

THE EPISTEMOLOGICAL BELIEFS OF PRE-PROFESSIONAL ACCOUNTING
STUDENTS: AN ANALYSIS UTILIZING THE EPISTEMOLOGICAL BELIEFS
INVENTORY

by

George E. Smith

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Abstract

Critics have suggested that characteristics of accounting education including the dominant research paradigm of academic accounting, positive economic science (PES), have negatively affected the development of important decision-making skills in pre-professional students. The purpose of this study was to measure and assess both accounting and non-accounting business students' beliefs about the nature of knowledge and learning. These epistemological beliefs are thought by educational psychologists to influence the development of unstructured decision-making skills. A survey instrument, the Epistemological Beliefs Inventory, was used in the experiments. Results indicated that contrary to expectations, accounting majors were significantly more sophisticated than non-accounting majors in at least two epistemological beliefs, certainty of knowledge and omniscient authority.

Dedication

This work is dedicated to the two people who inspired and sustained me in the fulfilling this dream - my wonderful wife, Mary Viguerie Smith, whose support and faith were always there, even when all reason dictated support and faith were but folly, and the wonderful gentleman, pioneer accountant, and pillar of rectitude whose name I bear proudly - my grandfather, G. Edwin Smith, CPA.

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CHAPTER 1. INTRODUCTION

Introduction to the Problem

In recent years, the public accounting profession has been the object of a great deal of scrutiny for its perceived failures to fulfill its traditional role as an independent "agent of confidence for society" (Carmichael, 2004). All of the most visible institutions of financial accounting and auditing - standard-setting boards, professional associations, firm governance, etc. - have been extensively examined for review and/or change. New regulations and regulatory bodies have been created. New accounting and auditing standards have been adopted while others have been proposed or are under review. In this supercharged atmosphere it is probably inevitable that all other aspects of the accounting profession will likewise come under intense critical attention. Old critics of even the most mundane ephemera of the profession reemerge with resounding recriminations while new, radical solutions for longstanding issues such as changes in the academic preparation of accountants are given wide audience.

It is in this environment that long-standing controversies over the educational preparation of pre-professional accountants have re-surfaced. In a speech in July, 2002, shortly after the Enron collapse, President George Bush called on business

educators to “be principled teachers of right and wrong, and not surrender to moral confusion and relativism” (Bush, 2002). Amernic and Craig (2004) cite three failures in accounting education: (a) failure to deliver professional and moral behavior, (b) perpetuating the myth that accounting is the revealer of an underlying natural truth rather than critically assessing accounting practices and principles, and (c) producing research and scholarly inquiry that is generally useless. Skepticism about the profession has begun to affect the population from which future accountants will eventually have to come. Coleman, Kreuze, and Langsam’s survey (2004) of 338 college students indicates that many feel that accounting has become a less attractive career because of recent events. Waddock (2005) captures the essence of many of the criticisms that the aftermath of the Enron, Tyco, WorldCom, and other scandals in her comments about the state of accounting education

If we want accountants who are capable of acting with integrity and understanding the broader system in which they work, we must teach them to be mindful - aware of their belief systems, conscious of consequences, and capable of thinking broadly . . . Courses on . . . soft subjects are typically given short shrift in favor of applied analytical tools and techniques, conceptual models,

and measures of profitability, which are all rooted in the mythology of positive economic science (p. 147).

The picture that is painted by these and other critics of business and accounting education is bleak. Possibly most troubling is the oft-heard criticism that accounting education fails to produce future professionals that demonstrate the ability to critically analyze their own profession and its place in the world around it. Recent events have proven that the world, especially the world of the accountant, is a messy place with challenges that refuse to fit comfortably in the confines of textbooks and professional pronouncement. The Accounting Educational Change Commission's Position Statement Number One (1990) defined "the ability to locate, obtain, and organize information and the ability to identify and solve unstructured problems in unfamiliar settings and to exercise judgment based on comprehension of an unfocused set of facts" (pp. 307-308) among the skills necessary to become a successful professional. Recent surveys indicate that these are also the skills that employers value most in new accountants (Burnett, 2003). A systematic lack of unstructured decision skills would be a serious problem for accounting education, students, employers, and the economic system that depends on them.

Problem Statement

If Waddock (2005) is correct, the accounting education system is controlled largely by academics whose research interests have moved significantly away from those of accounting practitioners. The positive economic science paradigm that has come to dominate academic accounting research is linked to the failure of accounting education to develop high level thinking skills in accounting students. While appealing to many of its critics both within and outside accounting, this linkage has been suggested but insufficiently tested empirically.

Purpose of the Study

The purpose of this study was to contribute to the debate over the effectiveness of the accounting educational system in the development of pre-professional accountants. The study proposed a framework that manifested relationships between positive economic science, accounting education, and pre-professional accounting students' beliefs about knowledge and knowing. Using an instrument developed by educational psychologists, those beliefs were measured and compared with the epistemological beliefs of non-accounting business majors for evidence of systematic differences between these two related, but arguably different disciplines. The three hypotheses developed and tested in this study proposed that if critics were

correct, pre-professional accountants' beliefs are significantly less sophisticated than those of non-accounting, business majors.

Background

The Crisis in Accounting Education

In the mid 1980's, critics from within and outside of the accounting education system warned that accounting graduates were unprepared to handle the challenges facing professionals in the "real world." A series of high-level studies critical of accounting education identified numerous areas requiring improvement. Mathews (2001), commenting on the multiplicity of such reports, observed that they had become "almost an industry in itself" (pg. 385). At the core of many of these studies was a perception that a growing divergence between accounting academics were producing pre-professionals without the skills that practitioners valued.

One of the first coordinated attempts to identify the educational deficiencies in accounting education was an American Accounting Association project culminating in 1986 with the publication of the Bedford Committee report entitled "Future Accounting Education: Preparing for the Expanding Profession" (American Accounting Association, 1986). The report recommended a significant change in the training given to future accounting

professionals away from the traditional emphasis on technical expertise to the development of learning skills, interpersonal skills, and systems thinking (Bolt-Lee & Foster, 2003). Another important commentary on the state of accounting education, the Accounting Education Change Commission report (1990), called for a change in the educational focus away from an emphasis on preparation for professional exams to enabling students to learn more effectively and to use these effective learning strategies to continue to learn throughout their lifetimes (Accounting Education Change Commission, 1990).

The importance of developing effective problem solving skills in young professional accountants was also underscored at an American Assembly conference on the future of the accounting profession. Conference participants observed that deficiencies in problem identification and problem solving could affect the ability of a financial statement audit to comply with audit standards relating to fraud detection. Inexperienced auditors are most likely to be working directly with clients in the field and are thus frequently in the best position to see conditions that might indicate potential client fraud. Audit firms believe that too frequently young professionals are unable to recognize the warning flags of fraud-prone organizations due to a lack of high level thinking skills (American Assembly, 2004).

Critical thinking has become a frequently used term to describe the skills required in a successful accounting professional. Definitions of critical thinking in the professional and academic literature are somewhat imprecise, however. Critical thinking has come to describe "a range of higher-order thinking skills and is commonly expressed in a descriptive or holistic form rather than with a generally agreed upon definition" (Kealy, Holland, and Watson, 2005, p. 34). An effective critical thinker has been described as able to draw upon higher-order thinking skills to address the challenges inherent in an increasingly complex and challenging world where diverse and unstructured problems in unfamiliar settings are the rule (Wolcott & Lynch, 1997). Critical thinking has also been defined as "an investigation whose purpose is to explore a situation, phenomenon, question, or problem to arrive at a hypothesis or conclusion about it that integrates all available information and that can therefore be convincingly justified" (Kurfiss, 1988, p.2). Students properly endowed with adequate critical thinking ability should be equipped with capacities for inquiry, abstract logical thinking, and critical analysis (Accounting Educational Change Commission, 1990).

If critical thinking skills have become for some the "holy grail" of accounting education, others within the accounting and business academic communities have adopted a more cautionary

tone on the rush to implement changes to enhance critical thinking through changes in accounting and business pedagogy. Baril, Cunningham, Fordham, Gardner, and Wolcott (1998) found a significant lack of agreement among accounting professionals on even such basic issues as the definition of what attributes constitute critical thinking skills. Wolcott, Baril, Cunningham, Fordham, and St. Pierre (2002) also noted a lack of empirical inquiry to support specific educational methodologies to improve critical thinking that could replace the anecdotal opinions and recommendations of accounting education's critics. This lack of empirical inquiry is not limited to accounting education but is also characteristic of other aspects of business-oriented education. Braun (2004) found that the effect of educational techniques to foster critical thinking skills in the education of future managers is minimal and inconclusive. Das (1994) suggests that

[t]he most insidious problem that I have encountered in discussing the topic of teaching critical thinking has been the belief among many individual educators that it is a routine matter for them to emphasize critical thinking in their instructional tasks, that indeed they routinely do so, and that it is a bit of a wonder why it is necessary to discuss it as a problematic issue in the educational field. These educators also consider themselves adequately

equipped to practice this particular pedagogical orientation with the existing institutional arrangements. This reminds me of surveys of ethical conduct, which typically reveal that most individuals claim to have higher standards than other people (p. 334).

Finally, Wolcott et al. (2002) boldly assert that, given the lack of empirical research on critical thinking, "the value of further efforts to develop students' critical thinking skills must be questioned" (pg. 87).

Personal Epistemology

If critical thinking has proven to be a difficult construct around which to address the development of ill-structured problem solving skills, developments in the field of educational psychology may hold more promise. These researchers have come to believe that basic notions about knowledge and knowing influence both learning and decision-making in profound ways (Hofer, 2002). These personal epistemological beliefs are thought to form a foundation or framework necessary for the development of critical thinking skills (King & Kitchener, 2002; Kuhn & Dean, 2004). Authors have conceptualized the development of personal epistemological beliefs in multiple models (Hofer & Pintrich, 1997), many of which will be discussed in the literature review that follows.

One model, in particular, holds significant promise to help define and measure these basic beliefs in pre-professional accounting majors - Schommer's epistemological beliefs model. Rather than viewing epistemological beliefs developing in a linear, stage-bound fashion, Schommer's model portrays personal epistemology as five separate beliefs that develop "more-or-less" independently of each other (1990) from positions of epistemological naiveté to increasing levels of sophistication at which high level decision-making is facilitated. The model has been used in a limited way to study the epistemological beliefs of students in introductory accounting classes (Phillips, 1998; 2001) but not pre-professional accountants.

Research Objectives

The research design of this study adds to the empirical information available about the ill-structured decision-making skills of pre-professional accounting majors by measuring the relative sophistication of their epistemological beliefs. To establish a benchmark against which pre-professional accounting students' epistemological beliefs could be measured, this study utilized non-accounting business majors as a comparative population. The objective of the research project was to test three hypotheses regarding the degree of epistemological differences between the two student groups. The theoretical

framework described in the following section suggested that the unique effect of positive economic science on accounting education created the possibility of significant differences between these two groups.

Previous studies have examined the epistemological beliefs of students in an introductory accounting course (Phillips, 1998; Phillips, 2001; Castigione, 2000). However, two issues limit the usefulness of these studies for understanding the personal epistemology of accounting students. Subjects were generally not senior-level students but students beginning exposure to college-level coursework. This study used as subjects pre-professional accounting majors and senior-level non-accounting majors. The epistemological beliefs that are measured in this study reflect the influence of the entire range of pedagogical influences these students are exposed to. The previous studies are primarily interested in the relationship between epistemological beliefs and accounting problem-solving not on differentiating between the epistemological beliefs of accounting and non-accounting majors. This study is among the first to specifically measure the epistemological beliefs of accounting majors after completing the accounting curriculum.

Implications of the Study

Accounting Education

Results of the proposed experiment may lend empirical support to the critics of accounting education. From a practical perspective, the talents and services of graduates of accounting programs have commanded a significant wage premium in relation to other business disciplines. This wage differential would be threatened if accounting pre-professionals are less equipped to demonstrate epistemological beliefs consistent with higher-order thinking skills than other business graduates. More importantly, the exclusive charter granted to public accounting firms would be threatened if accountants are less well-prepared to complete challenging, unstructured tasks like control environment and fraud risk assessments than other potential competitors.

Results that indicate that pre-professional accountants lack epistemological sophistication lend a great deal of support to critics of current accounting educational practices. As will be discussed in the literature review, significant effort has been expended to make accounting education more relevant to the problems inherent in the real-world activities of working accountants. This project will either give support to or cast doubt on the success of these undertakings.

An outcome that rejects the research hypotheses might indicate that, in the search for better critical thinking skills, the

model of personal epistemological beliefs was not well-specified and that other approaches to understanding critical thinking development in pre-professional students may prove to be more productive. In the struggle to produce better professionals able to deal with the highly complex and challenging post-Enron world, even this finding could be considered helpful. To paraphrase Enrico Fermi, an experimental confirmation of a prediction is merely a measurement but an experiment disproving a prediction is a discovery.

The "discovery" associated with failing to reject the null hypotheses could indicate that the problems attributed to accounting education may be misplaced. An outcome indicating that the epistemological beliefs of pre-professional accounting majors are equivalent or superior to non-accounting business majors suggest that the roots of the problem are much deeper than tinkering with accounting curricula can solve. These results may have direct, important implications for auditing standard-setting bodies, the PCAOB, FASB, and the Securities and Exchange Commission. The attention given to failures in pre-professional education, as yet not supported by empirical evidence, may have served to deflect attention from deficiencies inherent in the tasks entrusted to auditors and accountants. Technical knowledge about the control environment and other elements of a financial statement audit, taught and tested in

both pre-professional accounting curricula, may be systematically flawed. These tasks may involve obstacles that even the most epistemologically sophisticated would be unable to overcome. This finding would thus be consistent with the observations that criticize new regulations as introducing more confusion than they eliminate through obscure reasoning, imprecise language, and confusing discussions (Marden, Holstrum, and Schneider, 1997). Technical knowledge about flawed standards, routinely assessed through standardized examinations designed by the AICPA and administered by the various state boards of accountancy, may not overcome difficulties encountered in applying the standard in the field. What appears to be deficient critical thinking skill may in fact be masking a hopelessly flawed task.

Personal Epistemology

One of the unresolved issues in the study of personal epistemology is the issue of *domain specificity*. Domain in personal epistemological research is frequently used interchangeably with *academic discipline* (Hofer & Pintrich, 1997). Domain specificity, or its alternative domain generality, describes the degree to which theories of knowledge and knowing are conditioned by the academic disciplines students are exposed to in the educational process (Palmer & Marra, 2004). Domain generalists generally contend that epistemological development

occurs evenly across disciplines. Those who support domain specificity contend that (a) students may use different epistemological assumptions when dealing with different academic disciplines or (b) students within different academic disciplines may reflect similar epistemological beliefs consistent with the demands of their disciplinary orientation (Bell & Linn, 2002).

Research addressing questions of domain specificity and epistemological beliefs, particularly those that have used Biglan's (1973) taxonomy of academic disciplines (Paulsen & Wells, 1998; Schommer-Aikens, Duell, & Barker, 2003), have aggregated the epistemological beliefs of "business majors" into one homogeneous category. This study suggests that the epistemological beliefs of accounting majors in particular are significantly different from those majoring in other business majors. If the null hypotheses of "no difference between accounting and non-accounting majors" are rejected, strong support would be given to those who contend that epistemological beliefs are domain specific.

Nature of the Study

The research approach used is consistent with other studies using the Schommer model of five, "more-or-less" independent beliefs about the nature of knowledge and knowing (1990, 1992)

in that it utilizes a paper and pencil survey instrument. The study asks both pre-professional accounting and non-accounting majors to complete a survey of epistemological beliefs, the Epistemological Beliefs Inventory (EBI) developed by Schraw, Bendixen, and Dunkle (2002). The EBI was developed to measure the five dimensions of epistemological beliefs identified in previous research. Three of the five dimensions are of primary interest to this project: (a) beliefs about the nature of knowledge, (b) structure of knowledge, and (c) source of knowledge.

Assumptions & Limitations

Assumptions

For purposes of the study, the following assumptions were made:

1. Subjects used in the experiment are representative of the population of both accounting and non-accounting majors.
2. Subjects will respond honestly to the questionnaire and the decision-task.
3. The depiction of the dominance of positive economic science in accounting research accurately reflects the continuing state of accounting research in 2006-2007.

Limitations

The design of this study is limited by the following:

1. Subjects used in this experiment all attend colleges and universities in the mid-western section of North America which may constrain its generalizability to other geographic locations.
2. No effort is made to account for differences in teaching style or effectiveness although the limited number of sites will minimize variability.
3. The ability of survey instruments to capture the complex nature of epistemological beliefs has been questioned by some researchers (Hofer & Pintrich, 1997).

Chapter Summary

Recent and well-publicized failures of public accounting to serve as the guardians of stockholder's rights to accurate and unbiased financial information have focused attention on many aspects of the profession. Internal and external critics have revived decades-old criticism of accounting education claiming, among other things, that pre-professional accountants are systematically unprepared to deal with the ill-defined, unstructured decision tasks that characterize the modern business environment.

