in the junior financial accounting course when students had the cognitive conflict versions of principles courses.

Keywords: active learning; business simulation; cognitive conflict tasks; critical thinking; intellective tasks; principles of accounting courses; problem-based learning; situation model.

Data Availability: Data are available from Professor Borthick.

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THE POSSIBILITY OF IMPROVING PERFORMANCE THROUGH COGNITIVE CONFLICT TASKS

Research on learning suggests that the dominant pedagogy of concept and procedure mastery fails to develop the capabilities required of accountants (Francis et al. 1995). Deterred by both the lack of evidence for better instructional choices and students' struggles with learning just concepts and procedures, accounting educators have, for the most part, persisted with the familiar pedagogy. Although the need for improvements in accounting education has long been acknowledged (American Accounting Association 1986; *Perspectives* 1989; Accounting Education Change Commission 1990; Baril et al. 1998, 65; Albrecht and Sack 2000; Elliott and Jacobson 2002), the conventional wisdom has been that "more emphasis on development of new skills and abilities will come at the cost of loss of traditional accounting knowledge" (Pincus 1997, 65).

In the 1990s, some accounting educators tried to develop students' problem-solving and critical-thinking skills with problem-based learning (Johnstone and Biggs 1998) and cases (Campbell and Lewis 1991; Libby 1991; Knechel 1992). Even with grants from the Accounting Education Change Commission (Flaherty 1998), these efforts did not result in abundant evidence of learning gains. The University of Illinois' Project Discovery (PD) (University of Illinois at Urbana–Campaign 1998) did, however, offer evidence of learning. While the performance of PD students was equivalent to that of traditional students with respect to traditional accounting declarative knowledge, PD students developed better problem-structuring skills and attitudes toward accounting instruction (Stone and Shelley 1997).

Project Discovery was implemented for honors students. How would students of varying abilities respond to more challenging learning experiences? Based on our experimental results, we believe that learning with cognitive conflict tasks can improve comprehension and memory of concepts and procedures as students develop thinking skills they will need as accountants. Cognitive conflict tasks embody inherent conflicts of viewpoints that preclude single right answers. The conflicts may arise from different interpretations of the same information, different weightings of dimensions, different intentions, or different assumed probabilities for events. The process of resolving the conflicts prompts students to develop richer, more complete situation models that improve higher-level thinking.

Cognitive conflict tasks differ from unstructured problem solving in an essential way. Cognitive conflict tasks have no right answers, while unstructured problems may have right answers. For example, in Phillips (2001), the unstructured problem was an optimization problem subject to constraints. The assignment asked students to "recommend one of three depreciation policies for each of two categories of long-lived assets ... recommended policies should satisfy three specific financial-reporting constraints imposed by the company's debt covenants ... operating benchmarks ... and targeted return on investment" (Phillips 2001, 31). Although complex and unstructured, the problem does not require resolving conflicting perspectives because "only one solution satisfied the imposed constraints" (Phillips 2001, 31). In contrast, cognitive conflict tasks admit different conclusions or recommendations depending on how one resolves the conflicting perspectives of players in the situations. Thus, we believe cognitive conflict tasks represent a new construct useful in designing learning experiences.

Cognitive conflict tasks require active learning, but active learning does not require cognitive conflict tasks. Active learners monitor their current levels of mastery and understanding. This monitoring enables students to make sense of what they are learning and to reflect on what worked and what needs improving (Bransford 2000; van Hout-Wolters

et al. 2000). In addition, active learning is desirable because it is associated with higher transfer of learning to new settings (Palincsar and Brown 1984; Scardamalia et al. 1984; Schoenfeld 1985). Because active learning applies to learners' metacognition, one can be an active learner with any problem, independent of the level of thinking.

In our study, accounting principles students in the treatment condition worked on cognitive conflict tasks, replicating accountants' authentic work with its inherent ambiguities and conflicts. Embedded in business simulation episodes, the tasks prompted students to create rich situation models in order to comprehend and respond to problem requirements (Springer and Borthick 2004). In contrast, in the traditional principles environment, students learned accounting through intellective tasks that have correct answers, such as questions based on recall and problems solved through computations. To complete the business simulation episodes, students developed business advice based on the application of accounting principles. Students built spreadsheet models, analyzed the effects of assumptions on decisions, resolved competing viewpoints, created schedules to support advice, and prepared persuasive written advice for clients.

Our research shows that students in the cognitive conflict version of principles courses had higher exam scores in a junior financial accounting course. In addition, higher-achieving students were more likely to enroll in the junior financial accounting course. These results demonstrate that the prior perception of time on higher-order skills as threatening mastery of accounting knowledge may be unwarranted. Students taught with cognitive conflict tasks reflecting authentic accounting work had better comprehension and long-term memory of concepts and procedures than students taught with a more traditional pedagogy.

DEVELOPMENT OF HYPOTHESIS

Better Performance through Experience with Cognitive Conflict Tasks

Traditionally, accounting principles instructors have privileged students' mastery of concepts such as assets, liabilities, and cost drivers, and procedures such as calculating depreciation expense, isolating labor price variances, and preparing financial statements. Instructors have typically assessed conceptual and procedural mastery with recall-type questions and computational problems having correct answers. These questions and problems are examples of intellective tasks, which have demonstrably correct answers (Laughlin 1980; McGrath 1984). Problems with correct answers reinforce a view of knowledge as certain (King and Kitchener 1994), giving students no reason to consider potential ambiguities in how these answers might be used or misused in business settings.

Cognitive conflict tasks, however, portray knowledge as uncertain, requiring students to construct their understanding of a situation to draw a conclusion or justify a recommendation (King and Kitchener 1994). In these tasks, ambiguities preclude single right answers. In psychologists' terms, this kind of comprehension to make sense of specific circumstances constitutes "the construction of a coherent situation model" (Zwaan and Radvansky 1998, 163). In this characterization, students comprehend a problem by constructing a coherent situation model of it in memory (Johnson-Laird 1983; van Dijk and Kintsch 1983; Gernsbacher 1997; Graesser et al. 1997). Incorporating new information or relationships into the model is known as *updating*. Solving problems requires updating the models in memory. Information that coheres with or relates to previously comprehended information is mapped onto the developing structure; information about a different situation maps to a new structure (Gernsbacher 1997; Zwaan and Radvansky 1998).

