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An Imperfect Measurement System Introduction to Accounting

Daniel P. Tinkelman

ABSTRACT: The process of measuring, and reporting measurements, is fundamental in scientific and business activity. I propose introducing accounting as an example of a measurement system, albeit an imperfect one. The accounting measurement system includes: users and their decision models, attributes of objects to be measured, measurement rules, methods of accumulating measurements, reports, rule-makers, measurers, and verifiers. By looking at how accounting measures different business activities, this approach encourages the teaching of general measurement, reporting, and analytical skills. (For nonaccounting students, the concepts of measurement are clearly transferable to other fields.) It allows a logical, interesting presentation of accounting topics, and highlights links to other academic fields. An important feature of this approach is considering such pervasive measurement issues as uncertainty and allocations. Students examining accounting's imperfections are encouraged to think critically about accounting rules, and can understand why accounting changes over time.

Keywords: measurement system.

INTRODUCTION

Research consistently indicates that while economic factors are certainly important, a key factor in undergraduate students' choice of majors is their genuine interest in the field.[1] This is especially true of high-aptitude students.[2] Research (e.g., Geiger and Ogilby 2000) also indicates that success in the first courses is important to student choice of major. Therefore,

Daniel P. Tinkelman is a Professor at Hofstra University.

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[1] Simons et al. (2003) and Gibson (2010) provide literature reviews. Heiat et al. (2007), in a study involving junior college students, found that "students are most strongly influenced in their choice of major by a genuine interest in the subject matter . . . Other influential factors include availability of employment, starting pay, and the ability to interact with people." See, also, Malgwi et al. (2005).

[2] Adams et al. (1994) found that genuine interest in the field was the main reason high-aptitude students switched to accounting. Cohen and Hanno (1993) find that some good students choose not to major in accounting because they perceive it as boring and too number-oriented.

undergraduate introductory accounting courses need to present accounting as accessible and interesting.

I believe that organizing introductory accounting courses, at either the graduate or undergraduate levels, around an "imperfect measurement system" theme has several advantages over current approaches. Measurement is already a familiar idea to students, and applicable research in cognitive psychology indicates that new information is better understood and remembered when it relates to a familiar thematic framework. Accounting topics can be presented as part of an overall measurement theme, in a logical order. Students from other fields will see they are not only learning about accounting, but are gaining skills needed to skeptically analyze measurement processes in their own fields. Generally Accepted Accounting Principles (GAAP) can be presented as imperfect and provisional, subject to change as user needs, the business environment, and technology change. Considering imperfections should encourage critical thinking and show the need for accounting research to improve current practices.

A measurement approach may also help address the concerns of Demski (2007) and Fellingham (2006), among others, that accounting has too few links to other academic disciplines. Links to other parts of the academy are inherent in the measurement system: *what* accountants measure and report depends on economic, finance, and public policy considerations, and is constrained by legal and ethical factors; *how well* accountants measure depends on, among other factors, available mathematical or statistical or financial tools, and on accountants' and auditors' human and technological abilities.

The next three sections define measurement systems, explain how they can help motivate instruction, and how a measurement theme provides a logical structure for instruction. The fifth section suggests two possible implementation methods. The sixth discusses advantages of the new approach, and the final section concludes.

ACCOUNTING AS AN IMPERFECT MEASUREMENT SYSTEM

Measurement systems are comprised of a number of components, denoted here by italics when first used (see Ijiri 1967). *Users* want information about *key attributes* of *objects*. *User decision models* determine which attributes are important. *Rule-makers* create *rules* for measuring these attributes. *Measurers* make and *report* the actual *measurements*. *Verifiers* check their accuracy. The different features of the system are interdependent. For example, if the users trust the measurers' judgment, rules can be left more open to interpretation (see Porter 1995).

Both financial and management accounting are measurement systems. Users are both internal (managements, boards, employees) and external to the organization (investors, creditors, governments, etc.). User decision models include investment, lending, and managerial decision models. The objects being measured include organizations, consolidated groups of organizations, and such subdivisions of organizations as products, cost centers, and departments. Key attributes include numbers of units, costs, and values. The Financial Accounting Standards Board (FASB), International Accounting Standards Board (IASB), and Securities Exchange Commission (SEC) make financial accounting rules, governments make tax rules, and each company makes its own managerial accounting rules. GAAP, International Financial Reporting Standards (IFRS), and tax codes are important sets of rules. Accountants are measurers, and internal and external auditors are verifiers. Reports rely upon accounting systems to summarize data, and include financial statements, SEC filings, tax returns, and a variety of managerial analyses.

Accounting measurement systems are neither perfect nor unchanging. Any system must balance the needs of various users, and must contend with difficulties in defining, measuring, and reporting key attributes. The needs of users and the technologies of measurement have changed over time, and vary between cultures.