This study examines the fundamental beliefs of accounting majors about knowledge and knowing. These beliefs, commonly referred to as personal epistemology, are thought by many within

the fields of educational psychology and cognitive scientists to provide the environment within which critical thinking is possible. This study suggests that the current environment of accounting including the paradigmatic dominance within the accounting academic community of positive economic science, may retard rather than enhance the development of sophisticated epistemological beliefs.

CHAPTER TWO: LITERATURE REVIEW AND RESEARCH QUESTIONS

Introduction

A great deal of professional interest in the state of accounting education has centered on the “critical thinking” skills of pre-professional accounting majors. The first part of the literature review will examine the relatively small amount of research that directly addresses this topic. The remaining sections of the chapter will examine in detail the concept of personal epistemology, which some within educational psychology and the cognitive sciences believe may be a more useful construct to describe unstructured decision-making. Among the various models of personal epistemology discussed, one in particular, the Schommer (1990, 1992) model of epistemology beliefs will be examined. The last section of the chapter will develop the theoretical framework that proposes a linkage between accounting education practices and the epistemological beliefs of accounting pre-professionals and three hypotheses that will form the basis of the research study described in the last section.

Critical Thinking Research

As discussed in the previous section, empirical research on the state of critical thinking skills and accounting education

is very limited. Two studies have examined the relationship between critical thinking skills with the performance of students in both introductory and advanced accounting classes. Jenkins (1998) used the Watson Glaser Critical Thinking Appraisal (CTA) scores of 96 students enrolled in auditing classes at San Jose State University to determine whether critical thinking levels were positively associated with classroom performance. The CTAs of student volunteers were measured prior to the comprehensive final examination in each section of an auditing class commonly taught at the end of the undergraduate accounting program. In addition to critical thinking ability, the general regression model used in this experiment included cumulative college grade point (GPA), age, and gender as independent variables. Four separate regressions were analyzed with the test score of one examination used as the dependent variable in each iteration. Jenkins did not attempt to standardize the degree of critical thinking skill required for each of the four exams but reported that while the examinations varied in the difficulty of questions, a "substantial part of each test required critical thinking skills to analyze and solve unstructured problems" (p. 277).

The results of the regression indicated that for each exam, GPA was the only independent variable found significant at the .05 probability level in each of the four examinations. The CTA

variable was significant only for the third mid-term and the final exam indicating that students with higher levels of critical thinking skill performed better at the later stages of the auditing course. Neither age nor gender proved statistically significant predictors for any of the four exams. As noted by the author, results involving students of one instructor at one university are subject to the effects of instructor style, geographic location, so test design may not be generalizable to other educational institutions. More importantly, the results may not be generalizable to real-world settings.

Kealey, Holland, and Watson (2005) sought to address the same research question as Jenkins (1998), using a different approach to measuring critical thinking and a different student group. This experiment sought to predict the success of 178 students enrolled in nine sections of an introductory accounting course at a metropolitan mid-western university. Independent variables included a writing sample instead of a CTA to measure critical thinking ability, gender, college hours completed prior to the introductory accounting class, GPA, English score from the ACT examination, the ACT math score, and dummy variables for whether the student was a pre-business major or pre-accounting major. The use of writing samples as an alternative to CTAs to measure critical thinking has been recommended to allow the reviewer to assess both "the 'correctness' of the response, and

the process used to arrive at the answer" (p. 37). The authors also note that the use of writing samples is consistent with the written portion of the (then) Uniform CPA Examination.

Students were asked to complete a writing assignment to evaluate the possible reasons for financial distress in a major U. S. corporation. All personal identifying information was stripped from the students' responses, each sample assigned an identifying code number, and the samples passed along to an assessment team. Samples were then graded according to a grading rubric modeled on the rubric used on the GRE, GMAT, and the writing component of the SAT. Student samples were holistically scored on a 6 level scale ranging from seriously deficient (1) to extremely proficient (6). Inter-rater reliability was addressed by the use of a "norming" session to develop a common understanding of how to apply the rubric to the grading process. The actual grading process involved each exam being read by two independent reviewers and a holistic, rubric-based score assigned by each reviewer. Any exam which produced scores differing by more than a two-point difference was referred to a third reviewer. The score assigned the exam was an average of the three scores. The authors reported that the maximum difference between scores was 3 points in five of the essays reviewed. Cronbach's α (average = .83) and a weighted Kappa

Coefficients (average = .81) were computed for each pair of judges indicating a high degree of inter-judge reliability.

The dependent variable used in the experiment was the students' performance on both mid-term examinations and a comprehensive final examination. Consistent with the method used by Jenkins (1998), four regressions were computed, one for each exam and a final composite score for the entire class with each exam weighted: 100 points for the three mid-term examinations and 150 points for the comprehensive final. Both Pearson and Spearman correlations were also computed. Results indicated that, consistent with expectations, critical thinking scores, performance on the standardized placement tests, prior earned GPA, and a pre-accounting major were positively correlated with performance on the examinations. A positive correlation was not found for gender, completed college hours, or a pre-business major. Correlations between variables was noted in the case of critical thinking and ACT English scores, ACT math and English scores, critical thinking and ACT math, and gender and ACT math scores.

The multiple regression equation estimated using OLS for performance in the introductory accounting course produced results generally consistent with the authors' hypothesized relationships. The adjusted $R^2 = .3092$ and the F-value = 10.90, significant at the $p=.005$. Critical thinking scores, GPA, ACT

math scores, and a pre-accounting measure were also significant at levels greater than $p=.05$. Gender, hours, ACT English, and a pre-business major were not significant. The authors also attempted to replicate the Jenkins' results that indicated that critical thinking improved as the course progressed. This study found that critical thinking scores were significant for all tests during the semester.

Two significant issues are left unaddressed by these studies: (a) the degree to which tasks associated with these studies require high-level decision skills, especially levels of critical thinking required of working professionals and (b) how the critical thinking skills of pre-professionals can be improved through improved pedagogy. Kealey, Holland, and Watson (2005) use an introductory-level evaluative task to assess critical thinking skills. While certainly appropriate for the population selected for the study, no claim is made that this task is representative of the challenges facing a working professional. Jenkins assesses the relationship between critical thinking skills and success in a pre-professional auditing class. One of the chief criticisms of both professional and academic critics of modern accounting pedagogy is that these pre-professional courses are the very examples of pedagogy that fail to foster critical thinking. The current research project, as described in a later section, will instead utilize a task

associated with a high level of critical thinking by a wide range of professional and academic groups.

While both Jenkins (1998) and Kealey et al. (2005) indicate a positive correlation between measures of critical thinking skills and success in accounting courses, the most compelling question remains: how can current educational methods be improved to foster critical thinking in pre-professionals? Neither study makes an effort to suggest ways in which critical thinking skills can be stimulated and enhanced by accounting or general business curricula. Kealey et al. (2005) conclude that it might be advisable to pre-screen students for critical thinking ability before enrolling them in even an introductory accounting class. While pre-screening would certainly increase the probability that only students with high levels of critical thinking ability would graduate from a college accounting program, it pushes the task of development to other, non-accounting disciplines. As the discussion in the next section will indicate, it is not clear whether this will, in fact, translate into a better accounting critical thinker. It seems more consistent with the concerns of the profession that the pool of potential accountants not be reduced but that accounting education should be able to help potential professionals develop critical thinking skills while being trained within a collegiate accounting major. Various suggestions have been put forward to

foster the development of critical thinking skills including: assignments or activities, specific courses, programmatic designs, and teaching styles and practices (Wolcott et al., 2002). Unfortunately, the attention given to the problem has produced no consensus or empirical support for the efficacy of specific strategies or classroom techniques (Wolcott and Lynch, 1997).

Personal Epistemology Research

If critical thinking has proven to be a somewhat intractable construct, another approach, concentrating on fundamental building blocks of higher-level thinking, has begun to bring valuable, empirically based insights into the discussion. The next section of this chapter will discuss in some detail this approach to applying beliefs about knowledge and knowing to practical aspects of teaching and learning, the study of personal epistemology.

Foundational Studies

Perry's Harvard studies. In the 1950s, psychologists and educators began to investigate the "conceptions that individuals have about knowledge and knowing (Hofer, 2004, p. 1)", or as it has been frequently referred to - "personal epistemology" (Hofer & Pintich, 1997). Hofer and Pintrich (1997) summarize the basic questions addressed by personal epistemology research as "how

individuals come to know, the theories and beliefs they hold about knowing, and the manner in which such epistemological premises are a part of and an influence on the cognitive processes of thinking and reasoning (1997, pg. 88). Several authors (Hofer, 2004; Shommer-Aikens, 2004; Bråten & Strømsø, 2005) cite the early research efforts of William Perry and his associates as providing the basis for personal epistemology research. A team led by Perry studied a group of Harvard University students through their four-year undergraduate program to describe the "great range in the ways in which different students appeared to address the diversity and relativism of thought and values that characterized their liberal education in the setting of a pluralist university (Perry, 1968, p. 7-8)." As a consequence of extensive interviews with study participants, researchers "came to feel that we could detect behind the individuality of the reports a common sequence of challenges to which each student addressed himself in his own particular way" (1968, p. 9). As a result of these initial observations, these researchers extended their study to describe and test the validity of the developmental scheme they detected from the first descriptive study.

The model of epistemological development that the second research effort described was linear, composed of nine increasing sophisticated stages or positions:

Position 1: Right answers for everything exist in the absolute, known to Authority whose role is to mediate (teach) them.

Position 2: Student begins to perceive that diversity of opinion and uncertainty exist but views them as either needless confusion or mere exercises used by authority to determine whether students can find the answer themselves.

Position 3: Students begin to recognize that uncertainty may exist but only temporarily because Authority hasn't found the complete answer yet.

Position 4: A new structure of knowledge emerges consisting of two domains. One domain, Authorities right-wrong answers, coexist with a second domain where legitimate uncertainty and diversity of opinion predominate.

Position 5: Student perceives that all knowledge is contextual and relative. Dualism only exists in special cases.

Position 6: Student comes to perceive the necessity of commitment in a world where knowledge and virtue are essentially relative and contextual.

Position 7: Student makes a commitment.

Position 8: Student begins to experience and explore the implications of the commitments undertaken in Position 7.

Position 9: Through the commitments previous undertaken,

the student begins to find a sense of self and community (Perry, 1968, 20-42).

Early "naïve" positions were characterized by perceptions of varying degrees of "dualistic thinking." At these early stages, knowledge was perceived by students as consisting of isolated facts and absolute truths. Subsequent epistemological positions were characterized by progressive refinement of attitudes moving towards "relativist thinking" where the students increasingly saw themselves as an integral part of the knowledge creation process.

Perry subsequently reconfigured the nine-stage model into a four category model (Hofer, 2001). The first category, a dualistic perspective, was characterized by a belief in a simple right-wrong view of knowledge in which students were taught truths known and communicated by a teacher. The second category, multiplism, was characterized by an increasing acceptance by the student that diverse opinions and even uncertainty could exist on important questions. The third category, relativism, was characterized by the realization that some opinions were closer to truth than other opinions. Finally, a fourth category, commitment within relativism, was characterized by an increasing ability on the part of the student to become committed to values, relationships, and their own identity as an individual.

Ryan's studies on learning. Ryan's two studies (1984a, 1984b) were among the first to address the somewhat obvious question suggested but untested by Perry - do students with mature epistemological beliefs learn and perform educational tasks better than more epistemologically naïve students? Both experiments tested the effect of epistemological beliefs on students' development and learning strategies and outcomes but in different contexts. Ryan's first study (1984a) hypothesized that, given the nature of Perry's dualist epistemology stage that views knowledge as a set of isolated facts or truths, an epistemologically naïve student would assess the degree to which a reading task was successfully comprehended by the number of propositions from the text that could be retrieved from memory (knowledge standard). Conversely, a more sophisticated epistemologically developed student would assess comprehension based on the degree to which clear and coherent relationships could be developed from a reading assignment (comprehension/application standard). He further hypothesized that the nature of reading comprehension criteria applied by students to their own efforts should influence academic performance. Students adopting a knowledge standard would be expected to achieve lower grades in a reading course than students utilizing a comprehension/application standard. Students reporting a greater number of comprehension criteria in

evaluating reading assignments would be more likely to receive higher grades than those using a lower number.

Ryan's second study (1984b) extended the first study by linking epistemological development to the performance of a specific academic task, specifically the writing of an academic paper. Ryan argued that dualist students' essays fail to value, and hence would be less likely to exhibit, "interdependence" or "the degree to which a prose sample involves the careful elaboration and evaluation of a single theme" (p. 1227) than relativists. This lack of a coherence standard approaching the interdependency standard would be associated with less coherent prose in dualists than in relativists. Ryan's results supported the hypothesized relationships. Students' conceptions of coherence ranged from the least sophisticated criterion - informativeness - to the most mature - unity. Relativists were more likely to adopt more mature coherence conceptions than dualists and dualists were more likely to exhibit naïve conceptions of coherence. Coherence conceptions also predicted grades on the essays that subjects were asked to compose. Students with mature coherence conceptions scored higher than students with naïve coherence conceptions.

Methodological choices made by Ryan in the design of his experiments foreshadow some of the controversies among current personal epistemology researchers. Experiments described in both

studies placed students taking an introductory psychology class into epistemological groups based on survey responses. As will be seen in later studies, some researchers contend that self-administered surveys cannot capture the depth of a construct as complex as personal epistemology. Participants were drawn from several academic areas including business, sciences, liberal arts, and undecided. Although no correlation was noted between academic area and epistemological belief, other researchers will later suggest that epistemological differences may exist between academic disciplines.

Stage-Sequenced Epistemological Models

Hofer and Pintrich (1997) describe the post-Perry efforts to continue the development of models of personal epistemology. They categorize one research stream as the "sequenced trajectory of epistemological development" (Hofer, 2001, p. 356). These researchers were primarily interested in reinterpreting the unidimensional, linear, staged development of epistemological beliefs described by Perry but correcting what they perceived to be the deficiencies of the Perry model or in the methodology used by Perry. The following sections will discuss the primary stage sequential model paradigms.

Women's ways of knowing. One of the first revisions of the Perry model was described by Belenky, Clinchy, Goldberger, and Tarule (1985). Their model sought to redress what they saw as

the failures of other researchers to address gender differences in the development of epistemological beliefs. The samples used in Perry's projects made no provision for identifying differences attributable to gender (Hofer & Pintrich, 1997). Belenky et al.'s open-ended, taped interviews of 135 women from different social, economic, and educational backgrounds "focused on women's conceptions of truth and of themselves as knowers, and on how such notions evolve over time" (1985, p. 12).

This model, women's ways of knowing, portrays five distinct stages or "voices": silence, received knowledge (the voice of others), subjective knowledge (the inner voice), procedural knowledge (the voice of reason), and constructed knowledge (integrating the voices). At one extreme, the silence voice, women live in a world of silence and isolation, unable to use language to effectively acquire knowledge from others. The voices of others eventually are recognized as a means of receiving ideas, but in this voice, women have not come to see themselves as capable of creating them. The emphasis is on receiving information, not mastering it. Eventually, women begin to understand that voicelessness is equivalent to powerlessness. Subjectivists "see their own firsthand experience as the only reliable source of truth - not the words of others" (1985, p. 18). At the next position, further epistemological evolution brings the observation that there is more to knowledge than

one's own intuition or experience, that truth can be shared and the expertise of self or others is worthy of respect.

Constructivism, the last stage, begins the integration of two forms of knowing: separatism, which is characteristic of the procedural stage, and connected knowledge. Separatists celebrate the newly acquired voice of reason in the search for truth and are generally found within the academy. Connected knowers place the "knower into the known" (1985, 21), allowing the constructionist to draw from others, logic, and self in the search for knowledge.

Epistemological reflection. Baxter Magolda (2004) developed a model of epistemological development based on a 5-year longitudinal study of 101 college students (50 male and 51 female) that bridges the single-gender studies of men and women by Perry and Belenky et al., respectively. Magolda's model identified four stages: absolute knowing, transitional knowing, independent knowing, and contextual knowing. Absolute knowers view knowledge as certain and believe that experts are the guardians and transmitters of that knowledge. In the transitional stage, knowers begin to view knowledge as uncertain and recognize that experts have limitations. In the independent stage, knowers come to view themselves as more or less equally valid sources of knowledge. Contextual knowing views knowledge as contextually dependent and periodically reconstructed as new

evidence and new contexts occur (Baxter Magolda, 2004). Gender differences are more significant in the early stages but become less prevalent in the latter. She notes a similar receiving/mastery in the absolutist stage to that noted by Belenky et al. (1985). Although she finds that receiving is more common among females, it is not exclusively female. The same is true with the mastery pattern. Two patterns emerged in the transitional stage that had gender correlations. More women than men reported that learning was facilitated by "sharing views and connecting one's perspectives with others'" (2004, p. 35). This was in contrast to the largely male tendency toward an impersonal, arms-length orientation. Again, while the interpersonal/impersonal pattern was female/male oriented, it was not exclusively so.