Consider the intellective task represented in Figure 1 for calculating profits. According to Zwaan et al.'s (1995) event-indexing model, reading the first sentence in the problem

FIGURE 1
Intellective Task Version of Safe Night Out Episode 1

The Problem

Kris and Sandy want to auction tracking devices that record vehicle speed and route. They expect a selling price of $200 per device. The variable material costs per device are $156. The variable selling costs are $2.50 per item plus 5 percent of the selling price.

Requirements

1. How much profit would each device sold generate?
2. If Kris and Sandy wanted to earn $12,000, how many would they have to sell?
3. If they sold four devices each night:
   a. How much profit would they make in 30 days?
   b. How long would it take them to earn $12,000?

statement reveals a selling price of $200. The second sentence reveals variable materials costs of $156. Putting the information from both sentences together gives an integrated model with a selling price of $200 and $156 in variable materials costs.

Each requirement in the problem constitutes a goal, such as answering the question "How much profit would each device sold generate?" Based on understanding *selling price*, *variable costs*, and *profit*, the reader recognizes that the dollar amounts already in his or her integrated model are relevant to a profit calculation. Because this is the end of the situation, the model prompts no elaborations or enhancements.

Model updating in an intellective problem is straightforward because there are neither ambiguities in the language nor inherent conflicts in the situation. The fact pattern includes no motives or intentions likely to prompt elaborations or a more complete situation model. At no point does the reader need to make connecting inferences about intentionality, causality, or probabilities surrounding assumptions in order to update the model (Myers et al. 1987). While the reading may be straightforward, comprehending the immediate situation easily comes at the expense of impoverished long-term memory. Because the easy reading does not prompt elaborations or inferences, the recall value in having worked this problem is low (Duffy et al. 1990).

In contrast, consider the cognitive conflict version of the problem, depicted in Figure 2. The cognitive conflict version requires substantial elaborations to update the integrated model with new information. The business dilemma prompts readers to construct more detailed situation models through making inferences about situation details, including characters' stated and unstated motives and actions (Graesser et al. 1994). For example, the text gives estimates for costs of individual material components for the device without explicitly calling them "variable costs." Readers must make this inference. Students working on the dilemma must also analyze the information in light of the client's goals and consider which assumptions might change (for example, the selling price has not been market tested and fixed costs may not stay at this level if sales objectives are exceeded). In order to think through how their client in the simulation would react to potential accounting outcomes, students need to integrate all the available information into a situation model (Zwaan and Radvansky 1998). In the intellective version of the task, this integration is not required.

Compared to intellective tasks, cognitive conflict tasks do not have correct answers because there is no right way to resolve their inherent ambiguities. Cognitive conflicts arise because different people may interpret the same information differently, weight dimensions

FIGURE 2
Cognitive Conflict Task Version of Safe Night Out Episode 1
(Springer and Borthick 2004)

Learning Objectives

A Successful Learner Will Be Able To:		Learning Objectives
1.	Use product, price, cost and market demand, and decide if the product is feasible.	1. Identify variable and fixed costs. 2. Select relevant information. 3. Analyze feasibility of product using price, market volume, minimum earnings, and fixed and variable costs.
2.	Decide how each element of cost and price affects product profitability.	1. Calculate profit and contribution margin and contrast the two.
3.	Explain how sales volume and cost structure assumptions would likely affect profitability per unit.	1. Analyze profitability implications of changing assumptions and forecasts. 2. Report results of analysis to internal and external users.
4.	Create a spreadsheet (in good form) to compute and update: 1. The profit per unit based on a variety of sales volume estimates. 2. Monthly earnings based on a variety of sales volume estimates. 3. Breakeven sales and units given target profit estimates.	1. Create models using technology tools. 2. Create schedules to highlight observations and facilitate reader comprehension of conclusions.
5.	Identify the important assumptions that drive the conclusion about product feasibility.	1. Analyze profitability implications of changing assumptions and forecasts. 2. Explain how fixed costs and sales volume assumptions are important to per unit profit calculations.
6.	Write a professional memo (brief, clear, well-organized, without jargon) to a client that: 1. Summarizes the conclusions about product feasibility, 2. Explains how long it will take to reach the goals, and 3. Explains how changing sales volume estimates impacts both product profitability and length of time to reach the goals.	1. Report results of analysis to internal and external users. 2. Create schedules to highlight observations and facilitate reader comprehension of conclusions.

Business Dilemma

Do you know where your car is?
Do you know how it's being driven?

How it all started...

Kris and Sandy, roommates at Le Grande State University, overheard their parents' friends talk about how they wished there was some way to let their teenage children, especially the new drivers among them, have access to family cars, but still have some assurance that their offspring were driving responsibly. By "responsibly," the parents meant that the drivers stayed within the speed limits and within permitted geographical areas.

Kris had an idea: "You could create a tracking device that would be installed in the cars that would record the route and speed of the vehicle for 24 hours. The car knows how fast it's going, and the

(*continued on next page*)

FIGURE 2 (Continued)

location could be obtained from a global positioning system (GPS). With just a little bit of programming, you could record the speed and location on a writable CD-ROM, which moms and dads could pop in their computer to see how their offspring were behaving (or misbehaving!)."

Sandy: "I hope you're not serious about this project—remember that last programming project you had—remember how long it took!"

Kris: "Yeah, well, I've learned better programming techniques since then."

Sandy: "Just think of the possibilities—the typical 'youthful driver' premium is $2,000 over the family rate per year. The automobile insurers that now offer 10 percent discounts for teenage 'good students' might offer discounts for student-driven cars that had such a tracking device. Wonder what this kind of assurance would be worth to parents?"

Sandy and Kris couldn't stop thinking about the idea—in fact, they were late to classes the next morning because they stayed up most of the night thinking of the possibilities. Before the night was over, they'd thought through the materials that would be needed (GPS tracker, serial cable, CD-ROM disk), the programming that would be required (Kris would do it with Sandy testing it), and how they'd sell it (on eBay on a commission basis).

Here are the details they supplied (see below).

A few days later ...

Coming up for a reality check, Kris and Sandy realized they needed help figuring out whether their idea, which they were now calling Safe Night Out (SNO for short) was feasible. They knew you were taking an accounting course so they elected you to help them. (They'd helped you out of several jams, so how could you refuse?) They want to know what to expect. Specifically, they want to know:

1. How much profit would each SNO generate?
2. If Kris and Sandy wanted to earn enough to pay for school tuition, how many would they have to sell?
3. If they achieve the estimated sales each night on eBay, how much profit would they make in a month?
4. If they achieve the estimated sales each night on eBay, how long would it take them to earn Le Grande State tuition?