USING MEASUREMENT TO MOTIVATE INSTRUCTION

We should stress how important measurement systems are in science. As Logan Clenddening, cited in Tyson (1999), wrote, "No science attains maturity until it acquires methods of measurement." The astronomer Neil Degrasse Tyson (1999) wrote:

> There is no task so simple, yet so profound in its consequences, as the act of taking a measurement. The scientific and technological foundations of modern society depend upon it. Without it, that which we call knowledge would have little objective meaning and our understanding of the natural world would reduce to mythological proclamations.

Accounting is the measurement system that allows us to understand business activity. Tomo Suzuki (2003) wrote that "Only with accounting . . . have economic concepts become coherent, comprehensive, axiomatic, codified, comparable, reportable, demonstrable, controllable, and altogether account-able to the extent that we now know them." On a more personal level, students must realize that their own business success will largely be measured in accounting terms. If business is a game, accounting is the scoring system.

Accounting measurement is not an isolated field, but instead is linked to many other fields. As an American Accounting Association (AAA) committee noted:

> theory construction and measurement development are inseparable. The theory specifies, in a conceptual sense, what is to be measured, how the measurements are to be manipulated, and what measurable outcomes one can expect. This implies that the theory is constrained by what can be measured. It also implies that the measurements interact with the theory in that the predicted occurrences will either be verified or falsified by separate measurements. (AAA 1971b)

Table 1 presents subjects relevant to answering typical accounting questions. Subjects with insights related to accounting and auditing include, in alphabetical order: actuarial science, bankruptcy law, behavioral science, business law, communications theory, computer science, economics, education, engineering/process design, ethics, finance, information science, management science, perceptual science, political science, probability, psychology, and tax law. Clearly, all business disciplines use accounting measures, but so do economists, historians, courts, and political scientists, among others.

Many introductory accounting students, at both the graduate and undergraduate levels, are not accounting majors. These students should recognize that their own fields require measurements and that the same issues that are being discussed in the accounting classes apply to their own field. For example, marketing students must grapple with issues of measuring and reporting the effectiveness of marketing strategies.

We can also stress that accounting is not a set body of rules, but a live field of inquiry. Changes in business, user needs, and technology provide constant challenges to existing methods, requiring creative responses.

ORGANIZING INSTRUCTION AROUND AN IMPERFECT MEASUREMENT THEME

Measurement is an overarching theme that clarifies the logic of the typical curriculum, as well as the links between accounting and other disciplines. Intermediate, advanced, and cost accounting courses focus on measurement rules and rule-makers. Tax courses focus on the rules used by tax authorities. Law courses provide additional rules and define key attributes of organizations. Auditing courses discuss the verification process. The volume of measurements and the need to minimize processing errors require special accounting information systems, including the double entry process. Finance, economics, management science, and other courses describe users, their decision models, and key attributes. Measurements may require special mathematical and statistical

TABLE 1

Some Accounting Questions and Related Fields of Study

Accounting Question	Related Fields of Study
What entity should be measured?	Law, tax, management science, finance
What measures of company performance do investors need?	Finance, economics
What measures of company resources do creditors need?	Bankruptcy law, finance, economics
What data do shareholders need in order to hold top management accountable?	Corporate law, economics of information
How can values of assets and liabilities be estimated if there is no market value?	Finance, economics
What factors determine the cost of producing manufactured products?	Engineering, economics
How can pension obligations be determined?	Economics, probability, actuarial science, pension law
Who should receive financial reports? How frequent and detailed should reports be?	Corporate law, securities law, finance, economics of information, ethics
What type of reporting inside the company best ensures effective control?	Management science, psychology
How can errors in processing information be minimized?	Computer science, communications theory, behavioral science, information science and process design
Who should set accounting rules?	Political science, economics, ethics
What qualifications do measurers and verifiers need?	Theory of education, psychology

skills, and reporting calls for written and oral communication skills. Because accounting rules are not socially neutral, but affect how wealth is distributed,[3] study in ethics and philosophy is relevant.

The measurement system approach links numerous topics that now are approached separately. It also helps to show commonalities between financial and managerial accounting topics that are harder to discern in traditional courses. Both the system's successes and its imperfections can serve to organize instruction.