Reflective judgment. A third model of epistemological development, the reflective judgment model, was developed by King and Kitchener (2004) to study the Epistemological assumptions that underlie reasoning (Hofer & Pintrich, 1997). John Dewey argued that "reflective judgments are initiated when an individual recognizes that there is controversy or doubt about a problem that cannot be answered by formal logic alone, and involve careful consideration on one's beliefs in light of supporting evidence" (as cited in King & Kitchener, 2004, p. 6).

The model that King and Kitchener describe then represents the steps students make in the development of reflective thinking.

The seven-stage model defined by the Reflective Judgment Model (RJM) described the development of Epistemological cognition which is linked to an individual's ability to deal with ill-structured problems and thus provide the foundation for critical thinking (King & Kitchener, 2002, p. 37). The initial study from which the RJM emerged was a 10-year longitudinal study of students ranging from high-school through third-year doctoral students. The elaborated model consists of seven-stages grouped into three levels of thinking. Each stage is then differentiated on two dimensions representing the stage view of knowledge and the concept of knowledge justification used by stage adherents. As with the other models of personal epistemological development discussed previously, lower, naïve stages are associated with absolutist concepts of knowledge followed in an invariant sequence (Hofer & Pintrich, 1997) by stages representing the progressive evolution to a epistemologically sophisticated belief in the contextually dependent, inherently uncertain character of knowledge.

The Reflective Judgment Instrument (RJI) is used to determine the appropriate position of subjects on the RJM model. The RJI consists of ill-structured problems and subjects' responses are assessed by the subjective evaluations of

specifically trained RJI technicians. Numerous studies indicate that RJI scores increase gradually over time with education level and that students may operate at more than one stage depending on the situation. The question of domain specificity, whether individuals use similar sets of Epistemological assumptions across different knowledge domains, has been addressed, although with contradictory results. Interestingly, the greatest amount of domain dependent differences appears to be associated with more advanced students (King & Kitchener, 2002). Domain specificity, however, seems to remain a problem with the stage sequenced models described above as it is difficult to envision multiple sequential staging (Hofer, 2001).

Accounting Research Implications

The above models have had little penetration into accounting education research. Wolcott and Lynch (1997) have suggested three possible limitations for their application to the accounting classroom. First, these models have not been directly linked to the development of critical thinking. Movement from one epistemological stage to a more advanced stage has not been shown to automatically improve critical thinking (Schraw, 2001). The second limitation is the lack of effective quantitative techniques for assessing epistemological stage development. Most modeling research has been qualitative, relying on clinical interviews to assess epistemological

development (Hofer & Pintrich, 1997). Qualitative research has not been widely utilized or accepted as sufficiently methodologically rigorous in accounting research (Atkinson & Shaffir, 1997; Chua, 1986). Third, there has been little research on the impact of specific classroom techniques on student's critical thinking.

Reflective Judgment - Accounting Based Studies

Two papers on the implications of reflective judgment for accounting educators are notable exceptions to these shortcomings. The first paper, by Wolcott and Lynch (1997), introduced the reflective judgment model as a useful vehicle for the classroom assessment of critical thinking. The authors report on the use of the RJM in a sophomore-level financial accounting class. A total of 48 students completed an essay articulating and justifying an opinion about capitalization of costs in an unstructured setting. Essays were assessed by both an accounting instructor and a certified RJM rater. Quantitative analysis indicated a high-level of agreement between the two raters indicating that RJM evaluations could be successfully accomplished by faculty untrained in RJM.

While the purpose of the paper was not primarily to analyze the epistemological development of this group of students, the results of the process are nonetheless interesting. Results indicate that, on average, students were assessed in the fourth

level - indicating the beginning of quasi-reflective thinking. The range of ratings was between levels 3 and 6. These findings were consistent with expectations from previous research about the development levels of college sophomores. However, the prevalence of level 4 ratings was somewhat higher than expected. The authors conclude that additional research needs to be done to link specific instructional strategies on the development of reflective thinking.

Springer and Borthick (2004) suggest that simulation exercises that emphasize the use of knowledge construction that must be communicated, justified, and defended to others within a learning community provide a vehicle to stage critical-thinking experiences. By targeting educational experiences appropriately, a student operating at one RJM stage may be encouraged to use higher stage skills. This scaffolding process is imbedded within the simulation described by the authors and thus differentiates it from other case and problem-based learning approaches. The authors also describe the simulation's design as creating a need for the development of metacognitive skills for successful problem solving. They recommend the use of minimal amounts of teacher generated information prior to the simulation to stimulate learner engagement, further differentiating the simulation from existing learning strategies in accounting education.

The authors report bimodal responses from students. Some students reported satisfaction and enthusiasm for the simulation while others objected to the ambiguity imbedded in the exercise. Some students, however, noted a shift in their initial skepticism towards a realization of the growth in their academic development. Instructors' reactions were likewise mixed, ranging from enthusiasm for the new learning opportunity to dissatisfaction with the additional effort required to move from more traditional methods. The authors noted that the shift observed in some students was likewise observed in instructor attitudes. Qualitative outcomes were generally positive. Students who participated in classes utilizing the simulation earned higher exam scores in subsequent intermediate accounting courses than those who were in classes utilizing more traditional approaches. High-achieving students in introductory classes utilizing the simulation were more likely to enroll in intermediate accounting than students in other non-simulation classes.

Limitations of Stage Models

In general, the stage models thus far described have advanced the knowledge of the development of epistemological thinking by providing a "rough road map of development" (Hofer, 2001, p. 363). However, several areas of difficulty are associated with these models. Because these models are based on

qualitative research methods, their generalizability may be suspect (Bendixen & Rule, 2004). The reliance on trained raters to utilize the Reflective Judgment Interview has limited its use and "restricted the scrutiny of the methodology of rating" (Hofer & Pintrich, 1997, p. 103). Many of these models are based on work with older students, non-ethnically diverse students, and affluent students. Kuhn and Dean (2004) also observe that this research has yet to make an important contribution to the actual classroom environment because of the lack of attention paid by researchers to practical means of promoting the skills necessary for developing higher-order thinking.

Epistemological Beliefs

Schommer's Epistemological Belief Model and EBQ

A second line of inquiry, first described by Schommer (1990), offers a different model of personal epistemology. Rather than the uni-dimensional, fixed stage models previously discussed, Schommer's model depicts personal epistemology as composed of five more-or-less independent dimensions. Assessment of epistemological development is achieved by a paper-and-pencil survey instrument rather than the traditional qualitative methodologies; thus, analysis is more quantitative and analytical than possible with previous research. The model of epistemological beliefs (EB) has been adapted for use in

multiple educational levels and has been used directly in math, reading, and other specific classroom contexts. While not without criticism from others within the research community, Schommer's model has been seen as useful for overcoming many of the shortcomings of previous research.

Schommer's (1989, 1990) model of epistemological beliefs was designed to challenge the prevailing view of personal epistemology as a uni-dimensional pathway along which individuals travel in a fixed, stage-by-stage progression. The model consisted of five independent dimensions, three related to beliefs about knowledge (knowledge is composed of discrete facts, can be known with certainty, and is passed down by higher authorities) suggested by the work of Perry (1968) and two beliefs about learning, one based on work by Dweck (ability to learn is fixed at birth) (Dweck & Leggett, 1988) and one based on Schoenfeld (1983) (learning is accomplished quickly or not at all). Schommer (2004) has modified her initial conceptions of the model to suggest that epistemological beliefs can be described as a frequency distribution. Individuals could, for instance, hold most knowledge as changing, some as known and certain, while some knowledge is yet to be discovered. The individual could then be expected to generally act as though knowledge were changing while holding some knowledge as absolute. She suggests that it is critical for individuals to

maintain an epistemological balance, avoiding extreme positions in one area while holding opposite extreme positions in other beliefs.

Schommer developed a survey instrument (EBQ) consisting of 63 items to measure students' epistemological beliefs along the five hypothesized dimensions with Likert scale responses ranging from *strongly agree* to *strongly disagree*. Questions were then grouped within at least two subsets for each dimension for a total of 12 subsets "in order to assess each epistemological dimension" (1990, p. 499). Use of the self-administered survey instrument was in contrast to the largely qualitative character of previous research and allowed the use of quantitative techniques for the analysis of study data.

Initial research. Subjects for the initial study (1990) were 117 junior college and 149 senior college freshmen and sophomores. Subjects were required to complete the epistemological beliefs questionnaire, a survey of personal characteristics, and asked to perform a series of tasks to assess their ability to comprehend and assess their comprehension of complex material. Using factor analysis of the responses to the epistemological beliefs' questionnaire, Schommer was able to identify four of the hypothesized dimensions: (a) innate ability, (b) certain knowledge, (c) quick learning, and (d) simple knowledge. The first two dimensions are

descriptive of students' beliefs about the nature of knowledge. The third and fourth dimensions are indicative of beliefs about learning. A fifth dimension, omniscient authority, was hypothesized but was not validated by the analysis.

To test hypotheses about the relationship between beliefs and academic performance, half of the subjects were asked to read a social science passage while the other half were asked to read a physical science passage with the concluding passage missing from both. Subjects were then asked to write the final passage, rate their comprehension of the passage, and take a test to assess their actual comprehension. As hypothesized, significant correlations were found between non-naïve epistemological beliefs and students' ability to successfully integrate and interpret knowledge. Schommer found that belief in quick, dualistic knowledge negatively affects students' ability to integrate knowledge and assess their own comprehension. Situations indicating significant ambiguity are systematically distorted to conform to students' strong beliefs in the certainty of knowledge. Her findings also supported the importance of parents' educational experience and attitudes towards responsibility and the subjects' level of collegiate education on the development of sophisticated belief systems.

Schommer continued the elaboration of the epistemological beliefs model with a second paper (Schommer, Crouse, and Rhodes,

1992) to attempt to replicate the structure identified by factor analysis in the first paper, examine the relationship between simple knowledge and mathematical text comprehension, and examine the mediating influence of study strategies on simple knowledge. This experiment used a larger sample size of 424 college students enrolled in an introductory psychology course. Again, subjects were asked to complete the EBQ. Factor analysis initially identified three factors, with quick learning and innate ability merging. When the eigenvalue cut-off was decreased from 1.0 to .95, the four-factor structure described in the first paper reemerged, confirming the resiliency of the model.

In the second part of the study, subjects were asked to read a statistical passage, rate their confidence in comprehending the passage, take a mastery test, and complete a study strategy questionnaire. Regression analysis indicates that belief in simple knowledge predicted comprehension and metacognition (over/under confidence in comprehension) even after controlling for age and grade-point, as did quick learning in the first study. Path analysis suggested a link between belief in simple knowledge, study strategy, and test performance.

EBs and secondary school students. While initial studies of EBs used college students as subjects, Schommer extended her

attention to secondary school students to test both the validity and reliability of the model and EBQ and formation of EBs. Schommer (1993) sampled a cross-section of high school students ranging from freshmen through seniors to assess the validity of the EBQ for secondary students and the development of epistemological beliefs through the high school experience. Factor analysis using an eigenvalue cutoff of .98 resulted in a factor structure similar to that previously reported. As with the other studies, a factor representing source of knowledge failed to appear. Multivariate analysis of variance and regression analysis of students' demographic data and GPAs suggest that students' beliefs in simple knowledge, certain knowledge, and quick learning become increasingly more sophisticated as they move through the education system; that girls are less naïve than boys in quick learning beliefs; and that naïve beliefs in quick learning are negatively related to GPA. A second, longitudinal study (Schommer, Calvert, Gariglietti, and Bajaj, 1997) replicated the results of the cross-sectional study.

A second study (Schommer & Dunnell, 1994) found that the high school years have a significant influence on the EBs of gifted students, particularly in simple knowledge. Non-gifted students, while starting high school with EBs similar to gifted students, show no evidence of a growth effect. Similarly, gifted

students change their beliefs in quick learning in high school while non-gifted students remain stable. The study also found that boys were more likely than girls to have strong beliefs in fixed ability and quick learning.

Schommer and Dunnell (1997) extended the prior work by studying the EBs of gifted students and how these beliefs relate to problem solving and learning. As in the previous study, giftedness was determined by scoring in the 97th percentile in a standardized individual intelligence test or ranked no lower than the 95th percentile on two or more academic areas of a standardized achievement test. Results of the study indicated that students with naïve fixed ability, quick learning, and certain knowledge EBs were more likely to generate simplistic and unchanging responses to problems about school and every day life. The study also found that sophisticated fixed learning beliefs predicted students whose grade point averages were consistent with scores on the individual intelligence tests.

The model was later used to test the EBs of middle school students. Schommer-Aikins, Duell, and Hutter (2005) used the model to describe the epistemological beliefs and mathematical problem-solving beliefs of middle school students and the effect that these beliefs have on academic performance. A highly modified EBQ with fewer items and simplified language was used in the study. The study failed to replicate the four-belief

model previously described. Only one factor consistent with prior studies, quick/fixed learning, emerged. A second factor labeled studying aimlessly was identified and interpreted as the belief that learning was essentially random and does not involve strategy or effort. The study found that both sets of beliefs are related to problem-solving performance. Quick/fixed learning beliefs are related to the usefulness of mathematics, the amount of time given to studying mathematics and working on math problems, and the ability to successfully complete mathematical problems.

Epistemological beliefs and problems-solving. One of the fundamental presumptions of epistemological beliefs is that students with naïve epistemological beliefs are less likely to solve complex, unstructured problems than students with more sophisticated beliefs. Kardash and Scholes's 1998 study of 96 undergraduate students enrolled in an introductory educational psychology class found that individuals with naïve beliefs in the certainty of knowledge were disinclined to enjoy cognitive challenging tasks. The individuals were also more likely to hold fast to preconceived ideas and opinions in the face of subsequent challenging data than those with more sophisticated beliefs.

Schraw, Dunkle, and Bendixen (1995) found that certain knowledge, omniscient authority, and quick learning beliefs were

strongly correlated with the ability to solve ill-structured problems. They also determined that the ability to solve ill-structured problems was uncorrelated to the ability to solve well-structured problems. In a second study, Bendixen, Schraw, and Dunkle (1998) tested whether epistemological beliefs were associated with moral reasoning. Using college students as subjects, they found that simple knowledge, omniscient authority, and quick learning beliefs were correlated with moral reasoning.

Two studies have examined the relationship between epistemological beliefs and problem solving in an academic accounting context. Phillips (1998) measured the epistemological beliefs of undergraduate business students in an introductory financial accounting class. Students were asked to complete a modified version of Schommer's 1990 epistemological beliefs questionnaire and to complete a multiple choice quiz (a structured task) and a case problem involving capitalization of travel costs incurred during a business acquisition (an unstructured task). Factor analysis indicated three dimensions of knowledge beliefs: committed effort, uncertain knowledge, and abstract, complex knowledge. After controlling for ability, effort, and previous knowledge, epistemological beliefs were regressed with the results of both the structured and unstructured tasks. As hypothesized, epistemological beliefs

were associated with successful case analysis but unrelated to performance on multiple-choice questions. These results are generally consistent with Schraw et al. (1994), indicating that students who have sophisticated beliefs about knowledge certainty and/or connectedness do better on the unstructured tasks and that ill-structured problem solving is unrelated to well-structured problem solving.

In a second experiment, Phillips (2001) attempted to associate study strategies with epistemological beliefs. Phillips hypothesized that beliefs and study strategies that match the features of the solution will result in higher performance than those that do not. Specifically, Phillips proposed that students who had non-naïve beliefs about simple knowledge would perform better on a case demanding consolidated analysis. Factor analysis revealed a model of epistemological beliefs more consistent with prior research than that of his first study (Phillips, 1998). Study strategies were measured using an instrument developed by Weinstein. Cases required students to analyze a hypothetical company's financial statements and recommend depreciation policies for two categories of long-lived assets given constraints specified in the case instructions. Although several alternative solutions existed, only one satisfied all the constraints. Cases were evaluated by the degree to which students' evaluations were

consistent with that required to reach the optimum solution. The study indicated that epistemological beliefs were positively associated with study strategies appropriate to problem solution and correlated positively with GPA.

Epistemological beliefs and culture. The question of whether epistemological beliefs can be generalized across cultures is addressed by several studies. Cano's (2005) study of 1,600 Spanish secondary students found that, like their North American counterparts, both boys' and girls' epistemological beliefs became more sophisticated as they progress through the educational system. Certain knowledge and quick learning were associated with higher academic performance. Schreiber and Shinn (2003) found similar relationships between epistemological beliefs and learning processes. Their study of 150 community college students indicated that students with sophisticated fixed ability beliefs were more likely to compare and contrast information (deep processing). Students who had naïve simple knowledge beliefs were more likely to process information in a serial fashion, concentrating on memorization of facts rather than relationships and integration.

Bråten and Strømsø's (2005) study concluded that Schommer's epistemological beliefs model was generally descriptive of the epistemological beliefs of Norwegian post-secondary students and related to measures of self-regulated learning. Two samples, one

from a private school of management and a second from a public school for teacher training were administered the EBQ in a modified form. Admission into the school of management was more competitive and rigorous grading practices added to the pressure for high achievement. Admission to the school of education was less competitive, and examinations were less frequent and represented a small part of overall student evaluations than in the school of management. Four factors, three of which generally replicated factors identified in previous, North American-based research emerged: knowledge speed, certainty, and control of knowledge acquisition (fixed ability). A fourth factor, knowledge construction and modification were less consistent with Schommer and other North American-based research.