Requirements

Your assignment is to develop a spreadsheet that answers the entrepreneurs' questions. Include separate sheets for input, calculations, reports, and the advice memo. Make cells in the calculation sheet reference cells in the input sheet so that the calculation sheet updates with changes in the input sheet. Use the report sheet to summarize the most important findings for the client. In a one-page advice memo (prepared with a word processor), advise the entrepreneurs about the feasibility of their product. Import the memo into a separate sheet.

Details

Item	Estimated Cost
Materials	
GPS tracker	$150
Serial cable	$5
CD-ROM disk	$1
Sales Assumptions	
eBay selling costs	$2.50 per item plus 5% of selling price
Selling price	$200
Estimated number of SNOs that would be sold each night	4
Other Information	
Tuition at LeGrande State University, per student	$6,000

differently, have different intentions, or assume different probabilities for events. In the presence of cognitive conflicts, students draw conclusions and justify recommendations based on the most complete, plausible, or compelling understanding of a situation, given the available evidence (King and Kitchener 1994).

In business settings, cognitive conflicts arise when people have different decision criteria or differing probabilities for possible outcomes. For example, fiscal officers might key on cost and cash flow constraints, production managers might view the same items through the lens of the use of production facilities, and personnel managers might favor taking action based on the effects on company-union relations. Each manager may assign different probabilities to potential outcomes, leading to a range of recommendations based on perceived risks to the plan. The managers, however, have the same goal—a profitable company. As McGrath explained about the plight of one set of managers, "[n]one can profit at the expense of the others. Yet they might profoundly disagree, not only on what is the best alternative for each of a series of agenda items, but more fundamentally, on what are the important criteria on which to base company policy," (McGrath 1984, 94).

Although intellective tasks and cognitive conflict tasks differ substantially in the number and kinds of inferences readers make, the more significant difference between the two kinds of tasks is whether students must resolve different viewpoints. While the intellective task (Figure 1) requires no resolution of conflicts, the cognitive conflict version of the task (Figure 2) requires students to resolve conflicts between the assumptions underlying the feasibility forecasts and the entrepreneurs' intentions. Conflicts prompt more effort to construct coherent models from otherwise contradictory fragments, even if that effort requires constructing and integrating additional models (Barsalou 1999).

Because they require more elaborations and inferences to resolve ambiguities among situational aspects, cognitive conflict tasks make more cognitive demands than intellective tasks. Updating situation models with respect to intentionality, causality, and probabilities surrounding assumptions yields richer models with more relations that are more useful later than a larger number of more simplistic models afforded by intellective tasks (Zwaan and Radvansky 1998). Furthermore, integrated situation models constructed from elaborations and inferences to resolve conflicts are relatively resistant to memory decay, compared to models developed without making elaborations and inferences (Zwaan et al. 1995).

Thus, relative to students experiencing only intellective tasks, we believe students experiencing cognitive conflict tasks will be more likely to construct richer, more detailed situation models that will be more stable in long-term memory. Furthermore, better integrated situation models should be associated with better performance on subsequent intellective tasks relying on long-term memory. This premise is the following hypothesis:

H1: Experience with cognitive conflict tasks will be associated with better long-term performance on intellective tasks, based on retrieval from these models in memory.

The generative mechanism for the cognition in H1 is the process of constructing and applying situation models to resolve cognitive conflicts. Making the inferences required to construct rich, detailed situation models causes learners to create their own knowledge rather than simply receive knowledge from others. Applying these situation models gives learners practice in resolving cognitive conflicts. This process of constructing knowledge and applying it affords learners opportunities to function at higher stages of reflective judgment (Kroll 1992; King and Kitchener 1994), enhancing their capabilities for critical thinking (Egan 1997). In the process of completing authentic accounting tasks, learners

discover that they can participate in the social justification of belief that characterizes professional practice (Lave and Wenger 1991; Wenger 1998), which helps them identify with the practice of accounting. Moreover, the combination of growing capabilities and identification with accounting prompts more engagement. Increasing engagement prompts interest in developing better intellectual tools to solve problems in more challenging situations. In a virtuous spiral, growing capabilities and increasing engagement reinforce each other. As a manifestation of this process, we propose:

H2: Experience with cognitive conflict tasks will be associated with more higher-achieving students enrolling in the junior financial accounting course.

METHOD

Design

The research was conducted in the framework of a quasi-experimental nonequivalent control group design without pretest in a time-delayed setting (Campbell and Stanley 1963). Adjusted for prior academic achievement, performance on exam scores in a subsequent accounting course was analyzed in analyses of covariance (ANCOVA) as a function of participants' accounting principles experience (number of cognitive conflict courses: 0, 1, or 2).

Because resource constraints precluded offering the two versions of accounting principles courses (traditional principles and cognitive conflict principles) in parallel to students at the implementation school, the design did not admit a comparison of the performance of students having cognitive conflict principles courses and traditional principles courses during the same year from the same school. Consequently, the generalizability of the results may be subject to concerns regarding potential nonequivalence of the control group. Our design does, however, avoid the confound of students systematically self-selecting into control and treatment conditions, and the potential for the perception of unequal treatment that self-selection can engender (Stone and Shelley 1997).

Participants

Participants were students enrolled in the first junior-level accounting course in financial accounting (Fall 2001 through Summer 2002, n = 342) at a university whose student body includes approximately one-half transfer students. Table 1 shows the means for participant attributes by student residency (transfer or native) and the number of prior cognitive conflict courses taken (0, 1, or 2). Table 1 distinguishes between native students—those enrolled in the first principles course (Principles I) at the implementation school—and transfer students—those taking one or both principles courses at another school. Through a combination of personal contact with faculty members and examination of course descriptions and syllabi at institutions from which students transferred credit for accounting principles courses, we determined that all the transferred courses used traditional textbooks and focused on intellective tasks associated with mastery of concepts and procedures.

As shown in Table 1, participants with cognitive conflict experience (1 or 2 cognitive conflict courses) took principles courses more recently than other participants, were younger, were more likely to be full-time students, and had higher accounting and cumulative grade-point averages (GPAs), with cumulative GPAs reflecting grades in courses completed prior to their taking the junior financial accounting course. For transfer students, this GPA included transferred hours. To obtain a GPA measure from the same institution for all students, we constructed an institutional GPA based on the term of the performance measure and the next term if there were fewer than seven hours in the term of the

TABLE 1
Attributes of Participants in the Junior Financial Accounting Course
Mean (Std. Dev.)