The way the accounting measurement system *should* work is a good starting point for instruction. Some considerations in designing an appropriate measurement system would include: understanding user needs and decision models, defining the objects of measures, identifying key attributes of these objects, basic measurement rules, the identity and role of rule-makers, appropriate ways of reporting, and methods of accounting. Many items discussed within traditional introductory accounting courses can be related to this framework. For example, the key attributes that users care about help explain how accountants classify data. Such concepts as assets, liabilities, revenues, expenses, direct costs, variable costs, etc., are needed to measure attributes that internal

[3] See AAA (1971a): "The use of accounting in setting rates in regulated industries is an outstanding example of equity accounting. The choice among alternative accounting methods is dictated to a considerable extent by how each might affect the rate base and ultimately how a public utility's rate structure is likely to affect the firm, its shareholders, consumers, and the rest of the economy. Accounting in this and other important areas such as government contracting, health care reimbursement, and income tax accounting is used as an indirect vehicle for promoting social equity." See, also, Tinker (1985) and Watts and Zimmerman (1979).

and external users care about. Accounting rules, such as the accrual system, govern when events are recognized and how data are classified and reported.

Appropriate reporting is a topic that cuts across financial and managerial accounting. Concepts like materiality, full disclosure, proprietary information, the use of XBRL, and insider trading all relate to reporting. We could point out commonalities across various types of reports.[4] By discussing reporting in an integrated fashion, we can make clear the underlying logic of accounting reports.

While the essential parts of a measurement system can be used to introduce some accounting topics, other traditional introductory accounting topics relate more clearly to problems in accounting measurement. For example, the issue of uncertainty affects numerous areas (e.g., conservatism, bad debts, inventory obsolescence, sales returns, possible fixed asset impairment, and warranties and loss contingencies) that are typically taught in separate chapters in financial accounting texts. Under a measurement approach, a discussion of the problem of uncertainty could integrate its impact on various accounts. Students could compare the treatment of uncertainty in various accounts and challenge whether the current rules are appropriate.

Accounting valuation is a second problematic area. Students now encounter this topic in various separate places. Early in introductory accounting, they typically learn that accountants use historical cost. Then, in separate chapters, they learn that receivables are carried at cost less estimated bad debts, inventories at the "lower of cost or market," fixed assets at depreciated cost, and certain other assets or liabilities at fair value or at present value. Instead of this scattered approach, a measurement approach could discuss why the choice of valuation method is problematic and why the FASB and IASB allow varying measures of value.

The problem of allocation of costs and revenues across items and across time periods also affects numerous accounts. Instead of treating allocation in one place, traditional courses discuss aspects of the issue in a scattered fashion. "Matching" is typically discussed early, as a general principle of accounting. Prepaid expenses, deferred revenues, inventory costing methods, depreciation, allocation of basket purchases, and intangible amortization are typically discussed in separate places in financial accounting texts, and allocation of overhead costs to inventory is deferred until a managerial accounting course.

Human reactions to being measured are a fourth pervasive issue. Various budgeting and reporting methods are designed to induce appropriate performance. The fear of earnings management and manipulation is a factor in such accounting topics as objectivity, consistency, conservatism, and revenue and expense recognition.

By admitting the existence of serious measurement issues, we legitimize discussion of divergent historical and international practices and the possibility of future improvements. History and key findings from accounting research can be naturally integrated into a discussion of measurement issues.[5] For example, students could learn that the enactment of tax and securities laws in the U.S. influenced the widespread use of historical cost accounting and the recognition of revenues at time of sale.[6] As another example, Demski's (1973) finding, that no one valuation method can satisfy all users in the absence of perfect and complete markets, can serve to justify the

[4] Accounting reports tend to fall into one of four categories: lists of items existing at a point of time (e.g., balance sheets, receivables trial balances), lists of events occurring over time (e.g., income statements, sales journals), reconciliations (bank reconciliations, budget-to-actual reports, statements of owners' equity and cash flows), and computations (e.g., tax returns, income statements).

[5] Bisman (2009) reviews calls for incorporating more accounting history into the curriculum, e.g., the 2003 International Federation of Accountants (IFAC) International Education Standards for Professional Accountants.

[6] FASB (1980) notes, in discussing desirable qualitative characteristics of information, "Although those characteristics are expected to be stable, they are not immutable. They are affected by the economic, legal, political, and social environment in which financial reporting takes place and they may also change as new insights and new research results are obtained." See, also, FASB (1978).

existence of alternative accounting measures, or of an information approach to accounting research. Studies indicating the frequency of earnings management or the existence of pressure on rule-makers, e.g., Watts and Zimmerman (1979), can be cited in appropriate areas.[7]

TWO SUGGESTIONS FOR IMPLEMENTATION

Students may take their first accounting classes in typical undergraduate classes, in honors undergraduate classes, or as part of a Master's program. Educators will need to carefully consider their students' needs and abilities in implementing the ideas of this paper. I present two different general approaches. The first, less difficult, approach is to insert measurement concepts into a current two-course framework, with financial accounting and managerial accounting separated. A second alternative is to replace the current introductory courses with a course on the theory and imperfections of accounting measurement, and a second course that applies the theory to different business areas.