Epistemological Beliefs and Academic Disciplines

Bråten and Strømsø's research also addressed a second and very controversial topic in epistemological belief literature: the relationship between epistemological beliefs and academic discipline. Bråten and Strømsø found no systematic difference in epistemological beliefs between college students attributable to academic discipline. Business students were thus no more likely than education majors to hold naïve epistemological beliefs simply because they were business majors. Or, put another way, business students are no more or less able to cope with an environment where open-ended, unstructured decision-making is

the rule than other non-business students. One could conclude that, if accounting majors' epistemological beliefs are similar to those of other business majors, the systematic deficiencies noted by critics of accounting education may be misdirected. Either there is no general deficiency in ill-defined, poorly-structured decision-making among accounting majors, or at the very least accounting majors are as epistemologically naïve as other college students. In the latter case, the deficiencies noted among accounting pre-professionals is a symptom of much larger educational challenges - the reform of business education or even the reform of college educational pedagogy in general.

Domain specificity. Bråten and Strømsø's findings are at odds with those of other researchers, however. Some personal epistemology researchers have come to believe that epistemological beliefs are at least in part domain specific (Hofer & Pintrich, 1997). All models of personal epistemology have at their core the presumption that beliefs evolve over time from naïve beliefs in the duality of knowledge to a more sophisticated belief in the contextual, complex, dynamic character of knowledge (Hofer, 2002). Those who contend that epistemological beliefs are domain specific argue that as a part of this evolutionary process, students become acculturated through exposure to an academic discipline. Students "learn to view knowledge from the same perspective as those around them,

in much the same manner that they learn correct diction or learn to distinguish couth from uncouth behavior (Jehng, Johnson, & Anderson, 1993, p. 25). If naïve epistemological beliefs are domain specific, students may exhibit significantly different comprehension skills in one subject area than in others. In other words, domain dependent epistemological beliefs could be extremely problematic in learning activities that require extensive integrative tasks, like many unstructured, case analytic tasks.

Research on the domain specificity of epistemological beliefs has been something of a mixed bag. Jehng, Johnson, and Anderson's (1993) study of 486 undergraduate and graduate students found that students in "soft" disciplines (humanities, arts, and social science majors) had more sophisticated epistemological beliefs in certainty of knowledge and omniscient authority than those in "hard" disciplines (engineering and business majors). No significant difference was noted between beliefs in innate ability or quick learning. Also, no significant differences were noted among majors within either hard or soft disciplines. It was also unclear how the authors defined "hard" and "soft" domains.

Schommer and Walker (1995) extended the work of Jehng et al. by examining differences between epistemological beliefs of different academic majors and also whether individuals believed

differently across domains. Schommer's 1990 survey instrument was modified to include instructions that asked students to think specifically about a given domain when answering the questions used to assess epistemological beliefs. Two domains were used in this manner, social science and mathematics. Reminders were placed through out the test instrument to remind students to keep the domain in question in their minds while completing the questionnaire. Comprehension was then assessed using a task unique to each domain. Results of the experiment were mildly supportive of domain independence for epistemological beliefs. Most students displayed a consistent level of epistemological sophistication across domains and the level of sophistication predicted comprehension within and between domains.

However, Schommer and Walker (1995) did note that in simple knowledge beliefs, math students were more likely than social science majors to hold naïve beliefs. They explained this difference by suggesting that math is generally taught on the basis of unchanging, unquestionable rules that must be learned. Social sciences deal with problems that are ill structured. They hypothesize that students may adjust their beliefs by the demands of a particular, domain-specific task. Thus they may believe in more stable facts when thinking about math and less stable facts when thinking about social sciences.

Paulsen and Wells (1998) argued that lack of significant differences in epistemological beliefs could be traced to a common approach to knowledge creation and not a reflection of domain independence of epistemological beliefs. Specifically, Paulsen and Wells contended that Schommer and Walker's findings might be explained because math and social science might share characteristics that would mask domain dependence. They contended that both math and social sciences are "pure" disciplines, consistent with Biglan's (1973) taxonomy of academic disciplines. Biglan classified academic disciplines along three dimensions: hard/soft (the degree to which agreement exists on a single paradigm that defines acceptable research methodology, basic concepts, and research questions), pure/applied (interest in the use of knowledge versus the discovering and development of knowledge), and non-life/life (concern with life systems). Physical science disciplines were characterized as "hard" and social science disciplines would be classified as "soft." Mathematics, botany, geology, sociology, history, and psychology would be characterized as "pure" and engineering fields and business disciplines would be considered "applied." Economics was classified as "non-life" and education as "life system."

Paulsen and Wells also suggested that students will tend to select college majors in which the predominant epistemological

assumptions are consistent with their own. They hypothesized that students majoring in disciplines defined as soft or pure could be expected to have more sophisticated epistemological beliefs than those of students majoring in hard or applied fields. Two hundred and ninety students were sorted by majors and administered Schommer's epistemology questionnaire. Students were classified as either humanities and fine arts, social sciences, natural sciences, education, business, or engineering majors. Students' demographic information including GPA was collected by self-report. Students were also classed by age into traditional and non-traditional aged students (25 years or older). Pair-wise comparisons revealed differences between disciplines that were largely consistent with those suggested. The beliefs of students majoring in "pure" fields were more sophisticated than the beliefs of students in "applied" fields. Students majoring in engineering, a "hard" field, were more naïve than those of "soft" fields such as humanities and liberal arts, social sciences, and education. Students majoring in business (soft, applied) were significantly more likely to have naïve beliefs in simple knowledge than natural science (hard, pure) majors or humanities and fine arts (soft and pure). Business majors were also more likely to have naïve beliefs in quick learning than those with majors in the social sciences. Analysis of background variables concluded that females were

more likely to hold naïve beliefs in fixed ability and quick learning than males but less likely to hold naïve beliefs about simple knowledge. Students with high GPAs were less likely to have naïve beliefs about simple knowledge than those with lower GPAs. Older students were less likely to have naïve beliefs about fixed ability than younger students.

Paulsen and Wells' conclusion generally supported the proposition that students majoring in a given discipline are likely to hold epistemological beliefs that are consistent with that discipline. The emphasis on "new knowledge" in "pure" fields may encourage students to view knowledge as an evolving set of interrelated ideas and believe that learning takes place gradually. Applied disciplines emphasize application of the products of these new models to real problems. Much of this information is definitive, absolute, and must be learned quickly. "Soft" disciplines, lacking a single paradigm of content or methodology, encourage the belief that knowledge is evolutionary rather than absolute, idiosyncratic rather than certain and unchanging. Soft disciplines may encourage learning that is characterized by discourse and that emphasizes synthesis and critical thinking. Students in "hard" disciplines are characterized by memorization and solutions of known problems. Paulsen and Wells also suggest that while their research indicates that students share the epistemological

characteristics of their major fields, whether this is a function of selection or enculturation is not defined.

Researchers using qualitative methods have also reported similar results. Palmer and Marra's (2004) study of 60 junior and senior class college students assessed epistemological beliefs about sciences and social sciences/humanities. Interviews with subjects allowed researchers to place each student into one of three orientations for each subset of beliefs. Orientations for science beliefs were sequenced from simplest to complex. Orientation I - science is fact, Orientation II - science is theory or fact with exceptions, and Orientation III - science is a collection of facts within theories. Likewise for social science/humanities: Orientation I - knowledge perceived as a collection of facts, Orientation II - knowledge as a collection of equally valid views, and Orientation III - acknowledge multiple views but understand that with thinking and application of experiences, choices can be made from these multiple views.

The authors hypothesized and found that students frequently did not hold stage equivalent views for sciences and humanities/social sciences, indicating epistemological beliefs were domain dependent. Moreover, they found that major shifts from Orientation I to Orientation II and Orientation II to Orientation III were not equally easy for students. It was

harder for science Orientation I students to shift to Orientation II than for equivalent shifts in social science/humanities. Interestingly, they found just the opposite for shifts from Orientation II to Orientation III positions for social science/humanities.

Schommer-Aikins, Duell, and Barker (2003) re-addressed the question of domain independence, specifically the anomalies raised by Paulsen and Wells. Schommer et al. suggested that additional testing of the linkage between the epistemological belief model and Biglan's taxonomy might offer an opportunity to further explore the issue of domain generality. If Biglan's taxonomy could be used to predict epistemological beliefs as suggested by Paulsen and Wells, disciplines sharing a common dimension should have higher correlations of epistemological beliefs than disciplines not sharing either dimension. Schommer-Aikins et al. chose mathematics (pure, hard), social science (pure, soft) and business (applied, soft) to compare. They hypothesized that comparisons between mathematics and social science (both "pure" disciplines) should be more highly correlated than between mathematics and business (which share neither dimension).

Students from multiple disciplines, ethnic backgrounds, ages, and educational experience were asked to complete a domain-specific version of Schommer's epistemological belief

questionnaire. After controlling for background variables, Schommer-Aikin et al. found that both social science and business beliefs successfully predicted mathematics beliefs, indicating, in their view, domain generality of epistemological beliefs. Results that include controlling for exposure to each area were equally indicative of domain generality. Using the number of classes taken in each domain to proxy for familiarity with subject matter, Schommer et al. found that students with either high exposure or low exposure showed significant domain generality. Schommer-Aikins et al. suggest that rather than asking whether epistemological beliefs are domain general or specific, the breadth of epistemological beliefs may be a more germane question to explore. Schommer-Aikins et al. do acknowledge that, contrary to the predictions based on Biglan's classification, there were stronger correlations between mathematics and business than between mathematics and the social sciences. The authors attribute this to the difficulties students from ill-structured domains like the social sciences encounter when confronted with the demands of a well-structured learning environment and the accompanying study strategies and epistemological beliefs that are required.

Is accounting a "soft discipline"? An alternative explanation for the failure of Schommer-Aikens et al. (2003) to observe domain specificity is over aggregation of business

disciplines as one homogenous whole. Both Schommer-Aikins et al. (2003) and Paulsen and Wells (1998) assume that Biglan's classification of "business" as a soft, applied, and non-life discipline is descriptive of all business disciplines. A close review of Biglan (1973) suggests two difficulties with this assumption. First, only accounting, finance, and economics were classified as soft, applied, and non-life; no mention was made of other business disciplines. To suggest that accounting, finance, and economics are representative of all business disciplines commonly recognized by the academy is a gross simplification of a very complex reality.

"Business" is frequently but inaccurately used in academic and non-academic circles to collectivize several related disciplines including accounting, finance, management, marketing, management information systems, etc. In an academic sense, these disciplines are related only because of a shared set foundational courses and a common interest in the world of business. However, courses pertaining to the individual major are quite different as they approach topics from different perspectives, different pedagogy, and different professional/cultural assumptions.

This would not of itself present a problem for research that subsumes all disciplines under the common appellation of "business" unless these disciplines were epistemologically

different. If this were the case, any generalization of the epistemological beliefs of "business" students would be skewed based solely on the mix of the various business disciplines within the sample. This study suggests that there are significant differences between the epistemological beliefs of "business" students particularly between accounting and more "soft" business disciplines such as management and marketing.

While not a great deal of research has examined differences between accounting and other business majors, several studies are suggestive. Baker (1976) found that accounting majors differed from non-accounting majors in 8 of 36 variables measured by the Rokeach Survey of Values. Accounting majors were more likely to value security, cleanliness, and responsibility higher than non-accountants. Values reflecting the esthetics of life and possibly a higher level of epistemological sophistication including beauty, wisdom, and imagination were ranked lower than non-accountants. Pritchard, Potter, and Saccucci (2004) found empirical evidence to support the relationship between mathematics and accounting. Their study of 92 business students, 45 accounting/finance majors and the remainder scattered among management, marketing, and MIS majors, indicated that accounting/finance majors scored higher on basic algebra and computational assessment tests than non-accounting majors. They conclude that students self-select to an accounting

major or away from accounting majors because of the quantitative characteristic of the discipline. Ulrich (2005) found that accounting majors were less likely to find non-traditional teaching methods helpful than other non-accounting majors. Moreover, the methods rejected by accounting majors are those most closely associated with developing complex educational outcomes of application, analysis, synthesis, and evaluation including case studies and analysis. These are precisely the skills described by the accounting profession as critical for successful professionals: oral and written communication skills, interpersonal skills, leadership, and critical thinking.

A shift of accounting from a "soft/applied" to "hard/applied" academic discipline would explain many of the differences noted above as well as the deficiencies cited by critics of accounting education. In the 1960s and early 1970s, the time Biglan was developing his taxonomy, academic accounting was undergoing a period of fundamental change. This period has been described as schismatic - between academics and the practice community (Bricker & Previts, 1990) and even among accounting academics (Buckley, 1970). A complete discussion of the reasons for this schismatic atmosphere are complex and beyond the scope of this project. However, Van Whye attributes at least part of the changing atmosphere to "the problem of research" (1994, p. 140).

The 1967 recognition of the doctorate as the terminal degree for collegiate accounting educators by the Association to Advance Collegiate Schools of Business (AACSB) began a significant change in the composition and interests of faculty (Bricker and Previts, 1990). A 1956 study of the educational qualifications of accounting faculty found that only 26% held doctoral degrees in accounting but that 80% of the respondents were C.P.A.'s (Price, 1957). By 1983, the percentage of terminally qualified faculty at AACSB institutions in New York and New Jersey had risen to 48%. By 1995, this figure had increased to 70%. However, only 54% of faculty held any professional certification. This number had risen slightly to 57% by 1995 (Gibson & Schroeder, 1998) but was still significantly below 1960 levels.

Legitimacy within the academy for this new influx of accounting PhDs meant that accounting educators became more interested in service to the academic community and less concerned with the direct interests of the profession. According to Langenderfer,

the standards for promotion and tenure shifted so that accounting faculties were forced to meet the research and writing standards set by the general business faculties of the business school . . . [A]ccounting faculties were forced to employ more sophisticated research techniques,

which was thought to contribute to the development of accounting theory. (1987, 310-311).

In short, accounting research was moving away from its traditional narrative, experiential roots to an experimental and empirical orientation.

This period began what has been called the intellectual awakening in accounting (Gaffikin, 2003). What accounting was awakening to was a revolution that was also changing the face of economics and finance research: the movement away from normative theories that describe the way the world ought to be, to positive theories that describe the way the world is (Watts and Zimmerman, 1986, pp. 8-9). Beginning in the early 1950s, Milton Friedman and other economists argued that, since any model is an abstraction of reality, models should not be judged by the descriptive accuracy of their assumptions but by their predictive accuracy (Findlay & Williams, 2001). In the mid-1960s, Fama (1965) and other economists, inspired by positivism and utilizing the tools of mathematics and computer science, increasingly turned their attention to the analysis of capital markets and particularly to the empirical validation of the relationship between accounting information and securities pricing (Tinic, 1990).

Accounting researchers were quick to see the implications for injection of positivism into accounting research. Beginning with Ball and Brown's (1968) study of stock price response to unexpected changes in earnings, accounting researchers began to investigate the information content of accounting information. Research replicated Ball and Brown in different markets (Foster, 1975, Brown, 1970), measured the information content of interim financial reports (Foster, 1977), examined the relationship between the magnitude of unexpected earnings and price changes (Beaver, Clark, and Wright, 1979), and the dominance of accrual measures of earnings over actual cash flow (Patell & Kaplan, 1977). In many ways, Ross Watts and Jerold Zimmerman's publication of their landmark *Positive Accounting Theory* (1986) cemented positive theory as the dominant accounting research paradigm by empirically validating a commonly held supposition that managers frequently make decisions that, through their impact on earnings, affect stock price.

The effect of these and other positive theory-based research efforts was profound and soon reflected in the major academic accounting journals. Brown (1996) used citation analysis to identify the most frequently cited articles in the four most prestigious journals: *The Accounting Review*, *Journal of Accounting Research*, *Journal of Accounting and Economics*, and *Accounting, Organizations, & Society*. He found that of the 22

articles he identified as "classics," 85% were related to aspects of positive economic science (PES) and its two accompanying theories, capital market theory and principle/agent theory. Critics claim these journals "focus largely on superficial problems in order to demonstrate some versions of technical virtuosity, avoid substantive critique, and adopt an almost hubristic gatekeeper mentality as an effective means of limiting perspectives" (Amernic & Craig, 2004, p. 349-350). Williams (2003) describes the evolution of positive economic science (PES) towards the single-paradigm domination consistent with Biglan's (1973) definition of a "hard" discipline at the expense of a broader view of acceptable research:

[S]ince accounting is a social practice and not a social science, there is no necessary reason to believe that any mode of analysis would have a monopoly on providing understanding. Indeed, one might expect a multi-disciplinary eclecticism in accounting scholarship; it would be opportunistic in adapting many disciplinary insights to its purpose (as medicine increasingly does). This has not turned out to be the case. One mode of understanding has clearly become the predominant form of scholarly understanding of accounting and that form is what I have labeled PES (Williams, 2003, p. 252-253).