	Transfer Students[a] Number of Cognitive Conflict Courses		Native Students[b] Number of Cognitive Conflict Courses		
Attribute	**0**	**1**	**0**	**1**	**2**
Number of participants	177	16	49	20	80
Cumulative GPA[c]	2.91 (.70)	3.13 (.66)	2.97 (.46)	2.86 (.51)	3.21 (.50)
Institutional GPA[d]	2.96 (.81)	3.22 (.82)	3.11 (.68)	2.99 (.55)	3.34 (.64)
Accounting Principles I and II GPA	3.17 (.73)	3.19 (.70)	3.03 (.78)	2.93 (.61)	3.41 (.69)
Credit hours per term	10.2 (4.3)	12.1 (3.4)	10.8 (3.8)	11.1 (4.0)	12.4 (3.9)
Age in years	28 (5.9)	26 (3.5)	28 (7.6)	27 (6.2)	25 (5.9)
Percent female	67%	50%	47%	75%	64%
Months since Principles I course	46 (49)	35 (29)	38 (30)	24 (22)	12 (5)
Number of withdrawals	52	4	13	5	12
Percent of students withdrawing[e]	29.4%	25.0%	26.5%	25.0%	15.0%

[a] Transfer students defined as students taking Principles I at another school.
[b] Native students defined as students taking Principles I at the implementation school.
[c] Includes transferred hours.
[d] Recent GPA at the institution, excludes transfer hours.
[e] Of the 86 withdrawals, 37 occurred before the first exam.

performance measure. The institutional GPA measure excluded the junior financial accounting course. The accounting principles GPAs were the GPAs from the two accounting principles courses, prerequisites to the junior financial accounting course. All demographic and background attributes about participants were obtained from institutional records. For transient students[1] for whom cumulative GPAs were not available (n = 9), cumulative GPAs were proxied by the institutional GPA constructed as explained above.

The Accounting Principles Experience

Control: Traditional Accounting Principles Courses

In the traditional accounting principles courses, learning focused on mastering concepts such as assets, liabilities, cost drivers, and incremental costs and procedures like calculating depreciation expense, isolating labor price variances, preparing financial statements, and computing variable budgets. In these courses, students learned about accounting and demonstrated their mastery by completing intellective tasks such as answering questions about concepts and calculating and preparing accounting results for well-structured problems with "correct" solutions (Laughlin 1980; McGrath 1984).

Treatment: Cognitive Conflict Tasks in Accounting Principles Courses

Students in the treatment condition worked cognitive conflict tasks (Laughlin 1980; McGrath 1984) in the form of business simulation episodes. The courses centered on learning to apply accounting concepts and procedures in business contexts to achieve business objectives. The learning experiences were staged with simulation episodes in which students

[1] Transient students are those taking a course for credit at another institution.

applied accounting skills to address business dilemmas. To complete an episode, students (1) analyzed assumptions, unknown variables, client biases, and risk factors, and (2) prepared and communicated recommendations to clients incorporating clear, convincing support. In the absence of "correct solutions," students reasoned under uncertainty, communicated the meaning of computations in particular circumstances, and cautioned clients about when the advice or computations might cease to be useful. In the first course, simulation episodes were based on those in Springer and Borthick (2004), which map learning objectives for each episode into the King and Kitchener (1994) stages of reflective judgment. Similar learning experiences were staged in the second course,[2] one of which appears in Figure 3.

Instructional time in the treatment condition was the same as in the control condition. To equalize the time demands on students, courses in the treatment condition required fewer intellective-type exercises for out-of-class completion than courses in the control condition. In the principles courses, exams in the control and treatment conditions included only intellective-type questions.

The same integrated text (Ainsworth et al. 2000) was used in both courses. The text, organized around a cycle of planning, operating, and evaluating, supported the learning outcomes for introductory accounting courses. Principles I included planning (breakeven analysis, budgeting, special decisions, and costing), developing and applying the accounting cycle, recording operating activity, and developing financial statements. Principles II reviewed the operating cycle, making investing and financing decisions, and analyzing financial statements and ratios.

Performance Measures

Performance measures for testing H1 (that experience with cognitive conflict tasks will be associated with better long-term performance on intellective tasks) were exam scores in the junior financial accounting course. Exam 1 comprised topics that were covered in the accounting principles courses: the accounting cycle, adjusting entries, financial statement preparation, and basic concepts of accounting. With similar kinds of questions, exam 2 and the final exam covered topics not included in accounting principles courses. Exam score means appear in Table 2.

Individual instructors prepared and scored the exams with no knowledge of the students' backgrounds. Two full-time experienced financial accounting faculty members and one experienced Ph.D. student taught the sections. The instructors used the same text (Skousen et al. 2000) and covered the same topics. The format in all sections included class lectures, discussions, and homework problems from the ends of the chapters. No sections required projects, cases, or business simulations. To enable analyses invariant to instructor differences, we computed Z-scores of exam scores by instructor. To verify that no instructor had a disproportionate share of students with 0 or 2 cognitive conflict courses, we conducted a χ^2 test on the proportions of students with 0 and 2 cognitive conflict courses taking the junior financial course from different instructors. The difference was not significant ($\chi^2 = 1.61$, $p = 0.204$).

RESULTS

Covariate Selection

The following variables were considered for covariates to control for systematic differences across participants: cumulative GPA, institutional GPA, accounting (Principles I

[2] For access to all the simulation episodes, contact one of the authors.

FIGURE 3
Cognitive Conflict Task Example
Lump Sum versus Annuity

Learning Objectives

A Successful Learner Will Be Able To:		Learning Objectives
1.	Write a professional memo with supporting schedules that recommends a choice between taking a lump sum or an annuity, based on the client's preferences and explains the reasoning for the recommendation.	1. Communicate results of analysis to internal and external users 2. Create schedules to support and illustrate recommendations and conclusions
2.	Determine the point of indifference between a lump sum today and an annuity in the future.	1. Determine indifference points 2. Calculate and compare present value and future value 3. Calculate and compare wealth from a lump sum versus an annuity
3	Decide how income taxes influence the decision to accept a lump sum or an annuity.	1. Apply income taxes with incremental tax rates 2. Use online resources to find information
4.	Explain how interest rates and investment return rates change the decision to accept a lump sum or an annuity.	1. Determine the effect of interest rates on investment return rates 2. Determine the effect of investment return and interest rates on future values
5.	Calculate and analyze the wealth accumulated with a lump sum compared to an annuity under different interest rates.	1. Calculate present and future values of a lump sum and an annuity 2. Identify relevant data
6.	Create a spreadsheet (in good form) analyzing the future value of each option at multiple interest rates.	1. Develop spreadsheet models 2. Model what-if scenarios

Business Dilemma

With the help of Dr. Works, their CPA business advisor and fellow alumni, Kris and Sandy graduated and have been wildly successful in their adventures with car-tracking products. They have expanded to devices that monitor the mechanical functions and rear seat entertainment systems for families. They are both multimillionaires and active in mentoring students at their alma mater.