The first approach would add a measurement system perspective to current courses, using supplementary materials to traditional texts. I suggest that these materials include: a description of a measurement system, optimal properties of the system, and a general list of issues with the accounting measurement system. These issues might include: uncertainty, the diversity of user needs, difficulties defining the accounting entity, the existence of alternative accounting techniques or value measures, allocation issues, human reaction to being measured, and the difficulty of controlling the volume of accounting data. An instructor could devote part of an introductory lecture to these materials. The instructor could use nonaccounting examples to illustrate some of the issues. For example, what issues arise in measuring public school students' height or intelligence? As the course proceeds, the instructor can relate topics as they arise to the measurement system framework. The valuation of fixed assets, for example, relates to general issues of choice of value, their depreciation relates to methods of allocation, and their impairment relates to uncertainty.

The second approach involves reorganizing the presentation of introductory material entirely, to fully align with a measurement system framework. Only the basic concept is sketched here, but Exhibits 1 and 2 provide sample syllabi. The first course in accounting would treat measurement systems theoretically, and the second course would apply those concepts to key business areas. Each course would include both financial and managerial material. I believe this is a more logical treatment. More importantly, I feel that studying a clear thematic structure, then repeatedly using it to solve problems in different areas, will enhance student learning.

The theoretical course would discuss the theory of measurement systems, show how accounting now classifies and reports information, and discuss problem areas. It would discuss the importance of measurement in any discipline, and how accounting measures are linked to other fields. It would explain why, to satisfy user needs, accountants focus on certain "entities" as the object of measure, classify data into particular categories using certain rules, and produce various types of reports.[8] Various users then use these reports to help them make various types of decisions. The material included in the preceding sentences includes what is typically taught in financial

[7] We should not underestimate the ability of undergraduates to understand suitably presented research findings. Currently, other disciplines expose students to more research in their introductory courses than does accounting. As an experiment, I counted the number of references to research findings in the first five odd-numbered chapters of eight introductory accounting texts that I had on hand. The number ranged from zero (the mode with three) to eight, with a median of 1.5. The most common research references were to the frequency of use of accounting methods, not to theoretical ideas. In contrast, the introductory managerial finance and marketing texts used in my college had, respectively, 19 and 46 research references.

[8] This is an opportunity to integrate practice in communication skills into the curriculum. It is also a chance to explain basic principles of presenting data using tables and graphs.

EXHIBIT 1

Syllabus: Course 1
Theory of Accounting as an Imperfect Measurement System

Course Objectives: This course covers the key elements of measurement systems in general, including methods of measurement and reporting. It introduces accounting as an important measurement system used in business. It introduces methods accountants use to recognize, classify, control, and report financial data, as well as basic tools for analyzing internal and external accounting reports. An important objective of the course is to outline the issues and problems that cause accounting to be imperfect and that affect the usefulness and comparability of accounting reports. [The debit-credit system is introduced in the second course, not in this course.]

This syllabus assumes 26 90-minute classes during the semester.

Class	Suggested Coverage
#1	Introduction to measurement systems in general. Discussion of the relation of accounting to other fields. Examples of how accounting measurements have real-world consequences. Examples of how measurements have differed in different times and cultures.
#2	Begin discussing what accountants measure, and how accounting measurements are classified. Define the different objects of measurement used in accounting, such as a corporation, a cost center, or a consolidated group of companies. Begin discussing important users, and the key attributes that they want measured.
#3	Define basic elements of financial and managerial accounting, such as revenues, expenses, types of costs, etc. Introduce the accounting equation as part of the definition of equity.
#4–5	Begin discussion of recognition and measurement rules. How precise do measurements need to be, and how do we balance precision with timing and cost? When are items recognized? How are they measured? What important items are not recognized and measured? Concepts of materiality, costs and benefits of accounting, accrual, deferral, matching, the historical cost and fair value bases of measurement, etc., are introduced.
#6–8	Begin discussion of reporting, which will take several classes. Consider the conflicting ethical values of confidentiality and of public disclosure and transparency. In general, discuss when information should be reported orally, by a narrative, in tables, graphically, or using some other method. Discuss guidelines for proper reporting using prose, tables, and graphs. Introduce students to typical types of accounting reports, including basic external financial reports, footnotes, conference calls, MD&A, budgets, forecasts, and performance reports.
#9–11	Interpreting and using accounting reports. This topic will take several classes. User needs, such as judging profitability, solvency, conformity with budget, etc., are reintroduced. Students practice reading and making decisions based on a variety of typical accounting reports, including cash flow projections, budget-to-actual reports, balance sheets, income statements, and cash flow statements. A variety of analytical tools and ratios are introduced.
#12	Midterm exam—Material up to this point deals with measurement in general, before considering major problem areas. These are covered after the midterm.
#13–14	The problem of defining the object of measure. What is the appropriate entity to measure? What issues arise when measuring at an inappropriate level? For managerial accounting, objects of measure include divisions, cost centers, profit centers, and other units. For external reporting, objects of measure may include subsidiaries, corporations, and consolidated groups. How do related parties affect financial statements?