The results of this move towards accounting as a "sub-field of economics" were reflected in the classroom. Academic accountants moved further from the accounting problems of the profession and less contact with professional accountants (Langenderfer, 1987). The commonality of the educational backgrounds and credentials in academics and practitioners in other professions such as medicine and law deteriorated and disappeared (Bricker & Previts, 1990). The normative posture that previously characterized accounting academia - "what ought an accounting practice to be?" - was replaced with the positive theory mantra - "what is the effect of current practice?" Williams (2003) quotes McClosky's (1985) description of the attitudes of academic economists to describe the attitudes that prevail among those who teach academic accounting:

Many are bored by history, disdainful of other social scientists, ignorant of their civilization, thoughtless in ethics, and unreflective in method. Even the wise and good among the congregation, who are numerous, find it hard to reconcile their faiths with the ceremonies required of them on Sunday. Only religion can be like this - at once both noble and corrupting. The Ten Commandments . . . of modernism in economics and other sciences are

1. Prediction and control is the point of science.

2. Only the observable implications (or predictions) of a theory matter to its truth.
3. Observability entails objective, reproducible experiments; mere questionnaires interrogating human subjects are useless, because humans might lie.
4. If and only if an experimental implication of a theory proves false is the theory proved false.
5. Objectivity is to be treasured; subjective 'observation' (introspection) is not scientific knowledge, because the objective and the subjective cannot be linked.
6. Kelvin's Dictum: 'When you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind.'
7. Introspection, metaphysical belief, aesthetics, and the like may well figure in the discovery of an hypothesis but cannot figure in its justification; justifications are timeless, and the surrounding community of science irrelevant to their truth.
8. It is the business of methodology to demarcate scientific reasoning from nonscientific, positive from normative.

9. A scientific explanation of an event brings the event under a covering law.
10. Scientists - for instance, economic scientists - ought not to have anything to say as scientists about the "oughts" of value, whether of morality or art (1985, pg. 7-8).

Theoretical Framework

As depicted in Figure D1, the emergence of positive economic science had long-term impacts in the development of epistemological beliefs of pre-professional accountants. If this fundamental shift from normative to positive interests, in fact, represents a shift from "soft" to "hard" academic discipline, this could explain both the relative poverty of epistemological sophistication necessary for the solution of unstructured, ill-defined problems often noted by accounting education's critics and the ability of prior EB research to detect it. The accounting pre-professional would be more likely to exhibit those epistemological beliefs attributed by Paulsen and Wells (1998) and Schommer-Aikens et al. (2003) to students of hard/applied disciplines and less likely to exhibit those attributed to soft/applied disciplines. If accounting has evolved to a hard discipline, it is more epistemologically similar to mathematics, the sciences, and engineering than with

social science, education, and other soft disciplines (Biglan, 1973). If, on the contrary, accounting majors' epistemological beliefs are more consistent with the sophisticated beliefs of social science majors, the criticism of accounting education may be ill-founded because it is engendering the epistemological beliefs consistent with critical thinking. The linkages between PES and the epistemological dimensions of certain knowledge, simple knowledge, and omniscient authority (source of knowledge) are described in the following sections.

Certain Knowledge

The naïve beliefs in certain knowledge noted by Schommer and Walker (1995) among business students are consistent with the positivist paradigm dominating academic accounting. Accordingly, accounting students are taught to view accounting as a collection of rules and procedures to be memorized and accepted as fact, not questioned for theoretical consistency, equity, or relevance. Because of a lack of contact with practicing accountants and/or the real-world setting in which these rules and procedures exist, accounting academics may not teach and accounting students may not possess the general knowledge necessary to

understand the complex interdependence between the profession and society to interact with diverse groups of people . . . Such general knowledge should include an

appreciation for the flow of ideas and events in history, an awareness of the different cultures and socio-political forces in today's world, a broad understanding of mathematics and economics, and an aesthetic sensibility (Accounting Educational Change Commission, 1990, p. 308).

There are indications that teaching methods encouraging the development of students' capacities for analysis, synthesis, problem solving, and communication are taking hold in some accounting classrooms, including case studies and analysis (Hassall & Milne, 2004). However, accounting and finance majors lag seriously behind marketing and management majors in finding these methods a useful learning tool (Ulrich, 2005). Case studies that challenge naïve epistemological beliefs in the certainty of knowledge, particularly when the case is not written to lead to a single solution would be unpopular with students and professors alike. There would be little pressure on textbook authors, case base researchers, and the developers of simulation-based learning to expand unstructured learning opportunities. Accounting professors, divorced from practice, would likewise be reluctant to change teaching methods to encourage critique or meaningful exploration of alternatives to existing practice. Trained to explain existing phenomena, professors without practice backgrounds may have little more

foundation to challenge knowledge than their most advanced accounting students. Therefore the following hypothesis is proposed:

Certainty Hypothesis - Pre-professional accounting students will exhibit less sophistication on the certainty of knowledge dimension than non-accounting majors.

Simple Knowledge

Two characteristics of academic accounting suggest the nature of accounting students' simple knowledge beliefs. There is no indication that accounting has shifted from applied to pure, and prior research indicates that students in applied disciplines are more likely to have naïve simple knowledge beliefs than students in pure disciplines (Paulsen & Wells, 1998).

A second characteristic of academic accounting may accentuate this naïveté. Almost since 1929 when the State of New York made graduation with an accounting degree mandatory for taking the CPA exam (Van Whye, 1994, pp. 23-24), schools began competing with one another based on the number of students successfully completing the examination. The Bedford Committee noted the importance of the CPA examination for many accounting professors.

Many textbook writers and professors not only rely regularly on past professional examinations in their work,

but they seek to help students master the expected examination content. The feedback loop thus established may retard both teaching and the examination from reflecting recent trends in the body of knowledge utilized by accountants. This is especially important since the body of knowledge covered by professional examinations represents only a small part of the knowledge used by the accounting profession as a whole and to which students should be exposed (1986, p. 189).

A later study of accounting education, commissioned by the Institute of Management Accountants, the American Accounting Association, the American Institute of Certified Public Accountants, and the "Big 5" accounting firms noted much the same situation existed ten years later. They noted that "the rule-based, memorization, test-for-content, and prepare-for-certification exam model is inefficient, but, more important, it does not prepare students for the ambiguous world they will encounter after graduation (Albrecht & Sack, 2001, p. 22)."

A survey of auditing and assurance courses by the Auditing Section of the American Accounting Association is also indicative of the reliance placed on traditional testing at the expense of other, more integrative evaluative methods. The study indicated that the average auditing class allotted almost 70% of

the final course grade to tests and quizzes while only 16% were allotted to cases and problems. Written assignments, term papers, and student presentations on average accounted for less than 5% of the average grade (Johnson, Baird, Caster, Dilla, Earley, and Louwers, 2003). Reducing success in accounting courses to the recall and recitation of fragments of accounting and auditing information is consistent with reinforcing naïve beliefs that accounting is composed primarily of isolated, unambiguous rules. This suggests the following hypothesis:

Simple Knowledge Hypothesis - Pre-professional accounting students will exhibit less sophistication on the simple knowledge dimension than non-accounting majors.

Source of Knowledge (Omniscient Authority)

As already discussed, much of pre-professional accounting education consists of recall, recitation, and application of accounting and auditing standards in preparation for taking certification examinations upon graduation. Evaluations are heavily weighted toward assessing pre-professional students' performance in these tasks and very little, if any, attention is given to understanding the rationale behind the standards. In their critique of current accounting education, Amernic and Craig (2004) describe the scant coverage given to the theoretical underpinnings of accounting standards:

Few accounting graduates get a good exposure to the various underlying theories of their discipline. Most are exposed to GAAP, at great length, in the initial years of their study. It is often not until a final year semester-length elective unit - Accounting Theory - that they engage in any (even mild) critique of the accounting practices they have learned by rote. By this time they are already brainwashed into thinking that because accounting techniques are generally accepted, then those practices must be good and unchallengeable. Indeed, even when they are exposed to theory, such exposure is often perverse and highly delimited because of the theoretical perspectives that are excluded (p. 363).

This suggests that accounting majors are very likely to exhibit a strong presumption that knowledge passed down from a higher authority must be accepted without question. This suggests the following hypothesis:

Omniscient Authority Hypothesis - Accounting majors will exhibit naïve epistemological beliefs about the source of knowledge (omniscient authority).

Chapter Summary

This chapter has reviewed the personal epistemology literature in general and examined in some detail Schommer's model (1990; 1992) of epistemological beliefs as a framework to measure the higher-order thinking skills necessary to solve the unstructured problems that define modern practice. A framework was also developed that sought to explain how aspects of academic and professional accounting practice may have created a climate that contribute to retarding the epistemological development of pre-professional accountants. The next section will describe a research program using both pre-professional and non-accounting business majors to explore the relationships depicted in the diagram in Figure D1.

CHAPTER 3. METHODOLOGY

The previous chapter reviewed, in detail, Schommer's model of epistemological beliefs. A theoretical framework was also developed that suggests the epistemological beliefs of pre-professional accounting majors are: (a) more epistemologically naive along several belief dimensions than has been assumed in several prior studies and (b) that this epistemological naïveté may be associated with poor unstructured decision skills. This chapter describes an experiment testing three hypotheses related to the first of these assertions (depicted as double lines in the diagram in Figure D1). This chapter includes a description of the hypotheses, research designs, subjects, data collection procedures, data treatments, and analytic procedures used in the study. The purpose of this experiment was to assess and compare the epistemological beliefs of pre-professional accounting students and non-accounting business majors at an equivalent educational level. This experiment utilized an instrument, the Epistemological Beliefs Inventory developed by Schraw et al. (2002) to measure epistemological beliefs. The validity and reliability of this instrument will be discussed in a subsequent section.

Hypotheses

As discussed in the literature review, a much debated and unresolved question in the study of personal epistemological beliefs (EBs) is domain specificity. Previous studies examining this question (Paulsen & Wells, 1998; Schommer-Aikens et al., 2003) have compared predictions of business majors' epistemological beliefs (EBs), based on Biglan's (1973) taxonomy of academic departments, to actual measurements of EBs using Schommer's (1990, 1992) Epistemological Beliefs Questionnaire (EBQ). The study proposes that the conflicting and inconsistent results reported in these studies may be the product of the over-aggregation of the domain specific EBs of different business disciplines into a single category. The EBs of "business" students in these studies are a function of the unreported mix of accounting and non-accounting students in the sample and therefore vary as the composition of the sample varies.

Specifically, the theoretical framework developed in the previous chapter proposes that the emergence of positive economic science as a dominant paradigm in academic accounting research and its subsequent effects on accounting education have fostered an environment consistent with naïve EBs. As these factors have no significant effects on non-accounting business education, their influence in retarding the growth of EB

sophistication is assumed to be negligible. The hypotheses for the first experiment tested whether the predicted differences in epistemological beliefs exist between accounting and non-accounting along majors the EB dimensions of certainty of knowledge, simplicity of knowledge, and omniscient authority.

Certainty of Knowledge.

The first null hypothesis relates to the certainty of knowledge. Certainty of knowledge refers to the degree to which an individual believes that knowledge is absolute or is context bound and constantly evolving.

H₀₁: Pre-professional accounting students will not exhibit less sophistication on the Certainty of Knowledge dimension than non-accounting majors.

H_{a1}: Pre-professional accounting students will exhibit less sophistication on the Certainty of Knowledge dimension than non-accounting majors.

Simplicity of Knowledge

The second null hypothesis relates to the simplicity of knowledge. Simplicity of knowledge refers to the degree to which individuals view knowledge as isolated, individual facts as opposed to highly interrelated concepts.

H₀₂: Pre-professional accounting students will not exhibit less sophistication on the Simple Knowledge dimension than non-accounting majors.

H_{a2}: Pre-professional accounting students will exhibit less sophistication on the Simple Knowledge dimension than non-accounting majors.

Omniscient Authority

The third null hypothesis relates to the presence of an omniscient authority. An omniscient authority would be expected to pass down otherwise inaccessible knowledge to learners rather than requiring the active participation of the learner in the discovery of knowledge.

H₀₃: Pre-professional accounting students will not exhibit less sophistication on the Omniscient Authority dimension than non-accounting majors.

H_{a3}: Pre-professional accounting students will exhibit less sophistication on the simple knowledge dimension than non-accounting majors.

Research Design

This study used a survey-based research method. This research method is consistent with the approach used by numerous researchers (Schommer, 1990, 1992, 1994; Bendixen et al., 1998; Kardash & Scholes, 1998) to measure epistemological beliefs of student subjects. The instrument that will be discussed in more detail in a later section elicited both demographic data and Likert-scale responses measuring subjects' beliefs along five dimensions of epistemological beliefs: omniscient authority, certain knowledge, simple knowledge, quick learning, and fixed learning (innate ability).

Instrumentation

One of the contributions of this study is the introduction of the Epistemological Belief Inventory (EBI) to the measurement of epistemological beliefs (EBs) of accountants and non-accounting business majors. As will be discussed in the following section, the EBI has significant advantages over the instrument used in previous EB studies including a more stable factor structure, emergence of the omniscient authority dimension which is critical for this study, and ease of use.

Epistemological Beliefs Inventory

To test the three naïveté hypotheses, subjects were asked to complete an epistemological beliefs questionnaire (Appendix B). The great majority of epistemological belief research has utilized some form of Schommer's original instrument (Schommer, 1990). Although widely used, the questionnaire has also been criticized by several authors. Many of the criticisms center on issues of construct validity (Hofer and Pintrich, 1997). Schommer's original confirmatory factor analysis was based on twelve sub-sets of questions rather than on the 63 individual items that comprise the instrument (Schommer, 1990). The four-factor structure that Schommer originally described has been difficult to reproduce in studies that have used the instrument. Factor structures have ranged from three (Schommer, 1992) to

four (Schommer, 1990; Schommer, Crouse, & Rhodes, 1992; Schommer, 1993). Factor loadings have also been inconsistent. Clarebout, Elen, Luyten, and Bamps (2001) analyzed the factor structure and subset loadings in these studies. Of the twelve sub-sets, only five consistently loaded on the same factor in all four studies.

Schommer (1992) acknowledged that the EBQ was not a finished product. Rather, it was simply a beginning approach to the assessment of epistemological beliefs. Other authors, including Schommer, have revised Schommer's instrument to make it useable with populations with special requirements including age (Schommer-Aikens, Duell, and Hutter, 2005), language (Canno, 2005); and culture (Chan & Elliott, 2000). Several authors have modified Schommer's 63 item instrument to eliminate questions that failed to load or that measured particular belief dimensions that were of no interest to their study (Kardash & Howell, 2000; Bråten & Strømsø, 2005; Phillips, 1998). The Schommer instrument has also been combined with other questionnaires to produce new instruments (Wood & Kardash, 2002; Jehng, Johnson, & Anderson, 1993).

A particularly important issue for this study and others is the failure of one dimension in Schommer's original model of epistemological beliefs to emerge as a factor in studies using the EBQ: omniscient authority. Schommer (1990) identified source

of knowledge as an important belief from her analysis of Perry's (1968) description of the dualist stage of student development. Her original exploratory factor analysis and subsequent factor analysis failed to identify omniscient authority although two subsets were designed to represent it. It is interesting that Schommer's subsequent studies did not remove the subsets from the instrument.

Because GAAP, GAAS, IRS regulations, and other official announcements are an important part of pre-professional accounting education, omniscient authority may be an important cause of naïveté in the EBs of the pre-professional accountants. It is therefore important to allow for the possibility that the dimension will emerge in the instrument selected for the study. In Chan and Elliott's (2004) study of the epistemological beliefs of Hong Kong students, belief in omniscient authority was also hypothesized to be a significant element. Factor analysis of the 45-item questionnaire developed for the study was able to identify a dimension consistent with omniscient authority. The culturally specific character of this instrument however, raises serious concerns about its generalizability, particularly as a substitute for the instrument selected for use in this study.

To resolve these problems with Schommers' instrument, Schraw et al. (1995) developed a survey instrument, the

Epistemological Beliefs Inventory (EBI), for their study on the relationship between epistemological beliefs and well-defined and ill-defined problem solving to resolve three outstanding issues unsuccessfully addressed by the EBQ. First, the EBI was designed to eliminate a frequently mentioned shortcoming of the EBQ - failure of all items to load unambiguously on the five hypothesized dimensions. The second objective was to yield an omniscient authority dimension. The last objective was to derive a more efficient instrument than the 63 item EBQ. The next section describes the validity and reliability of this instrument

Validity and Reliability of the EBI

The validity and reliability of the EBI was documented in a direct comparison with the EBQ (Schraw et al., 2002). One hundred and sixty undergraduates were asked to complete the EBI and EBQ as well as a reading comprehension test. Both the EBI and EBQ results were analyzed using a principle factor analysis with oblique rotation (correlated factors) and varimax rotation (uncorrelated factors). Because none of the factors were correlated, only the varimax rotation solutions were reported. Using the same approach reported by Schommer (1990, 1992) factor analysis was first performed on subsets of items rather than individual items for the EBQ. This procedure yielded four factors similar to those reported in previous research. An

individual item analysis, however, produced 19 factors with eigenvalues greater than 1. The first five observed factors explained 35% of the variance and included factors significantly different than those previously described: Incremental Learning, Innate Ability, Certain Knowledge 1, Certain Knowledge 2, and Integrative Thinking. Only Innate Ability and Certain Knowledge 1 were consistent with Schommer's (1990). Eigenvalues for these five factors ranged from 1.38 - 2.02.