Kris: "Are you getting tired of speaking at alumni functions?"

Sandy: "Heck no. Isn't it a kick to see the Multimedia Center with your name on it? I still remember the look on Dean Willowby's face when you said you were donating $5 million!"

Kris: "I really like watching the students get excited about being entrepreneurs. I remember just being another sophomore trying to get into the computer lab! Hey, look who just walked in? Dr. Works, our favorite CPA business advisor!"

Dr. Works: "Hello fellow alumni! Having fun showing off? I just finished visiting with Lee Yin, the newest millionaire at LeGrande University."

(*continued on next page*)

FIGURE 3 (Continued)

Sandy: "Who?"

Dr. Works: "Lee is a sophomore here who just won the Big Game lottery. The new millionaire wants some advice."

Kris: "Lee just got lucky again. Dr. Works to the rescue."

Dr. Works: "Actually, I just referred Lee to one of LeGrande's accounting students."

You're elected! Help Lee decide whether to take the winnings as a lump sum or as a 26-year annuity.

Requirements

1. Assume that Lee will use $400,000 each year for personal use. Create a spreadsheet to analyze whether the lump sum receipt is better than the 26-year annuity. Prepare the analysis using three interest rate assumptions: 4 percent, 6 percent, and 9 percent. In your analysis, determine what Lee will be worth at the end of Year 26 under each option and interest rate combination. Be sure to provide input cells for both interest rate and personal use allowance. This will allow Lee to study the results using different assumptions.
2. Determine the interest rate at which would Lee be *equally happy* with the lump sum or the annuity.
3. Write a brief one-page memo to Lee explaining which option is better *and why*. Create an Excel® table with all six options for comparison purposes as the formal report page of the spreadsheet. (Note: In your memo, do not use any technical terms such as NPV or IRR because Lee doesn't understand these concepts.) Insert the Word® document memo as the first sheet in your spreadsheet so that Lee can easily flip back and forth between the table and calculations while reading the memo.

Details

Item	**Amount**
Lottery winnings may be taken as either:	
Lump sum	$41,173,095.17
Annuity for 26 years, per year	$3,200,000.00
Annual allowance for Lee's personal use	$400,000.00

Assumptions:

1. Winnings are paid on the first day of each year.
2. The personal allowance is taken out of the winnings payment on the first day and put into a checking account that does not earn interest.
3. Winnings less personal allowance are invested on the first day of the year at the assumed interest rate.
4. Lee is unable to comprehend net present value and future value computations and would like to *see* how the wealth changes each year, which suggests creating a table showing the wealth increases and deductions for personal allowances each year.

and II) GPA, number of months since Principles I, age, gender, and credit hours per term. Of these, only cumulative GPA and institutional GPA were significantly related to exam performance. None of the other covariate candidates was retained. The analyses presented below gave similar results with and without the nonsignificant covariate variables. Because cumulative GPAs may not have been uniform across native and transfer participants (Table 1), we used ANCOVA to determine whether there was an interaction between cumulative GPA and status (native or transfer). The interaction was not significant ($F = 1.343$, $p = 0.119$).

H1: Performance as a Function of Principles Experience

Hypothesis 1, that experience with cognitive conflict tasks will be associated with better performance on intellective tasks requiring retrieval from models in memory, was tested in

TABLE 2
Exam Scores in the Junior Financial Accounting Course
Mean (Std. Dev.)

	Number of Cognitive Conflict Courses						All Participants (n = 342)	
	0 (n = 226)		1[a] (n = 36)		2 (n = 80)			
	Score	Z-Score[b]	Score	Z-Score	Score	Z-Score	Score	Z-Score
Exam 1	70.52 (16.35)	−0.178 (1.03)	73.35 (16.46)	0.023 (0.98)	80.83 (11.70)	0.480 (0.74)	73.28 (15.93)	0.00 (1.00)
Exam 2[c]	73.56 (17.37)	−0.099 (1.04)	75.12 (15.62)	0.063 (0.89)	78.64 (14.81)	0.216 (0.89)	75.05 (16.64)	0.00 (1.00)
Exam 3[d]	74.15 (18.15)	−0.047 (1.01)	71.70 (18.46)	−0.167 (1.09)	77.61 (15.51)	0.178 (0.91)	74.81 (17.55)	0.00 (1.00)

[a] Some transfer and traditional lagged students in Principles I took Principles II with cognitive conflict tasks. Students transferring after Principles I and native students completing the second principles course after taking the first course prior to implementation of cognitive conflict principles comprised a group with one transferred or lagged principles course and one cognitive conflict course. These students were coded as one cognitive conflict course (cognitive conflict = 1).
[b] Z-scores of exam scores by instructor.
[c] Scores on exams 2 and 3 were subject to systematic, non-ignorable loss of participants (Rubin 1976), i.e., course withdrawals were confounded with the number of cognitive conflict courses with withdrawal rates being inversely proportional to the number of cognitive conflict courses. Thus, scores on exams 2 and 3 are not analyzed further.

two separate ANCOVA models for exam score adjusted for either cumulative GPA or institutional GPA. While cumulative GPAs include transferred courses, institutional GPAs are based only on courses taken at the implementing institution. For exam 1 scores, cognitive conflict experience was significantly associated with exam performance for all students in a model with institutional GPA ($F = 5.71$, $p = 0.004$, Table 3, Panel A) and in a model with cumulative GPA ($F = 6.42$, $p = 0.002$). (Results for the model with cumulative GPA are not shown in the table.) Results based on Z-scores for exam 1 were similar to results for raw exam scores, i.e., students with cognitive conflict experience outperformed other students in a model with institutional GPA ($F = 6.23$, $p = 0.002$, Table 3, Panel A) and in a model with cumulative GPA ($F = 6.95$, $p = 0.001$). Results were similar for subgroups of students completing the term and native-only students.