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EXHIBIT 1 (continued)

#15–16	The problem of value. What value should be assigned to attributes we measure? Define historical cost, fair value, expected fair value, replacement cost, and other methods of valuation, and discuss when and why they are permitted or required. Discuss the importance of the going-concern assumption as justification for values other than exit value. Briefly introduce present value. Discuss whether recorded amounts should be adjusted for changes in the value of the dollar.
#17–19	The problem of allocation of costs or revenues that relate to more than one time period or one product. Allocation over time requires rules for accrual and deferral. Discuss rules for revenue and expense recognition. Explain how the issue affects prepaid expenses, deferred revenues, depreciation of fixed assets, and amortization of intangible assets. For inventory, explain basic cost flow assumptions, such as LIFO and FIFO. Allocation of costs or revenues within a period requires rules of how to spread these items across products or divisions. Allocating costs of basket purchases are discussed. Concepts of overhead cost application are introduced. Because allocation is arbitrary, the need for consistency of application and disclosure of accounting methods is stressed.
#20–21	The problem of uncertainty. Issues covered include the concepts of conservatism, risk, and the need for estimation in accounting. The impact of uncertainty on the accounting in the following areas is discussed and compared: bad debts, inventory obsolescence, warranties, fixed asset lives and salvage values, intangible asset values, contingent gains and losses, and pension and other post-employment obligations. The treatment of changes in estimates is also covered.
#22–23	The problem of human reaction to measurement. Measurement has a motivational aspect and may also stimulate undesirable actions such as fraud. Coverage includes ways that budgeting, accounting, and reporting systems can help management motivate good performance. Topics include financial reporting fraud, tax fraud, earnings management, and various legal and institutional safeguards that have been put in place to discourage fraud, e.g., the Sarbanes-Oxley Act.
#24–25	Internal controls. Internal controls are a response to both the inherent difficulty of measuring and reporting a huge volume of activity, and the need to discourage improper actions. Topics include the COSO framework, common control procedures, and examples of common accounting reconciliations, including bank reconciliations.
#26	Catch-up and review.
	Final exam during exam period.

Ideas for supplementary projects or materials include:

1. Prose communication assignments.
2. Critiquing real graphs or tables or reports using guidelines taught in this course.
3. Tracing the history of selected accounting practices.
4. Examining frauds that exemplify specific issues, such as Enron's use of inflated values of assets, or its use of off-balance-sheet entities.
5. Considering ethical or political implications of particular accounting practices.
6. International comparisons of particular accounting practices.
7. Debates on whether particular accounting treatments or decisions are appropriate.
8. Examining selected research on the motives for management of earnings.
9. Tracing the historical role of auditors or accountants.
10. Applying the concepts of measurement to nonaccounting areas, such as considering what should be reported about a marketing campaign.
11. Critically considering whether the current output of accounting systems meets user needs for investment or lending models.

EXHIBIT 2

Syllabus: Course 2
Applying the Theory of Accounting as an Imperfect Measurement System

Course Objectives: This course applies the concepts from the first course to five key business areas. The debit-credit system is introduced as part of a discussion of accounting systems and applied to each area.

This syllabus assumes 26 90-minute classes during the semester, one of which is a midterm exam, and assumes a final exam period following these 26 classes.