Results of student responses to the EBI were analyzed using the same factor analytic technique. Factor analysis using a varimax rotation yielded five factors with eigenvalues greater than 1, explaining 60% of the variance. The five factors were labeled Omniscient Authority, Certain Knowledge, Quick Learning, Simple Knowledge, and Innate Ability which were identical to those hypothesized by Schommer (1990). Eigenvalues ranged from 1.36 - 1.63. Internal consistency, measured by α was similar for both instruments ranging between .53 - .74 for the factor structure of the EBQ and .58 - .68 for the EBI.

Reliability over time was assessed through a retest of both the EBQ and EBI, conducted one month after the original test. Analyses of the retest results of the EBQ reflect many of the reliability criticisms of the instrument. Factor analysis identified 17 factors with eigenvalues greater than 1 and explained only 39% of the sample variation. Only three factors

were similar to those identified in the first analysis while two did not elicit a clear interpretation. Retest of the EBI indicated a significantly greater degree of temporal reliability. A principal factor analysis of EBI retest results identified 5 factors explaining 64% of sample variation for the EBI. Three of the factors, Omniscient Authority, Certain Knowledge, and Quick Learning, were identical in structure to the first test. Two factors were slightly different; innate ability included one additional item that was not reported on the first test and simple knowledge had one item replaced with another. Coefficient α for both test and retest samples were essentially equivalent.

The EBI has been used in other studies with results very similar to those reported above. Schraw, Dunkle, and Bendixen (1995) measured the epistemological beliefs of two college student samples to investigate the relationship between EBs and problem solving. The first administration of the instrument produced factor loadings consistent with those reported above and Cronbach's α scores between .67 - .87. The second administration was very comparable to the first. The EBI also was used to measure the epistemological beliefs of 24 veteran teachers in a study of the relationship between beliefs of knowledge and teaching practices (Schraw &, Olafson, 2002). Results indicate factor loading very comparable to those

previously reported and coefficient α scores ranging between .70 - .79.

In summary, the EBI has proven to be a stable, parsimonious instrument compared to the Schommer's EBQ. The emergence of the omniscient authority factor in studies using the EBI have proven beneficial to understanding the relationship of this factor in various contexts. By eliminating the reliability and validity concerns expressed by others about the EBQ, the EBI is a significant improvement that will make the current project less problematic and produce results with greater interpretability.

Subjects

The focus of the experiment was to empirically test three hypotheses relating to differences between the epistemological beliefs of accounting majors and non-accounting, business majors. Three universities agreed to allow students to participate in the experiments. Two of the three university sites were private institutions. One institution is a small, non-selective, Roman Catholic university. The other private university is larger, non-denominational, and moderately selective. Both institutions offer advanced business degrees. The third institution is a medium-sized state university with moderate selective admission policies. This institution also offers graduate degrees in Business. Multiple sites were selected to provide as diverse and as large a sample as

possible. Each university required review by an Institutional Review Board which was obtained prior to the surveys being administered.

Consistent with the requirements of the experiment, participants were recruited from senior-level business and accounting classes. Surveys were completed between April, 2006 and January, 2007 by a total of ninety students: 31 accounting majors and 59 non-accounting, business majors. Sixty-nine percent of the students were in the 20-24 age category, 14% were in the 25-29, and the remaining 17% were 30 or older. Among accounting majors, only 16% of the students were older than 24. Thirty-one percent of the non-accounting majors were older than 24.

Convenience sampling was used to select participants in the study. Convenience sampling is the most commonly used sampling method used in psychological research (Gravetter & Forzano, 2003, p. 125) and is the method used in previous studies of domain specificity (Paulsen & Wells, 1998; Schommer-Aikens et al., 2003). Participants in previous studies have ranged from 73 to 290 souls and every effort was made to utilize a sample size consistent with these studies.

Several issues inhibited increasing sample size, however. Business policy/strategy classes are increasingly used for institutional assessment activities. Several institutions

contacted as potential survey sites thus objected to taking up what they felt was increasingly scarce class-time for non-class work activities such as this survey. One other potential site objected to the "moral relativistic" tone of some of the questions in the survey and refused to allow students to participate.

Administration Procedure

Subjects were asked to respond to each of the questions that make up the EBI and a brief demographic fact-sheet. Consistent with other administrations of the document, responses were recorded on a 5-point Likert Scale ranging from *strongly agree* to *strongly disagree* (Schraw et al., 1995; Schraw & Olafson, 2002). All three institutions participating in the project were offered the option of using either paper surveys or an on-line version. All the instructors involved opted to use the paper version of the survey. All sessions were conducted by the classroom instructor whose class was being surveyed. Participation was voluntary and as two of the universities objected to the use of monetary inducements to encourage participation, no incentives were offered.

Data Analysis

The purpose of this experiment is to ascertain whether three epistemological beliefs dimensions of accountants are similar to those of non-accountants. The Epistemological Beliefs Inventory (EBI) described in the previous section is designed to measure these beliefs dimensions. The plan for analyzing the experimental data, including the construction of the epistemological beliefs (EBs) scales is discussed in this section.

Scale Construction

A scoring key provided by the EBIs authors was used to evaluate the epistemological beliefs of subjects in this experiment. In order to accurately evaluate the EBs of research subjects, it is critical to utilize the most accurate scales available to measure individual beliefs. Ordinarily, factor analysis would be used to produce loadings of individual variables (questions) on factors (epistemological beliefs). Those variables with the highest loadings would be used to construct scales measuring EBs from the sample data. For reasons discussed in the next chapter, factor analysis was not appropriate for this sample. Scales constructed from factoring an inadequate sample would be less reliable than those derived from the substantial validation of the EBI noted above. In order to construct the most accurate scales, it was therefore decided

to use the scoring rubric as the best alternative possible. The scoring rubric relates each of the questions in EBI to a specific epistemological dimension. Appendix C shows the portion of the rubric applicable to this experiment. Scales were constructed for certainty of knowledge, simplicity of knowledge, and omniscient authority based on the key rather than using factor loadings as is customary.

Dimension Scoring

Dimension scores were computed for each subject by summing the Likert-scale responses for each question associated with the three epistemological dimensions of interest for this experiment. Lower scores represented more sophisticated epistemological beliefs, higher scores represented more naïve beliefs. Maximum scores (more naïve) for the Simple Knowledge, Certain Knowledge, and Omniscient Authority dimensions were 35, 40, & 25, respectively. Minimum scores (less naïve) for the Simple Knowledge, Certain Knowledge, and Omniscient Authority dimensions were 7, 8, & 5 respectively. Statements that were "reverse scored" were manually converted to their scale opposites. For example a response of "2" was manually converted to a response of "4", a "1" converted to a "5", etc. A separate auditor checked the data inputs for accuracy. Only one survey was rejected for inclusion in the sample due to missing information.

Chapter Summary

This chapter has described an experiment that will test three hypotheses regarding the differences between epistemological beliefs and academic disciplines, particularly those of accounting and non-accounting business majors. As discussed in previous chapters of this project, a great deal of controversy about the unstructured decision-making skills of pre-professional accountants has arisen because of widely publicized failures of public accounting firms to protect the interests of various stakeholder groups. Research in educational psychology and cognitive science suggests that personal epistemological beliefs, beliefs about knowledge and knowing, are related to high-level thinking and decision-making.

This study, using student subjects in both accounting and non-accounting business disciplines and a survey based research design designed and validated for this task, will attempt to add empirical evidence to support what is, at best, largely anecdotal. The results of the experiment are expected to contribute to the understanding of the structure of epistemological beliefs, the degree of domain specificity inherent in these beliefs, and the extent to which pre-professional accounting majors are equipped to compete in the modern business world.

CHAPTER 4. DATA COLLECTION AND ANALYSIS

The purpose of this chapter is to describe the results of the experiment described in Chapter 3. The conceptual framework developed in the second chapter posited that characteristics of accounting education had long-term implications for at least three components of the epistemological beliefs of pre-professional accounting majors: certain knowledge, simple knowledge, and omniscient authority. Subsequent sections will describe the student sample, the method used for scoring student responses, a detailed item analysis of responses to the Epistemological Beliefs Inventory (EBI), and the statistical analysis used to test the three hypotheses.

Factor Analysis

Consistent with other studies, factor analysis of subjects' responses to the questions on the EBI was attempted. However, two issues limited the usefulness of this technique. The Kaiser-Meyer-Olkin statistic for this sample was .58 (see Table D23) which is below the .60 level generally considered the minimum required for proceeding with factor analysis (Norusis, 2003, p. 400; Garson, 2007). The sample size (90 subjects) presented challenges to a straight-forward interpretation of the factor analytic results. Factor analysis is very sensitive to

sample size. Norusis (2003, p. 402) recommends 10 cases per variable or 300+ cases as a reasonable sample size. Either sample guide-line greatly exceeds the sample collected for this experiment.

Given these limitations, factor analysis was used to examine the factor structure of the EBI in the current study (see Table 23). The decision to use the EBI scoring key as a basis for construction of belief scales would be further validated if a factor structure similar to that identified in previous studies could be documented using data from this study. In spite of the difficulties posed by the sample size, the factor structure identified by factor analysis in this study was remarkably similar to that reported in the prior studies. Principle component analysis and a varimax rotation identified 13 factors with eigenvalues greater than 1 rather than the predicted five. The scree plot indicated a noticeable "elbow", however, at seven factors. These seven factors explain approximately 46% of the variance and are generally consistent with if not identical to the five factor model described by previous research. Of particular interest are the factors corresponding to the epistemological dimensions of primary importance for this study. Factors 5 and 6 correspond unambiguously with the Omniscient Authority and Simple Knowledge dimensions, respectively. The third dimension, Certain

Knowledge, is more problematic, being primarily present intermingled with Omniscient Authority statements in factor four. The other two dimensions, Quick Learning and Fixed Ability, load generally as predicted on factors 1 and 2. It is reasonable to assume that a larger sample would have clarified any ambiguities resulting from the current factor analysis.

Individual Item Analysis

While the focus of these experiments is on individual dimensions of epistemological beliefs, some analysis of individual questions is informative (see Tables D2, D4, & D6). Among all subjects, the lowest average response (least naïve) was to the question "If two people are arguing about something, at least one of them must be wrong" (1.84). The question with the highest average response (most naïve) across all subjects was "It bothers me when instructors don't tell students the answers to complicated problems" (4.21). Interestingly, the two questions eliciting the largest average differences between accounting and non-accounting majors were both questions in the Certain Knowledge scale. The average response by accounting majors (2.90) to the question "Absolute moral truth does not exist" was .63 lower (less naïve) than that of non-accounting majors (3.53). The average response of accounting majors (2.90) to the question "I like teachers who present several competing

theories and let their students decide which is best" was .54 higher (more naïve) than that of non-accounting majors (2.36).

The question "Truth means different things to different people" produced the largest standard deviation (1.281) across all majors being higher for non-accounting majors (1.344) than accounting majors (1.110). This question produced the largest single standard deviation for non-accountants while the question "I like teachers who present several competing theories and let their students decide which is best" produced the highest for accounting majors (1.350). Across all students, the question "When someone in authority tells me what to do, I usually do it" generated the lowest standard deviation (.781). This question also represented the lowest standard deviation for both accounting and non-accounting majors.

Among the three dimensions of interest for these experiments, Certain Knowledge scored lowest (least naïve) with an average score of 2.408 (Table D3). This was also true for both accounting majors (2.29) (see Table D5) and non-accounting majors (2.47) (see Table D7). The highest average dimension (most naïve) score of 3.23 was for the Omniscient Authority dimension (see Table D17). This dimension was also produced the highest (most naïve) score (3.346) for non-accounting majors (see Table D21). Accountants highest average score (3.157), was on the Simple Knowledge dimension (see Table D12).

Results of the Tests of Hypotheses

Hypothesis One

As stated in the previous chapter, the first hypothesis stated in the null form is

H₀₁: Pre-professional accounting students will not exhibit less sophistication on the Certainty of Knowledge dimension than non-accounting majors.

Both accounting and non-accounting majors' Likert-scale responses to certainty of knowledge questions were computed and compared using a Student's t-test for equality of means (McClave, Benson, Sincich, 2008, chap. 7) Descriptive statistics for the total sample, accounting majors, and non-accounting majors are presented in Table D1. Mean score for accounting majors was 18.3226 with a standard deviation of 3.95295 compared to a mean score of 19.7627 with a standard deviation of 3.94505 for non-accountants. The Student's t-test rejected the equality of means between accounting and non-accounting majors, $p=.104$. The relatively higher levels of epistemological sophistication on the certain knowledge dimension by accounting majors in comparison to those of non-accounting majors were contrary to expectation (see Table D22). This finding suggests strongly that accounting majors were at least as epistemologically sophisticated as non-accounting majors.

As the hypothesis tested in this part of the experiment posited that non-accounting majors would exhibit a more sophisticated level of certain knowledge sophistication than accounting majors, the observed result was, in fact, just the opposite of the expected result with a relatively high-level of probability. Therefore, the null hypothesis of equal to or greater sophistication in certain knowledge beliefs by accounting majors cannot be rejected.

Hypothesis Two

As stated in the previous chapter, the second hypothesis is

H₀₂: Pre-professional accounting students will not exhibit less sophistication on the Simple Knowledge dimension than non-accounting majors.

As described above, both accounting and non-accounting majors' Likert-scale responses to simplicity of knowledge questions were computed and compared using a Student's t-test for equality of means. Descriptive statistics for the total sample, accounting majors, and non-accounting majors are presented in Exhibit 3. Mean score for accounting majors was 22.0968 with a standard deviation of 3.13427 compared to a mean score of 21.8644 with a standard deviation of 2.94465 for non-accountants (see Figures D3 & D4). The relatively higher levels of epistemological sophistication on the simple knowledge dimension were not contrary to expectation (see Table D22). The

Student's t-test did not reject the equality of means between accounting and non-accounting majors, $p=.729$.

The hypothesis tested in this part of the experiment posited that non-accounting majors would exhibit a more sophisticated level of simple knowledge sophistication than accounting majors. The observed result was the expected result but without a high-level of probability. Therefore, the null hypothesis of higher or equal difference in simple knowledge epistemological beliefs cannot be rejected.

Hypothesis Three

As stated in the previous chapter, the first hypothesis stated in the null form is

H₀₃: Pre-professional accounting students will not exhibit less sophistication on the Omniscient Authority dimension than non-accounting majors.

As with the preceding two experiments, both accounting and non-accounting majors' Likert-scale responses to omniscient authority questions were totaled and compared using a Student's t-test for equality of means. Descriptive statistics for omniscient authority are presented in Table D15. Mean score for accounting majors was 15.0968 with a standard deviation of 3.06980 compared to a mean score of 16.7288 with a standard deviation of 2.76574 for non-accountants. The relatively higher levels of epistemological sophistication on the omniscient

authority dimension by accounting majors in comparison to those of non-accounting majors were significantly contrary to expectation (see Table D22). The Student's t-test rejected the equality of means between accounting and non-accounting majors ($p=.012$). This finding suggests strongly that accounting majors were significantly more epistemologically sophisticated on this dimension than non-accounting majors.

The hypothesis tested in this part of the experiment posited that non-accounting majors would exhibit a less naive level of omniscient authority than accounting majors. As with the certainty of knowledge dimension, the observed result was, in fact, just the opposite of the expected result with an even higher level of probability. Therefore, the null hypothesis of equal to or greater sophistication in omniscient authority beliefs by accounting majors obviously cannot be rejected.

Chapter Summary

This chapter reports on the results of tests of three hypotheses relating the epistemological beliefs of both accounting and non-accounting majors at three mid-western United States universities. The implications of these results in light of previous research will be discussed in more detail in the following chapter. The next chapter will also discuss the

limitations of the current study and suggest areas for future research in light of these findings.

CHAPTER 5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this chapter is to discuss the results of the experiments described in chapter 3, and reported on in chapter 4. These experiments were designed to test three hypotheses relating to the personal epistemological beliefs of pre-professional accounting majors. Educational psychology and cognitive science researchers have investigated the relationship between these beliefs about knowledge and learning and the ability to handle the types of poorly defined, ill-structured tasks that require higher order thinking skills. In general, this literature has associated "sophisticated" epistemological beliefs with higher-order problem solving. Critics of accounting education have claimed that the emergence of positive accounting theory, "teaching to the exam", and the concentration on various official pronouncements across accounting curricula have combined to produce young accountants who are poorly prepared for accounting practice. If these critics are correct, pre-professionals should have markedly more "naïve" epistemological beliefs than other business majors, not encumbered by the purported shortcoming of the accounting educational establishment. The next section of this chapter will discuss the results of the experiments testing these hypotheses. The last

two sections will discuss the implications of the study and suggestions for future research.