To ensure that the performance effect was not a function of differences between native and transfer students, we ran the analysis for only native students taking Principles I within 24 months of the junior financial accounting course. Cognitive conflict participants outperformed traditional participants in a model with cumulative GPA ($F = 3.07$, $p < 0.052$, Table 3, Panel B). Running these tests with Z-scores for exam 1 gave similar results (with cumulative GPA: $F = 2.73$, $p = 0.071$). We used cumulative GPA in these models because it incorporates more hours than the institutional GPA.

Table 3, Panel A gives contrast results comparing performance across the number of cognitive conflict courses. Although neither the difference between 0 and 1 cognitive conflict courses ($F = 0.50$, $p = 0.478$) nor between 1 and 2 cognitive conflict courses ($F = 2.48$, $p = 0.116$) was significant, the difference in least-squares performance means between 0 and 2 cognitive conflict courses was significant for all students ($F = 11.42$, $p < 0.001$). The significant differences between 0 and 2 cognitive conflict courses supports H1; cognitive conflict experience is associated with better long-term performance on intellective tasks. The lack of significant results for the difference between 0 and 1 and between

TABLE 3
ANCOVA: Exam 1 Score as a Function of Cognitive Conflict Experience (two-tailed tests)

Panel A: All Students (n = 305)

	Raw Scores					Z-Scores				
Source of Variance	**Type III SS**	**df**	**MS**	**F-value**	**p-value**	**Type III SS**	**df**	**MS**	**F-value**	**p-value**
Institutional GPA	9018.4	1	9018.4	43.46	0.000	33.1	1	33.1	40.50	0.000
Cognitive conflict courses (0, 1, or 2)	2370.3	2	1185.2	5.71	0.004	10.2	2	5.1	6.23	0.002
Error	62454.5	301	207.5			245.7	301	0.8		
Model R^2 = 0.19						Model R^2 = 0.19				

Contrasts (raw scores) on the Number of Cognitive Conflict Courses

0 versus 1	104.5	1	104.5	0.50	0.478
1 versus 2	515.3	1	515.3	2.48	0.116
0 versus 2	2369.7	1	2369.7	11.42	0.001

Number of Cognitive Conflict Courses	**Least-Squares Mean**	**Std. Error**	**95% CI Lower Bound**	**95% CI Upper Bound**
0	71.43	1.02	69.41	73.45
1	73.40	2.59	68.31	78.50
2	78.31	1.73	74.91	81.71

Panel B: Native Students within 24 Months of Principles Courses (n = 89)

	Raw Scores					Z-Scores				
Source of Variance	**Type III SS**	**df**	**MS**	**F-value**	**p-value**	**Type III SS**	**df**	**MS**	**F-value**	**p-value**
Cumulative GPA	2205.0	1	2205.0	15.35	0.000	8.5	1	8.5	15.17	0.000
Cognitive conflict courses (0, 1, or 2)	880.6	2	440.3	3.07	0.052	3.1	2	1.5	2.73	0.071
Error	12209.0	85	143.6			47.6	85	0.6		
Model R^2 = 0.22						Model R^2 = 0.21				

Contrasts (raw scores) on the Number of Cognitive Conflict Courses

0 versus 1	221.9	1	221.9	1.54	0.217
1 versus 2	19.1	1	19.1	0.13	0.717
0 versus 2	879.4	1	879.4	6.12	0.015

Number of Cognitive Conflict Courses	**Least-Squares Mean**	**Std. Error**	**95% CI Lower Bound**	**95% CI Upper Bound**
0	70.98	3.48	64.07	77.89
1	78.43	4.89	68.70	88.16
2	80.29	1.42	77.46	83.12

1 and 2 cognitive conflict courses may indicate a threshold effect, i.e., that a single course is not enough experience with cognitive conflict tasks to yield differential performance.

Between the first and second exams there was a systematic loss of participants due to course withdrawals. Students who had taken two cognitive conflict courses were significantly less likely to withdraw (withdrawal rate = 15.0 percent) from the junior financial course than students who had taken no cognitive conflict courses (withdrawal rate = 28.8 percent) (χ^2 = 5.94, p = 0.015). Because participants dropped the course at differential rates depending on the number of cognitive conflict principles courses they had taken (Table 1), participant loss is non-ignorable with respect to analysis. In this case, participants who withdrew differed systematically on the number of cognitive conflict courses, which means that results based on the remaining participants may not be generalizable to those who withdrew from the course (Rubin 1976). Consequently, we did not include analyses based on scores on exam 2 and the final exam because they would not be generalizable.

Equivalence of Native and Transfer Students in Prior Year

Although our analyses indicate that the learning effect of cognitive conflict tasks persists through different subgroups of students, the quasi-experimental design prompts the need to determine the extent to which native and transfer students' prior academic performances were comparable. If transfer students underperformed native students in the prior year, then the learning effect could be confounded with residency status. To gauge the relative performance of native and transfer students, exam scores of native and transfer students in six sections of the junior financial accounting course from Spring 1999 through Summer 2000 were compared. Full-time faculty members taught the sections, one of whom taught sections in the year of the study. Mean GPAs (Table 4) were very similar: 2.92 and 2.93 for transfer students and native students, respectively. Although the mean exam 1 score for transfer students (78.2) appeared higher than the mean score for native students (74.7) (Table 4), the difference was not significant in a t-test of means (F = 1.699, p = 0.20) or of Z-scores (F = 1.617, p = 0.21). In separate ANCOVAs for exam 1 score, residency status (native or transfer) was not significant adjusted for cumulative GPA (F = 2.71, p = 0.102), adjusted for accounting GPA (F = 0.81, p = 0.131), or adjusted for credit

TABLE 4
Performance in the Junior Financial Accounting Course in the Year Prior to Implementation of Cognitive Conflict Principles Courses[a]
Mean (Std. Dev.)

Attribute	Transfer Students	Native Students[b]	All Students
Number of students	69	86	155
Cumulative GPA	2.92 (.62)	2.93 (.53)	2.92 (.58)
Accounting (Principles I and II) GPA	2.94 (.95)	3.12 (.66)	3.02 (.83)
Mean credit hours per term	10.5 (4.2)	11.0 (4.3)	10.7 (4.2)
Exam 1 score: Junior financial accounting	78.2[c] (15.1)	74.7[c] (16.4)	76.8 (15.8)

[a] Includes students from six sections from Spring 1999 through Summer 2000.
[b] Native student defined as students completing Principles I at the implementation institution.
[c] Difference not significant (F = 1.699, p = 0.20).

hours per term (F = 1.32, p = 0.252). The lack of significant differences between transfer and native students is consistent with neither native nor transfer students being inherently superior to the other with respect to performance in the prior year. To the extent this relationship persists over time, it is unlikely that the learning effect was a function of residency status in the study year (Fall 2001–Summer 2002).