Class	Suggested Coverage
#1	Introduction and brief review of the first course.
#2–5	Accounting systems, including debits and credits—This material builds on the final chapter of the first course, which dealt with the need to control the processing of transactions. Show how the debit-and-credit system and journals and ledgers are used to record transactions, and to record periodic adjustments to recorded amounts. Discuss how this helps accountants to handle large amounts of transactions and to minimize errors.
#6–8	Measuring merchandising activities. Consider user needs and key decisions, such as the appropriate volume to sell, in this area. Discuss the accounts, source documents, accounting records, and special accounting rules related to sales, sales discounts, sales returns, receivables, bad debts, warranties, inventory, cost of goods sold, and selling expenses. Consider how the issues of object of measure, valuation, allocation, uncertainty, and human reaction relate to the accounting rules, internal controls, and reports in this area.
#9–12	Measuring financing activities. Consider user needs and key decisions in this area. Discuss the accounts, source documents, accounting records, and special accounting rules related to loans payable, bonds, interest expense, common stock, retained earnings, dividends, stock splits, and treasury stock. Consider how the issues of object of measure, valuation, allocation, uncertainty, and human reaction relate to the accounting rules, internal controls, and reports in this area.
#13	Midterm exam.
#14–17	Measuring investing activities. This includes both financial investments and investments in operating assets. Consider user needs and key decisions, such as capital budgeting, in this area. Discuss the accounts, source documents, accounting records, and special accounting rules related to investments in stocks and bonds, fixed assets, natural resources, and intangible assets, and related depreciation, allocation, and gain/loss accounts. Consider how the issues of object of measure, valuation, allocation, uncertainty, and human reaction relate to the accounting rules, internal controls, and reports in this area.
#18–23	Measuring production activities. Consider user needs and key decisions in this area. Consider different types of costs, and their behavior relative to volume of production. Discuss the accounts, source documents, accounting records, and special accounting rules related to raw materials, work in process, finished goods, variances, and cost of goods sold. Consider how the issues of object of measure, valuation, allocation, uncertainty, and human reaction relate to the accounting rules, internal controls, and reports in this area.
#24–25	Measuring human resource activities. Consider user needs and key decisions in this area. Consider different types of costs and their behavior relative to volume of production. Discuss the accounts, source documents, accounting records, and special accounting rules related to salaries, payroll taxes, fringe benefits, pensions, and fees paid to non-employee consultants. Consider how the issues of object of measure, valuation, allocation, uncertainty, and human reaction relate to the accounting rules, internal controls, and reports in this area.

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EXHIBIT 2 (continued)

#26 Catch-up and review.
Final exam during exam period.

Ideas for supplementary projects and materials include:

1. Giving students an accounting practice set, to be done using a simple computerized accounting system.
2. History of accounting systems, including double entry.
3. Examining why accounting for leases has been controversial, and how the rules have changed over time.
4. Examining why accounting for pensions has been controversial, and how the rules have changed over time.
5. Considering why accounting rules do not allow companies now to establish assets for the value of their workforce, or for internally developed brand names.
6. Asking students to see how a real business handles any of the five major reporting areas.
7. Examining frauds that related to one or more of the five major reporting areas.
8. Considering ethical issues that arise in measurement and reporting in any of the five areas.
9. Critically considering whether, in any of the five major areas, the current accounting reports give users what they need.

accounting courses with regard to defining elements of financial statements, describing financial statements, general principles of accounting such as revenue recognition, the basic financial statements, and financial analysis. It also includes managerial topics such as different cost classifications and managerial reports.

The rest of a semester would be organized around issues and problems. What is the right object of measure? What type of value should be used? How should allocation problems be addressed? How should values be set in the face of uncertainty? How should accountants adapt to the fact that their reports will affect the actions of managers, and that these effects may include fraud? How can businesses establish internal controls to minimize the risks of errors and intentional misstatements? In each of these areas, the coverage would integrate topics now taught in a scattered way in traditional courses, following the ideas set forth in the preceding section.

The second course would be a more real-world, applied course. It would introduce the need for accounting systems to ensure the quality of reported measurements. Internal controls guard against errors or intentional distortion of measurements. Accounting systems are methods of reliably processing large amounts of accounting data. Double entry bookkeeping could be introduced at this point as an important method of controlling the processing of data.[9] Students could then look closely at how accounting now works in several separate business areas, such as buying and selling goods, financing the business, investing in and using long-term assets, using labor, and manufacturing.[10]

Students would study how basic measurement and reporting concepts are now applied to each of these business areas, and what problems arise in applying them in each area. For example, the coverage of accounting for investments in long-term assets would start by discussing the relevant business processes for investing in both financial and physical assets. The relevant interested internal and external parties would be described, as well as the types of decisions they make and their decision

[9] Some current introductory financial accounting courses cover double entry bookkeeping, while others omit it. Either approach could be accommodated. The "accounting equation" would be introduced in the first course.

[10] While Exhibit 2 illustrates topics in five areas, it is not essential to cover each topic or, indeed, each business area. However, instructors should try to cover each topic that is necessary to follow-up accounting courses.

models. This gives the student the context to understand why special accounts are used to classify information, special records and systems accumulate the data, and specific rules are used for measurement and reporting. The accounting in each area is affected by the pervasive issues discussed in the first course, such as difficulty in assigning values, uncertainty, and allocation issues.

This approach is more challenging to implement. It would require school approval of formal curriculum changes. There is no current accounting text taking this approach. However, an instructor need not start from scratch. The courses, as outlined in Exhibits 1 and 2, actually cover all the key areas of traditional introductory financial and managerial courses, albeit in a different order. While it is awkward, instructors covering allocation issues can direct students to applicable pages and problems in standard texts.[11]

EDUCATIONAL BENEFITS

This approach has two major educational benefits, which I hope will make the course more interesting and accessible.