Discussion of the Results

Hypothesis One

The first hypothesis tested in this study was presented as:

Certainty Hypothesis - Pre-professional accounting students will exhibit less sophistication on the certainty of knowledge dimension than non-accounting majors.

Critics of accounting education have charged that an increasing separation of accounting academics from accounting practitioners has produced pre-professionals who are not exposed to the "real world" context of accounting practice. In particular, the emergence of "positive accounting theory" as the predominant research paradigm has pushed practice-based research from the pages of the major accounting journals. Without grounding in accounting practice, accounting education could degenerate into the transmission of professional pronouncements by professors uninterested in the application or context of these standards to students whose academic preparation consists of rote memorization and recall. This would produce a naiveté in epistemological beliefs about the certainty of knowledge

compared to disciplines that are less affected by a separation of academic preparation and practice.

While not statistically significant at the $p=.05$ level ($p=.104$) the results of the Students' t-test indicate that contrary to expectations, accounting majors are less naïve about the certainty of knowledge than non-accounting business majors. This result indicates the possibility that efforts by both the profession and academia to foster a greater level of communication between academia and the profession may be taking root. Particularly, the importance of bringing practical pedagogical aids including case studies and guest speakers into the classroom as suggested by the Accounting Educational Change Committee and other groups may have made accounting pedagogy more context sensitive. Changes in textbooks and other learning aids may also be having the desired effect of enhanced "critical thinking" opportunities for accounting students. Differences in attitudes among academics about the importance of researcher versus teaching may also play an important role in determining students' epistemological beliefs.

A possible explanation for the results of this experiment is the influence of internships and cooperative education opportunities on the epistemological beliefs of pre-professional accounting majors. Many universities encourage students to spend a part of their academic experience working with practicing

accountants. In turn, accounting firms see these programs as part of the recruiting process. The exposure to the real world that young accountants may lack due to the lack of practical experience or interest from their professors may be overcome by the influence of their experience working alongside professionals in the field.

Hypothesis Two

The second hypothesis tested in this study was presented as:

Simple Knowledge Hypothesis - Pre-professional accounting students will exhibit less sophistication on the simple knowledge dimension than non-accounting majors.

Analysis of the sample data indicated that accounting majors' average score (22.0968) on this epistemological belief dimension was more naïve (higher) than that of non-accounting majors (21.8644). Students' t-test indicated that the results were not significant at the $p=.05$ level ($p=.729$).

As discussed in a previous section, accounting education has traditionally relied on memorization and test-for-content methods for evaluating learning achievement. This tendency is mirror to a great extent in the testing format used in the Certified Public Accountant (CPA) examinations. The validation that schools and departments of accounting receive in "pass

scores" as a measure of effectiveness has prompted a "teach to exam" mind-set among accounting faculty, particularly in financial accounting and auditing classes. Multiple-choice questions account for a high percentage of the grade in upper-division accounting classes than written assignments, term papers, or participation. It was speculated that the tendency among pre-professional accounting majors would be to view accounting knowledge as a collection of isolated, unambiguous rules.

While the data did not support this hypothesis with the level of statistical certainty desired, the higher (more naïve) average score for accentuating majors than for non-accounting majors gives scarce comfort for those supporters of current accounting educational practice. An inability to see the theoretical underpinnings for generally accepted accounting principles (GAAP), generally accepted auditing standards (GAAS), and the tax code could hamper the ability of young professionals to deal with a rapidly changing business environment. Recent history has demonstrated that blindly applying technically correct interpretations of standards has too often resulted in at best unrealistic or at worst grossly misleading information.

Hypothesis Three

The third hypothesis tested in this study was presented as:

Omniscient Authority Hypothesis - Accounting majors will exhibit naïve epistemological beliefs about the source of knowledge (omniscient authority).

As with the first hypothesis, analysis of the data revealed something of a surprising result. The Students' t-test of the equality of means indicated that accounting majors' mean scores (15.0968) on the omniscient authority dimension were lower (less naïve) than those of non-accounting majors (16.7288). Further the difference in means was statistically significant at the $p=.05$ level ($p=.012$).

The accounting profession and to a great extent accounting education revolves around the understanding and application of the official pronouncements of the Securities and Exchange Commission (SEC), Financial Accounting Standards Board (FASB), the American Institute of Certified Public Accountants (AICPA), the Internal Revenue Service (AICPA), and other authoritative bodies. If accounting majors came to view accounting knowledge as being created by those in authority and passed down, intact, to be learned and repeated by those to whom it was to be entrusted. The results of this experiment reveal that this does not appear to be the case, at least in comparison to the non-business majors who were a part of the study.

The study's conclusion that accounting majors are significantly less naïve beliefs about the source of knowledge than those of non-accounting majors may be an indication of the effect of reform movements in accounting education. Additional coverage of accounting theory, the introduction of more case studies, and the expansion of contacts with working professionals may be transmitting a more realistic attitude towards official pronouncements. Accounting majors may be more exposed to the political/contextual nature of accounting standards than has been assumed by critics of current accounting pedagogy.

The less naïve attitude of accounting majors towards omniscient authority may also be a reflection of both the effects of recent accounting scandals and an increasing level of participation by accounting majors in internships and cooperative educational opportunities. As students are exposed to the inadequacy of accounting and auditing standards in dealing successfully with the increasingly complex financial environment, pre-professional accountants could be forgiven a slightly more cynical attitude towards standard-setting and the regulatory bodies. The recent past has shown that accounting practice is not the safe, static environment that many imagine it to be. The ability of the next generation of accountants to deal with these new realities will decide the ability of the

profession to survive the challenges of this new environment. The extent to which this new view of accounting practice has begun to filter into the accounting classroom may be being reflected in the findings of this study.

Implications of the Study

Epistemological Beliefs Research

Domain specificity. As previously discussed, researchers including Bråten and Strømsø (2005), Hofer & Pintrich, 1997), Schommer and Walker (1995), and Paulsen and Wells (1998) have investigated the relationship of epistemological beliefs. This research continues this discussion by offering insight into the systematic differences between accounting and non-accounting majors along three dimensions of epistemological beliefs. Paulsen and Wells (1998) used Biglan (1973) taxonomy of academic disciplines as the basis for associating epistemological sophistication with various academic disciplines. Schommer-Aikins, Duell, and Baker (2003) challenged Paulsen and Wells finding of moderate domain specificity of epistemological beliefs. Both studies specifically used business majors as subjects in their studies. Because both studies failed to differentiate between business majors, any systematic differences in epistemological beliefs may have not been reflected in their findings.

This study finds several instances of demonstrable differences between accounting and non-accounting majors' epistemological beliefs. Biglan's (1973) taxonomy classifies academic discipline along two dimensions: hard-soft and pure-applied. The theoretical framework developed in a previous chapter speculated that the emergence of Positive Economic Science (PES) had shifted accounting away from the soft-applied classification assumed by both Paulsen and Wells (1998) and Schommer et al. (2003). The findings of the current study do not support, in general, this shift by showing significantly more naïve epistemological beliefs among accounting majors than non-accounting majors. The results do, however, indicate that at least along two dimensions, there is reason to believe that significant differences do exist between these two "business" disciplines. Whether this indicates a shift of accounting towards a more "soft" orientation, a shift of non-accounting towards a more "hard" orientation, or a significant flaw in Biglan remains to be determined. What is apparent is that any study that assumes "business" majors are epistemologically homogenous is assuming too much.

Pre-professional accounting majors. This study attempted to measure the epistemological beliefs of pre-professional accountants, a question not addressed by prior research.

Previous studies of the epistemological beliefs of "accounting"

students were not directed primarily at accounting majors but at students in introductory accounting classes. Phillips (1998) study of 73 students in a sophomore-level introductory accounting class, Castiglione's (2000) study of 70 "accounting students", and Phillips (2001) study of 113 sophomores enrolled in an introductory accounting class reflect the tendency to confuse accounting students with accounting majors in epistemological beliefs studies.

The focus of this paper was on a comparison of accounting and non-accounting majors at the end of their collegiate experience. Whether two or more years of upper-division classes affects epistemological beliefs is an open question. Perry's (1968) studies as well as those of numerous other researchers indicate that attitudes of students toward learning and knowledge evolve over their college years. While accounting and non-accounting business students' epistemological beliefs have not been studied longitudinally, there is strong reason to believe that these students' beliefs and attitudes also evolve. This study thus provides a benchmark for changes and/or differences between accounting majors due to different pedagogical approaches, exposure to practice through participation in internships and cooperative education, and professional employment.

Accounting practice. This study indicates that pre-professional accounting majors are equal to if not more sophisticated in epistemological beliefs than other, non-accounting majors. While no benchmark yet exists for measuring epistemological beliefs among all college students, the claims of critics that the accounting profession is at risk of being replaced by non-accountants in many of the areas where accounting holds a monopoly are somewhat over-blown. While the research linking epistemological beliefs and the performance of ill-defined, unstructured real-world accounting tasks does not yet exist, other research indicates that such a linkage could be expected.

Accounting education. While somewhat encouraging for the state of accounting education in turning out pre-professional with epistemological beliefs that are at least on a par with other non-accounting, business majors, there is indication that additional work must be done. The findings of this study that indicate accounting majors are less sophisticated than their non-accounting peers indicates the possibility that too much reliance on multiple choice examinations at the expense of "critical thinking" opportunities is still the rule in accounting classrooms. The temptation to use evaluative methods that are easy to construct through computerized test-banks and grade using student graders is great especially when the

pressure of other professorial duties is high. However, the criticism of professional groups about the inability of accounting graduates to handle effectively just such tasks is clear. Accounting education needs to move towards less objective evaluation techniques.

It is also worth noting that this study is only a comparison between non-accounting majors and pre-professional accounting majors. It makes no pretense of measuring where accounting majors should be at the end of their academic careers, only how their epistemological beliefs compare to those of non-accounting, business majors. It is possible that the epistemological beliefs of non-accounting students are particularly naïve and that accounting majors are still below where they ought to be in comparison to other groups (liberal arts, science, allied health, etc.). Clearly, additional research needs to be done before the true state of personal epistemological beliefs and pre-professional accounting majors can be completely assessed.

Limitations and Suggestions for Future Research

Sample Size

The sample of pre-professional accounting majors and non-accounting, business majors used in this study, while not inconsistent with other studies, was not large enough to do

meaningful factor analysis. As previously discussed, a much larger sample would allow further investigation of the factor structure of the Epistemological Beliefs Inventory (EBI). While the literature validating this instrument is robust, further validation especially within the context of accounting majors may be helpful and informative in future research. A larger sample size would allow additional hypotheses to be tested that would help define the relationships between aspects of accounting pedagogy and personal epistemology.

Sample size, however, can only be a function of the academy's commitment to allow its senior-level students to participate in research studies like the current project. The increased emphasis on assessment in colleges and universities has impinged on the class-time available for all purposes including research. Including epistemological belief studies as a part of the assessment process would provide an opportunity for dual use and a wonderful data base from which important research could emerge. Use of the EBI or similar instruments in assessment would also allow impact epistemological beliefs' improvement initiatives to be assessed.

Internships and cooperative education

One possible area of future research may thus focus on the beliefs of students with internships, cooperative education, and even part-time or summer accounting jobs versus those without

such experience. The effects of internships and cooperative education may have important influences on the epistemological beliefs of accounting majors. The extent of students' participation in these programs as a part of their accounting education has not been extensively studied. These programs are designed to expose accounting students to the profession as well as serving as recruiting tools by the participating accounting firms. The exposure that participating students have to the real world may have profound effects on their beliefs.

Longitudinal Studies

The evolution of epistemological beliefs in college students before, during, and after graduation could have important insights for the academy and the profession. Long term studies would allow the epistemological beliefs of students prior to advanced accounting classes would help understand the crucial points at which beliefs are formed. The evolution of those beliefs after graduation would allow comparisons to be made of the effect on epistemology of different career paths. This may offer important insights that would explain why some leave the profession, change careers within the profession (i.e. public to private), or remain professionally static.

Qualitative Research

As discussed in the literature review, much of the early research on personal epistemology was qualitative. Many have

criticized the ability of quantitative techniques such as the use of questionnaires like the EBI to adequately capture the depth of information needed to assess a topic as complex as personal beliefs about knowledge and knowing. Apart from the study by Wolcott and Lynch (1997) qualitative research has not been used to assess personal epistemology in accounting majors. As previously discussed, qualitative research is not a popular methodology in accounting research. It is quite possible that epistemological research might offer important insights and also expose accounting researchers to the possibilities it offers.

Chapter Summary

This chapter summarized and discussed the results of the tests of hypotheses described in Chapters 2 and 3. The implications of these findings for personal epistemological research, accounting practice, and accounting education were explored. The concluding section discussed limitations of the study and several areas for future research.

REFERENCES

- Accounting Educational Change Commission (1990). Objectives of education for accountants: Position statement No. 1. *Issues in Accounting Education*, 5(2), 307-312.
- AlHashim, D. D. (2004). Recent developments in accounting education and the future of the AICPA 150-hour requirement. *International Journal of Commerce & Management*, 14(1), 19-27.
- Albrecht, W. S. & Sack, R. J. (2001, March). *The CPA Journal*, 17-23.
- American Accounting Association (1986). Future accounting education: Preparing for the expanding profession. *Issues in Accounting Education*, 1(1), 168-195.
- American Assembly (2004). The future of the accounting profession: American assembly report. Downloaded, March 7, 2005 from:
<http://www.tscpa.org/welcome/futureacctprofrrt04.asp>
- Amernic, J. & Craig, R. (2004). Reform of accounting education in the post-Enron era: Moving accounting "out of the shadows". *Abacus*, 40(3), 342-378.
- Atkinson, A. A. & Shaffir, W. (1997). Standards for field research in management accounting. *Journal of Management Accounting Research*, 10, 41-68.
- Baker, C. R. (1976, October). An investigation of differences in values: Accounting majors vs. nonaccounting majors. *The Accounting Review*, 886-893.
- Ball, R. & Brown, R. (1968, Autumn). An empirical evaluation of accounting income numbers. *The Journal of Accounting Research*, 159-178.
- Baril, C. P., Cunningham, B. M., Fordham, D. R., Gardner, R. L., St. Pierre, K., & Wolcott, S. K. Critical thinking in the public accounting profession, *Journal of Accounting Education*, 16(3/4), 381-406.
- Baxter Magolda, M. (2004). Evolution of a constructivist conceptualization of epistemological reflection. *Educational Psychologist*, 39(1), 31-42.

- Beaver, W. H., Clarke, R., & Wright, W. (1979). The association between unsystematic security returns and the magnitude of earnings forecast errors. *Journal of Accounting Research*, 17, 316-340.
- Belenky, M., Clinchy, B., Goldberger, N., & Tarule, J. (1985). Epistemological development and the politics of talk in family life. *Journal of Education*, 167(3).
- Bell, P. & Linn, M. C. (2002). Beliefs about science: How does science instruction contribute? In B. K. Hofer & P. R. Pintrich (Eds.). *Personal epistemology: The psychology of beliefs about knowledge and knowing* (pp. 321-346). Mahwah, NJ: Erlbaum.
- Bendixen, L. & Rule, D. (2004). An integrative approach to personal epistemology: A guiding model. *Educational Psychologist*, 39(1), 69-80.
- Bendixen, L. D., Schraw, G., & Dunkle, M. E. (1998). Epistemological beliefs and moral reasoning. *The Journal of Psychology*, 132(2), 187-200.
- Biglan, A. (1973). Relationships between subject matter characteristics and the structure and output of university departments. *Journal of Applied Psychology*, 57(3), 204-213.
- Bolt-Lee, C. & Foster, S. D. (2003). The core competency framework: A new element in the continuing call for accounting education change in the United States. *Accounting Education*, 12(1), 33-47).
- Braun, N. M. (2004, March/April). Critical thinking in the business curriculum. *Journal of Education for Business*, 232-236.
- Bråten, I, & Strømsø, H. I. (2005). The relationship between epistemological beliefs, implicit theories of intelligence, and self-regulated learning among Norwegian postsecondary students. *British Journal of Educational Psychology*, 75, 539-565.
- Bricker, R. J., & Previts, G. J. (1990, March). The sociology of accountancy: A study of academic and practice community schisms. *Accounting Horizons*, 1-14.