H2: Higher-Achieving Students from Cognitive Conflict Principles

An ANCOVA with prior academic achievement (cumulative GPA) as the dependent measure and the number of cognitive conflict courses (0, 1, or 2) as the independent variable showed that the mean cumulative GPA for participants with cognitive conflict courses was significantly higher (F = 6.43, p = 0.002) (Table 5, Panel A). The higher GPA result as a function of experience with cognitive conflict tasks persisted when a covariate for credit hours was added to the model (F = 5.05, p = 0.007, Table 5, Panel B). These results support H2, that cognitive conflict tasks will be associated with more higher-achieving students enrolling in an accounting major course.

DISCUSSION

This analysis supports the hypothesis that the more cognitive conflict task experience students had in two accounting principles courses, the better they performed on a review exam in the junior financial accounting course. Moreover, this instructional innovation was associated with more higher-achieving students enrolling in the junior financial accounting course. The results are good news for accounting education. They open up new possibilities for designing learning experiences that develop students' thinking capabilities, individually and collaboratively, and improve their long-term memory of concepts and procedures.

We believe finding an effect for an instructional innovation up to a year after course completion is a promising response to the demands of the accounting profession and the business community for more capable students. The results also call into question the notion that a large amount of prerequisite instruction must occur before students are ready to understand real-world situations and participate in authentic accounting tasks (Derry and Lesgold 1996).

TABLE 5
ANCOVA: Cumulative GPA[a] of Students in the Junior Financial Accounting Course as a Function of Cognitive Conflict Principles Experience (two-tailed tests)

	Type III SS	df	MS	F-value	p-value
Panel A: All Students (n = 342)					
Cognitive conflict courses (0, 1, or 2)	4.9	2	2.4	6.43	.002
Error	129.2	339	.4		
Panel B: All Students Analyzed with Credit Hours per Term (n = 342)					
Credit hours per term (covariate)	1.1	1	1.1	2.94	.088
Cognitive conflict courses (0, 1, or 2)	3.8	2	1.9	5.05	.007
Error	128.1	338	.4		

[a] For 13 post-baccalaureate and transient students, semester average, accounting GPA, or grade for semester enrolled at implementation school was used in lieu of missing cumulative GPAs.

Performance: Traditional Tasks versus Cognitive Conflict Tasks

Although accounting faculty members have long been concerned that instructional time spent on higher-level skills would come at the expense of traditional accounting knowledge (Pincus 1997), no such loss occurred. Not only was there no loss, but students experiencing cognitive conflict tasks also outperformed their traditional peers on the first exam in the traditional junior financial accounting course. This outcome is noteworthy because students benefiting from the innovation performed better on traditional tasks, even after spending less time on them in the cognitive conflict principles courses.

Because of non-ignorable data loss (Rubin 1976) engendered by course withdrawal rates that were inversely proportional to the number of cognitive conflict courses, we cannot offer evidence other than the analysis of scores on one exam with intellective questions. Thus, we leave open the question of the effect of experience with cognitive conflict tasks on performance on new topics not covered in principles courses and on cognitive conflict tasks. We invite future researchers to explore the potential for experience with cognitive conflict tasks to improve subsequent performance on new content and on cognitive conflict tasks. Similarly, further research might address some of the weaknesses of our study, including the quasi-experimental, non-equivalent control group design and the lack of control for student time.

Interpreting the Student Quality Effect

The cumulative and accounting (Principles I and II) GPAs of students choosing to major in accounting after experience with cognitive conflict tasks were higher than those of students with traditional accounting principles courses (Table 1). Did the authentic experience of the business simulations stimulate interest in accounting in higher-ability students, or did the cognitive conflict tasks develop the ability of students during the introductory courses? We acknowledge that this study does not separate the self-selection component from the development component. Further study is needed to tease out the reasons for more higher-achieving students selecting the first junior financial accounting course after taking cognitive conflict principles courses, and whether the result is idiosyncratic to this instance.

Comparison with Project Discovery

A comparison of the experience in accounting principles with Project Discovery (PD) reveals interesting similarities and differences. The similarities include: learning theory-driven curriculum change; a focus on complex, unstructured, and ambiguous problems; no loss of performance on traditional accounting tasks; and generalizability threatened by a self-selection bias (PD) or a nonequivalent control group (this study). There were differences with respect to student quality, scope of the curriculum change, funding source, and faculty composition. The similarities point to the possibility of achieving curriculum change that enables students to develop higher-order reasoning skills with no loss in traditional learning objectives. The differences illustrate that learning gains are possible across different kinds of institutions with varying resources and student quality.

Conclusion

In this research, experiencing cognitive conflict tasks in two accounting principles courses was associated with higher first exam scores in the part of a junior-level financial course on content similar to that of Principles I and II and more higher-achieving students selecting the accounting major course. We believe that this curriculum change is responsive to the demand from the accounting profession for accounting programs to improve student

outcomes and attract more capable students. In addition, finding a performance result one to five semesters after the learning intervention attests to the power of experience with cognitive conflict tasks to prompt the construction of situation models that are resistant to memory decay compared to those associated with more traditional instruction. We hope this work prompts further studies testing the effects of using cognitive conflict tasks throughout the curriculum and analyzing specific ways to enable learning gains.

REFERENCES

Accounting Education Change Commission (AECC). 1990. Objective of education for accountants: Position Statement Number One. *Issues in Accounting Education* 5 (2): 307–312.

Ainsworth, P., D. Deines, R. D. Plumlee, and C. D. Larson. 2000. *Introduction to Accounting: An Integrated Approach.* Burr Ridge, IL: Irwin McGraw-Hill.

Albrecht, W. S., and R. J. Sack. 2000. *Accounting Education: Charting the Course through a Perilous Future.* Accounting Education Series Volume 16. Sarasota, FL: AAA.

American Accounting Association (AAA), Committee of the Future Structure, Content, and Scope of Accounting Education (the Bedford Committee). 1986. Future accounting education: Preparing for the expanding profession. *Issues in Accounting Education* 1 (1): 168–195.

Baril, C. P., B. M. Cunningham, D. R. Fordham, R. L. Gardner, and S. K. Wolcott. 1998. Critical thinking in the public accounting profession: Aptitudes and attitudes. *Journal of Accounting Education* 16 (3/4): 381–406.