First, the measurement system framework is a flexible, overall knowledge structure, transferable to other fields. The cognitive psychology literature suggests that people are better able to grasp and retain new material when it fits into an existing mental framework (see Seifert et al. 1986; Abelson and Black 1986; deWinstanley and Bjork 2002; Reif 2008). Memory and understanding are enhanced by the experience of using and elaborating upon the frameworks. deWinstanley and Bjork (2002) note that "the act of retrieving information from memory is itself a potent learning event." The approach in the prior section is designed to utilize these findings. Since students have all measured things before, a measurement system represents a familiar preexisting theme. Organizing a course around this theme helps students integrate each new topic. The two-course sequence, where the second course repeatedly applies the theoretical ideas presented in the first course, involves elaborative repeated processing of the basic ideas.

Introductory accounting courses are not now organized in this manner. After an introduction to bookkeeping systems, which are new to most students, introductory financial accounting texts approach topics, typically, in the order they appear in the financial statements, starting with the balance sheet. Managerial courses normally proceed topically and, thus, do not emphasize links in the student's mental framework between such topics as job order costing and flexible budgeting.

Second, this approach requires students to use higher order learning skills. Bloom's (1956) taxonomy of cognitive tasks ranks them in order of difficulty as: knowledge (recall of data), comprehension, application, analysis, synthesis, and evaluation. Our current courses stress learning rules, comprehending them, and applying them in problems and exercises, the first three elements in the taxonomy. Zeff's (1989) complaint is still relevant:

> Typically, a problem facing the profession's practitioners is asserted (not argued), the official solution is exposited, journal entries and sample financial statements illustrating the official solution are presented, and the students are then put through the hoops of numerical problems that test their capacity to apply the official solution to hypothetical situations. Authors do not ask why the problem arose, why the official solution was preferred over alternatives (and what were the alternatives?), and whether the official solution spawned any further problems. More often than not the official solution is not even subjected to evaluation or criticism.

[11] Students who take this two-course sequence would cover all the main topic areas of the two typical introductory courses, allowing them to move on to traditional follow-up courses. Thus, later courses need not be redesigned, and transfer students (in and out) can be accommodated.

In contrast, the measurement approach in the previous section requires students to not just comprehend and apply certain concepts, but to compare the different approaches to problems in different accounting areas and to evaluate the treatment.

CONCLUSION

Using a measurement approach, accounting can be introduced as an intellectually interesting, academically based field that deals with important business issues. The accounting process requires anticipation of diverse user needs, compromising between user conflicts, anticipating problems in measuring, designing procedures to reduce error and control operations, and reporting in a clear and concise manner. In different times and cultures, different accounting is appropriate. Students who absorb these ideas would emerge from introductory courses with not just a working knowledge of basic accounting rules and financial statements, important as that is, but a cohesive knowledge structure related to measurement issues. They would be able to approach new issues in measurement in an organized way, and would have a critical perspective on the current accounting system.

An imperfect measurement system approach unifies and orders the discussion. It encourages students to synthesize knowledge, compare alternative treatments, and critically evaluate accounting policies. The measurement approach provides a framework that instructors can extend in a variety of ways, as appropriate for the level of their students.[12] Accounting research measuring or addressing the imperfections of the current system fits naturally into the discussion, as does discussion of how the issues were handled in other times or in other cultures. The emphasis on larger issues, and on developing skills that are clearly transferable to other disciplines, should make the courses more interesting to nonaccounting students. Where feasible, instructors should try to indicate the impact of accounting rules on society, and how rules may favor one group over others. Fraud stories can illustrate what happens when internal controls fail. Instructors can supplement discussions of reporting with assignments in communication skills, or could teach techniques for tabular and graphical displays.

Accounting need not be boring, either to learn or to teach. To quote Littleton (1933):

> In these paragraphs an attempt has been made to remove the stigma attached to accounting by showing that in its origin it is respectable, even academic; that despite its present disrepute it has from time to time attracted the attention of men of unquestioned intellectual attainment; that it justifies itself in that it has arisen to meet a social need, for its function is to place responsibility, to prevent fraud, to guide industry, to determine equities, to solve the all essential conundrum of business: "What are my profits?," to facilitate the government in its fiscal operations, to guide the business manager in the attempt to secure efficiency. Are not these efforts worthy of any man's attention?

REFERENCES

Abelson, R. P., and J. B. Black. 1986. Introduction. In *Knowledge Structures*, edited by Galambos, J. A., R. P. Abelson, and J. B. Black, 1–18. Hillsdale, NJ: Erlbaum Associates.

Adams, S. J., L. J. Prior, and S. L. Adams. 1994. Attraction and retention of high-aptitude students in accounting: An exploratory longitudinal study. *Issues in Accounting Education* 9 (1): 45–58.