Barsalou, L. W. 1999. Language comprehension: Archival memory or preparation for situated action? *Discourse Processes* 28 (1): 61–80.

Bransford, J. 2000. *How People Learn: Brain, Mind, Experience, and School.* Expanded edition. Washington, D.C.: National Academy Press.

Campbell, D. T., and J. C. Stanley. 1963. *Experimental and Quasi-Experimental Designs for Research.* Chicago, IL: Rand McNally.

Campbell, J. E., and W. F. Lewis. 1991. Using cases in accounting classes. *Issues in Accounting Education* 6 (2): 276–283.

Derry, S., and A. Lesgold. 1996. Toward a situated social practice model of instructional design. In *Handbook of Educational Psychology*, edited by D. C. Berliner, and R. C. Calfree. New York, NY: Simon & Shuster Macmillan.

Duffy, S. A., M. Shinjo, and J. L. Myers. 1990. The effect of encoding task on memory for sentence pairs varying in causal relatedness. *Journal of Memory and Language* 29: 27–42.

Egan, K. 1997. *The Educated Mind: How Cognitive Tools Shape Our Understanding.* Chicago, IL: University of Chicago Press.

Elliott, R. K., and P. D. Jacobson. 2002. The evolution of the knowledge professional. *Accounting Horizons* 16 (1): 69–80.

Flaherty, R. E., ed. 1998. *Accounting Education Change Commission Grant Experience: A Summary.* Accounting Education Series, Volume 14. Sarasota, FL: AAA.

Francis, M. C., T. C. Mulder, and J. S. Stark. 1995. *Intentional Learning: A Process for Learning to Learn in the Accounting Curriculum.* Accounting Education Series, Volume 12. Sarasota, FL: AAA.

Gernsbacher, M. A. 1997. Two decades of structure building. *Discourse Processes* 23: 265–304.

Graesser, A. C., M. Singer, and T. Trabasso. 1994. Constructing inferences during narrative text comprehension. *Psychological Review* 101: 371–395.

———, K. K. Millis, and R. A. Zwaan. 1997. Discourse comprehension. *Annual Review of Psychology* 48: 163–189.

Johnson-Laird, P. N. 1983. *Mental Models: Towards a Cognitive Science of Language, Inference, and Consciousness.* Cognitive Science Series 6. Cambridge, MA: Harvard University Press.

Johnstone, K. M., and S. F. Biggs. 1998. Problem-based learning: Introduction, analysis, and accounting curricula implications. *Journal of Accounting Education* 16 (3/4): 407–427.

King, P. M., and K. S. Kitchener. 1994. *Developing Reflective Judgment: Understanding and Promoting Intellectual Growth and Critical Thinking in Adolescents and Adults*. San Francisco, CA: Jossey-Bass.

Knechel, W. R. 1992. Using the case method in accounting instruction. *Issues in Accounting Education* 7 (2): 205–217.

Kroll, B. M. 1992. Reflective inquiry in a college English class. *Liberal Education* 78 (1): 10–13.

Laughlin, P. R. 1980. Social combination processes of cooperative, problem-solving groups as verbal intellective tasks. In *Progress in Social Psychology*, edited by M. Fishbein. Hillsdale, NJ: Erlbaum.

Lave, J., and E. C. Wenger. 1991. *Situated Learning: Legitimate Peripheral Participation*. Cambridge, U.K.: Cambridge University.

Libby, P. A. 1991. Barriers to using cases in accounting education. *Issues in Accounting Education* 6 (2): 193–213.

McGrath, J. E. 1984. *Groups: Interaction and Performance*. Englewood Cliffs, NJ: Prentice Hall.

Myers, J. L., M. Shinjo, and S. A. Duffy. 1987. Degrees of causal relatedness and memory. *Journal of Memory and Language* 26: 453–465.

Palincsar, A. S., and A. L. Brown. 1984. Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and Instruction* 1 (2): 117–175.

Perspectives on Education: Capabilities for Success in the Accounting Profession (The White Paper). 1989. Arthur Andersen & Co., Arthur Young, Coopers & Lybrand, Deloitte Haskins & Sells, Ernst & Whinney, Peat Marwick Main & Co., Price Waterhouse, and Touche Ross. New York, NY.

Phillips, F. 2001. A research note on accounting students' epistemological beliefs, study strategies, and case analysis performance. *Issues in Accounting Education* 16 (1): 21–39.

Pincus, K. V. 1997. Discussion of educating for accounting expertise: A field study. *Journal of Accounting Research* 35 (Supplement): 63–74.

Rubin, D. B. 1976. Inference and missing data. *Biometrika* 63: 581–592.

Scardamalia, M., C. Bereiter, and R. Steinbach. 1984. Teachability of reflective processes in written composition. *Cognitive Science* 8: 173–190.

Schoenfeld, A. H. 1985. *Mathematical Problem Solving*. Orlando, FL: Academic Press.

Skousen, K. F., E. K. Stice, and J. D. Stice. 2000. *Intermediate Accounting*. Cincinnati, OH: South-Western.

Springer, C. W., and A. F. Borthick. 2004. Business simulation to stage critical thinking in introductory accounting: Rationale, design and implementation. *Issues in Accounting Education* 19 (3): 277–303.

Stone, D., and M. K. Shelley. 1997. Educating for accounting expertise: A field study. *Journal of Accounting Research* 35 (Supplement): 35–61.

University of Illinois at Urbana–Champaign. 1998. Project discovery. In *Accounting Education Change Commission Grant Experience: A Summary*, edited by R. Flaherty. Sarasota, FL: AAA.

van Dijk, T. A., and W. Kintsch. 1983. *Strategies of Discourse Comprehension*. New York, NY: Academic Press.

van Hout-Wolters, B., R-J. Simons, and S. Volet. 2000. Active learning: Self-directed learning and independent work. In *New Learning*, edited by R-J. Simons, J. van der Linden, and T. Duffy. Dordrecht, The Netherlands: Kluwer Academic Publishers.

Wenger, E. 1998. *Communities of Practice: Learning, Meaning, and Identity*. Cambridge, U.K.: Cambridge University.

Zwaan, R. A., M. C. Langston, and A. C. Graesser. 1995. The construction of situation models in narrative comprehension: An event-indexing model. *Psychological Science* 6 (5): 292–297.

———, and G. A. Radvansky. 1998. Situation models in language comprehension and memory. *Psychological Bulletin* 123 (2): 162–185.