[12] There is no reason interested professors could not build in discussion of the types of items called for by Demski (2007), e.g., more discussion of information science and coding, more discussion of historical foundations, a "portfolio of errors" approach, and management's behavior in choosing accounting methods. See, also, Zeff's (1989) call for introducing awareness of history, of different cultural choices, of the impact of lobbying on standard-setting, of the economic consequences of standards, and for giving students an ability to critically evaluate alternatives.

American Accounting Association (AAA). 1971a. Report of the Committee on Foundations of Accounting Measurement. *The Accounting Review* 46 (4): 1–48.

American Accounting Association (AAA). 1971b. Report of the Committee on Accounting Theory Construction and Verification. *The Accounting Review* 46 (4): 51–79.

Bisman, J. 2009. Making accounting historians. *Accounting Historians Journal* 36 (1): 135–162.

Bloom, B. S. 1956. *Taxonomy of Educational Objectives, Handbook I: The Cognitive Domain*. New York, NY: David McKay Co., Inc.

Cohen, J., and D. M. Hanno. 1993. An analysis of underlying constructs affecting the choice of accounting as a major. *Issues in Accounting Education* 8 (2): 219–238.

Demski, J. S. 1973. The general impossibility of normative accounting standards. *The Accounting Review* 48 (4): 718–723.

Demski, J. S. 2007. Is accounting an academic discipline? *Accounting Horizons* 21 (2): 153–157.

deWinstanley, P. A., and R. A. Bjork. 2002. Successful lecturing: Presenting information in ways that engage effective processing. *New Directions for Teaching and Learning* 89 (Spring): 19–31.

Fellingham, J. 2006. *Is Accounting an Academic Discipline?* Address to the AAA Annual Meeting Plenary Session (August 9). Available at: http://fisher.osu.edu/~fellingham_1/Review/johnplenary.pdf

Financial Accounting Standards Board (FASB). 1978. *Objectives of Financial Reporting by Business Enterprises*. Statement of Financial Accounting Concepts No. 1. Stamford, CT: FASB.

Financial Accounting Standards Board (FASB). 1980. *Qualitative Characteristics of Accounting Information*. Statement of Financial Accounting Concepts No. 2. Stamford, CT: FASB.

Geiger, M. A., and S. M. Ogilby. 2000. The first course in accounting: Students' perceptions and the effect on their decision to major in accounting. *Journal of Accounting Education* 18: 63–78.

Gibson, A. 2010. Measuring business student satisfaction: A review and summary of the major predictors. *Journal of Higher Education Policy and Management* 32 (3): 251–259.

Heiat, A., D. Brown, and D. M. Johnson. 2007. An empirical analysis of the underlying factors affecting the choice of accounting major. *Journal of College Teaching & Learning* 4 (8): 83–98.

Ijiri, Y. 1967. *The Foundations of Accounting Measurement: A Mathematical, Economic, and Behavioral Inquiry*. Englewood Cliffs, NJ: Prentice Hall, Inc.

Littleton, A. C. 1933. *Accounting Evolution to 1900*. New York, NY: American Institute Publishing Company.

Malgwi C. A., M. A. Howe, and P. A. Burnaby. 2005. Influences on students' choice of college major. *Journal of Education for Business* 80 (5): 275–282.

Porter, T. M. 1995. *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life*. Princeton, NJ: Princeton University Press.

Reif, F. 2008. *Applying Cognitive Science to Education: Thinking and Learning in Scientific and Other Complex Domains*. Cambridge, MA: MIT Press.

Seifert, C. M., R. A. Abelson, and G. McKoon. 1986. The role of thematic knowledge structures in reminding. In *Knowledge Structures*, edited by Galambos, J. A., R. P. Abelson, and J. B. Black, 185–210. Hillsdale, NJ, Erlbaum Associates.

Simons, K. A., D. R. Lowe, and D. E. Stout. 2003. Comprehensive literature review: Factors influencing choice of accounting as a major. *Proceedings of the 2003 Business of Education Conference*. Available at: http://www.iacis.org/iis/2006_iis/PDFs/Crampton_Walstrom_Schambach.pdf

Suzuki, T. 2003. The accounting figuration of business statistics as a foundation for the spread of economic ideas. *Accounting, Organizations and Society* 28: 65–95.

Tinker, T. 1985. *Paper Prophets: A Social Critique of Accounting*. New York, NY: Praeger Publishers.

Tyson, N. D. 1999. Measure for pleasure. In *Measuring the Universe: Our Historic Quest to Chart the Horizons of Space and Time*, by K. Ferguson. New York, NY: Walker & Company.

Watts, R. L., and J. L. Zimmerman. 1979. The demand for and supply of accounting theories: The market for excuses. *The Accounting Review* 54 (2): 273–305.

Zeff, S. A. 1989. Does accounting belong in the university curriculum? *Issues in Accounting Education* 4 (1): 203–210.