- Brown, L. D. (1996). Influential accounting articles, individuals, Ph.D. granting institutions, and faculties: A citation analysis. *Accounting, Organizations, and Society*, 21, 723-754.
- Brown, P. (1970, July). The impact of the annual net profit report on the stock market. *The Australian Accountant*, 277-283.
- Buckley, J. W. (1970). A perspective on professional accounting education. *The Journal of Accountancy*, August, 41-47.
- Burnett, S. (2003, January/February). The future of accounting education: A regional perspective. *Journal for Education for Business*, 129-134.
- Bush, G. W. (Speaker) (2002). Remarks by the President on corporate responsibility. Delivered in New York, July 9, 2002. Downloaded from <http://www.whitehouse.gov/news/releases/2002/07/20020709-4.html>, February 9, 2006.
- Cano, F. (2005). Epistemological beliefs and approaches to learning: Their change through secondary school and their influence on academic performance. *British Journal of Educational Psychology*, 75, 203-221.
- Carmichael, D. R. (2004). The PCAOB and the social responsibility of the independent auditor. *Accounting Horizons*, 18(2), 127-133.
- Castiglione, K. R. (2000). *The effects of accounting students' epistemological beliefs of structured and unstructured performance measures*. Unpublished doctoral dissertation, Nova Southeastern University.
- Chan, K. & Elliott, R. G. (2000). Exploratory study of epistemological beliefs of Hong Kong teacher education students: Resolving conceptual and empirical issues. *Asia Pacific Journal of Teacher Education*, 28, 225-234.
- Chan, K. & Elliott, R. G. (2004). Epistemological beliefs across cultures: Critique and analysis of beliefs structure studies. *Educational Psychology*, 24(2), 123-142.
- Chua, W. F. (1986). Radical developments in accounting thought. *Accounting Review*, 61(4), 601-632.

- Clarebout, G., Elen, J., Luyten, L., & Bamps, H. (2001). Assessing epistemological beliefs: Schommer's questionnaire revisited. *Educational Research and Evaluation*, 7(1), 53-77.
- Coleman, M., Kreuze, J., & Langsam, S. (2004). The new scarlet letter: Student perceptions of the accounting profession after Enron. *Journal of Education for Business*, 79(3), 134-141.
- Cooper, D. R. & Schindler, P. S. (2003). *Business Research methods* (8th ed.). New York, NY: McGraw-Hill.
- Das, T. K. (1994). Educating tomorrow's managers: The role of critical thinking. *The International Journal of Organizational Analysis*, 2(4), 333-360.
- Dweek, C. S. & Leggett, E. L. (1998). A social-cognitive approach to motivation and personality. *Psychological Review*, 95, 256-273.
- Fama, E. F. (1965). The behavior of stock-market prices. *The Journal of Business*, 38(1), 34-105.
- Findlay, M.C. & Williams, E.E. (2001, Winter). A fresh look at the efficient market hypothesis: How the intellectual history of finance encouraged a real "fraud on the market". *Journal of Post Keynesian Economics*, 181-199.
- Foster, G. (1975). Earnings and stock prices of insurance companies. *Accounting Review*, 50, 686-698.
- Foster, G. (1977). Quarterly accounting data: Time-series properties and predictive-ability results. *Accounting Review*, 52, 1-21.
- Gaffikin, M. J. R. (2003). The *a priori* wars: The modernization of accounting thought. *Accounting Forum*, 27(3), 291-311.
- Garson, G. D. (2007). Factor analysis. Retrieved March 8, 2007 from North Carolina State University, PA 765: Quantitative Research in Public Administration Web site: <http://www2.chass.ncsu.edu/garson/pa765/factor.htm>
- Gibson, C. & Schroeder, N. (1998). The changing face of accounting faculties. *Review of Business*, 19(2), 16-20.

- Gravetter, F. J. & Forzano, L. B. (2003). *Research methods for the behavioral sciences*. Belmont, CA: Wadsworth/Thomson Learning.
- Hassall, T. & Milne, M. J. (2004). Using case studies in accounting education. *Accounting Education*, 13(2), 135-138.
- Hofer, B. K. (2001). Personal epistemological research: Implications for learning and teaching. *Journal of Educational Psychology Review*, 13(4), 353-383.
- Hofer, B. K. (2002). Personal epistemology as a psychological and educational construct: An introduction. In B. K. Hofer & P. R. Pintrich (Eds.). *Personal epistemology: The psychology of beliefs about knowledge and knowing* (pp. 3-14). Mahwah, NJ: Erlbaum.
- Hofer, B. K. (2004). Introduction: Paradigmatic approaches to personal epistemology. *Educational Psychology*, 39(1), 1-3.
- Hofer, B. K. & Pintrich, P. R. (1997). The development of epistemological theories: Beliefs about knowledge and knowing and their relation to learning. *Review of Educational Research*, 67(1), 88-140.
- Jehng, J. J., Johnson, S. D., & Anderson, R. C. (1993). Schooling and student's epistemological beliefs about learning. *Contemporary Educational Psychology*, 18(3), 23-35.
- Jenkins, E. K. (1998). The significant role of critical thinking in predicting auditing students' performance. *Journal of Education for Business*, 73(5), 274-279.
- Johnson, E. N., Baird, J., Caster, P., Dilla, W. N., Earley, C. E., & Louwers, T. J. (2003). Challenges to audit education for the 21st century: A survey of curricula, course content, and delivery methods. *Issues in Accounting Education*, 18(3), 241-263.
- Kardash, C. M. & Howell, K. L. (2000). Effects of epistemological beliefs on undergraduates' cognitive and strategic processing of dual-positional text. *Journal of Educational Psychology*, 92(3), 524-535.

- Kardash, C. M. & Scholes, R. J. (1996). Effects of preexisting beliefs, epistemological beliefs, and need for cognition on interpretation of controversial issues. *Journal of Educational Psychology*, 88(2), 260-271.
- Kealey, B. T., Holland, J., & Watson, M. (2005). Preliminary evidence on the association between critical thinking and performance in principles of accounting. *Issues in Accounting Education*, 20(1), 33-49.
- King, P. M. & Kitchener (2004). Reflective judgment: Theory and research on the development of Epistemological assumptions through adulthood. In L. Corno & P. H. Winne, *Personal epistemology: Paradigmatic approaches to understanding students' beliefs about knowledge and knowing* (pp. 5-18). Mahwah, NJ: Erlbaum.
- King, P. M. & Kitchener (2002). The reflective judgment model: Twenty years of research on Epistemological cognition. In B. K. Hofer & P. R. Pintrich (eds.). *Personal epistemology: The Psychology of Beliefs About Knowledge and Knowing* (pp. 37-62), Mahwah, NJ: Erlbaum.
- Kuhn, D. & Dean, Jr., D. D. (2004). Metacognition: A bridge between cognitive theory and educational practice. *Theory Into Practice*, Autumn, 268-273.
- Kurfiss, J. G. (1988). Critical thinking: Theory, research, practice, and possibilities. ASHE-ERIC Higher education report No. 2, Washington, DC: Association for the Study of Higher Education.
- Langenderfer, H. Q. (1987, May). Accounting education's history: A 100-search for identity. *Journal of Accountancy*, 302-331.
- Marden, R. E., Holstrum, G. L., & Schneider, S. L. (1997). Control environment conditions and the interaction between control risk, account type, and management's assertions. *Auditig: A Journal of Practice & Theory*, 16(1), 51-68.
- Mathews, M. R. (2001). Whither (or wither) accounting education in the new millennium. *Accounting Forum*, 25(4), 380-394).
- McClave, J. T., Benson, P. G., & Sincich, T. (2008). *Statistics for business and economics* (10th ed.). Upper Saddle River, NJ: Pearson, Prentice Hall.

- McClosky, D. (1985). *The rhetoric of economics*. Madison, WI: University of Wisconsin Press.
- McMillian, K. P. (1999). The Institute of Accounts: A community of the competent. *Accounting, Business, & Financial History*, 9(1), 7-28.
- Nelson, I. T. (1995). What's new about accounting education change? An historical perspective on the change movement. *Accounting Horizons*, 9(4), 62-75.
- Norusis, M. J. (2003). *SPSS® 12.0 statistical procedures companion*. Upper Saddle River, NJ: Prentice Hall, Inc.
- Palmer, B. & Marra, R. M. (2004). College student epistemological perspectives across knowledge domains: A proposed grounded theory. *Higher Education*, 47, 311-335.
- Paulsen, M. B. & Wells, C. T. (1998). Domain differences in the epistemological beliefs of college students. *Research in Higher Education*, 39(4), 365-432.
- Perry, W. G. (1968). *Patterns of development in thought and values of students in a liberal arts college: A validation of a scheme*. Cambridge, MA: Bureau of Study Counsel, Harvard University.
- Phillips, F. (1998). Accounting student's beliefs about knowledge: Associating performance with underlying belief dimensions. *Issues in Accounting Education*, 13(1), 113-126.
- Phillips, F. (2001). A research note on accounting students' epistemological beliefs, study strategies, and unstructured problem-solving performance. *Issues in Accounting Education*, 16(1), 21-39.
- Previts, J. P. & Marino, B. D. (1998). *A history of accountancy in the United States*. Columbus, OH: Ohio State University Press.
- Price, H. R. (1957). Qualifications for college accounting teachers. *The Accounting Review*, 32(1), 83-89.

- Pritchard, R. E., Potter, G. C., & Saccucci, M. S. (2004, January/February). The selection of a business major: Elements influencing student choice and implications for outcomes assessment. *Journal of Education for Business*, 152-156.
- Ryan, M. P. (1984). Monitoring text comprehension: Individual differences in epistemological standards. *Journal of Educational Psychology*, 76(2), 248-258.
- Ryan, M. P. (1984). Conceptions of prose coherence: Individual differences in epistemological standards. *Journal of Educational Psychology*, 76(8), 1226-1238.
- Schoenfeld, A. H. (1983). Beyond the purely cognitive: Belief systems, social cognition, and metacognitions as driving forces in intellectual performance. *Cognitive Science*, 7, 329-363.
- Schommer, M. (1990). Effects of beliefs about the nature of knowledge on comprehension. *Journal of Educational Psychology*, 82(3), 498-504.
- Schommer, M. (1992). Predictors of epistemological beliefs: Comparing adults with only a secondary education to adults with post-secondary education. Paper presented at the Midwestern Educational Research Association, Chicago, IL.
- Schommer, M. (1993). Epistemological development and academic performance among secondary students. *Journal of Educational Psychology*, 85(3), 406-411.
- Schommer, M., Crouse, A. & Rhodes, N. (1992). Epistemological beliefs and mathematical text comprehension: Believing it is simple does not make it so. *Journal of Educational Psychology*, 4, 453-483.
- Schommer, M. & Dunnell, P. A. (1997). Epistemological beliefs of gifted high school students. *Roeper Review*, 19(3), 153-156.
- Schommer, M. & Dunnell, P. A. (1994). A comparison of epistemological beliefs between gifted and non-gifted high school students. *Roeper Review*, 16(3), 207-210.

- Schommer, M., Calvert, C., Garigleietti, G., & Bajaj, A. (1997). The development of epistemological beliefs among secondary students: A longitudinal study. *Journal of Educational Psychology*, 89(1), 37-40.
- Schommer, M. & Walker, K. (1995). Are epistemological beliefs similar across domains? *Journal of Educational Psychology*, 87(3), 424-432.
- Schommer-Aikins, M. (2004). Explaining the epistemological belief system: Introducing the embedded systemic model and coordinated research approach. *Educational Psychologist*, 39(1), 19-29.
- Schommer-Aikins, M., Duell, O. K., & Barker, S. (2003). Epistemological beliefs across domains using Biglan's classification of academic disciplines. *Research in Higher Education*, 44(3), 347-366.
- Schommer-Aikins, M., Duell, O. K., & Hutter, R. (2005). Epistemological beliefs, mathematical problem-solving beliefs, and academic performance of middle school students. *Elementary School Journal*, 105(3), 289-305.
- Schraw, G. (2001). Current themes and future directions in epistemological research: A commentary. *Educational Psychology Review*, 451-464.
- Schraw, G. Bendixen, L. D., & Dunkle, M. E. (2002). Development and validation of the Epistemological Inventory (EBI). In Hofer, B. K. and Pintrich, P. B. (eds.). *Personal epistemology: The psychology of beliefs about knowledge and knowing*. Mahwah, NJ: Erlbaum.
- Schraw, G., Dunkle, M. E., & Bendixen, L. D. (1995). Cognitive processes in well-defined and ill-defined problem solving. *Applied Cognitive Psychology*, 9, 523-538.
- Schraw, G. & Olafson, L. (2002). Teachers' epistemological world views and educational practices. *Issues in Educations*, 8(2), 99-148.
- Schreiber, J. B. & Shinn, D. (2003). Epistemological beliefs of community college students and their learning processes. *Community College Journal of Research and Practice*, 27, 699-709.

- Springer, C. W. & Borthick, A. F. (2004). Business simulation to stage critical thinking in introductory accounting: Rationale, design, and implementation. *Issues in Accounting Education*, 19(3), 277-303).
- Tinic, S. M. (1990). A perspective on the stock market's fixation on accounting numbers. *The Accounting Review*, 65(4), 781-796.
- Ulrich, T. A. (2005). The relationship of business major to pedagogical strategies. *Journal of Education for Business*, May/June, 269-274.
- Van Wyhe, G. (1994). *The Struggle for Status: A History of Accounting Education*. New York, NY: Garland Publishing, Inc.
- Waddock, S. (2005). Hollow men and women at the helm . . . hollow accounting ethics? *Issues in Accounting Education* 20(2), 145-150.
- Watts, R. L. & Zimmerman, J. L. (1986). *Positive Accounting Theory*, Upper Saddle River, NJ: Prentice Hall, Inc.
- Williams, P. F. (2003). Modern accounting scholarship: The imperative of positive economic science. *Accounting Forum*, 27(3), 251-269.
- Wolcott, S. K., Baril, C. P., Cunningham, B. M., Fordham, D. R., & St. Pierre, K. (2002). Critical thought on critical thinking research. *Journal of Accounting Education*, 20, 85-103.
- Wolcott, S. K. & Lynch, C. L. (1997). Critical thinking in the accounting classroom: A reflective judgment developmental process perspective. *Accounting Education*, 2(1), 59-78.
- Wood, P. & Kardash, C. (2002). Critical elements in the design and analysis of studies of epistemology. In B. K. Hofer & P. R. Pintrich (Eds.) *Personal epistemology: The Psychology of beliefs about knowledge and knowing* (pp. 231-260). Mahwah, NJ: Erlbaum.

APPENDIX A. DEVELOPMENTS IN EARLY ACCOUNTING EDUCATION

Because accounting is among the youngest of the major professions, fundamental questions like the education of pre-professionals remain unsettled. Accounting began its evolution from virtually anonymous clerical function to profession only in the last decades of the nineteenth century. An increasingly complex business environment and a rapidly growing capital market demanded well-educated, technically competent accounting practitioners to protect the interests of investors and creditors and provide the information necessary to manage enterprises. Accounting leaders in this period were anxious to separate themselves from the "'back parlor' (moonlighting) nature of many American [accounting] practices (Previts and Marino, 1998, pg. 134)" by professionalization.

Building on work of Haskell and Abbott, business historian Keith McMillen (1999) describes the driving vision of separation from less skilled and/or ethically challenged competitors that motivated accounting leaders as the creation of a "community of the competent".

Once insulated from disruptive outside influences competent professionals created a competitive and intellectual discourse out of which the field itself progressed. Through mutually challenging one another, the individual's and

community's body of knowledge developed. The communal status of competence provided assurance that an active member was competent and conferred authority on that member to act (1999, p. 9).

Engineers, historians, sociologists, and accountants can all trace the beginning of their status as professionals to this period. The aura of competence that surrounded physicians, the clergy, and attorneys provided the model for the community to which these groups aspired. McMillen (1999) identified three tasks that required successful completion before a group could be considered a competent community: identifying those individuals who exhibited competence in the field, providing for the cultivation of the community's technical competence, and conferring authority on those who exercise the competence.

Only through identifying competent practitioners can a technical field separate the professional from the charlatan. Only through cultivating the competence of the community of competent practitioners can there be progress in a technical field. Only through conferring status on the competent practitioner can this community gain the authority to act. These statements constitute the threefold elements of the concept of the *community of the competent*. (McMillan, 1999, pg. 7-8)

Identifying and Enabling the Competent

Nascent professional accounting societies that began forming in the last half of the 19th century were the immediate vehicles for the creation of an accounting community of competence. Groups dedicated to the promotion of accounting practice and the dissemination of accounting literature began in major cities across the United States including New York, Kansas City, Memphis, St. Louis, Boston, and other cities in the last quarter of the nineteenth century. These local societies, in turn, would provide the nucleus from which national practitioner-oriented associations such as the Institute of Accounts (IA) and the American Association of Public Accountants (AAPA) (which would later become the American Institute of Public Accountants) formed in 1882 and 1887, respectively, would emerge.

In 1884, the IA instituted a restricted membership policy, limiting its membership to practitioners who passed "strict, practical, and technical entrance examinations (Previts and Marino, 1998, pg. 139)". While a necessary first step in the creation of a community of the competent, without state recognition the IA's certification was limited in achieving its goal of separating its members from the non-competent. The battle for legal recognition of the profession would be fought between rival accounting associations for more than a decade

until the State of New York passed the first CPA law in 1896 followed in succession by Pennsylvania (1890), Maryland (1900), California (1901), and Washington and Illinois (1903) (Previts and Marino, 1998, pg. 144).

Cultivating Competence

Early accounting leaders were aware that an important source of professional competence must come from pre-professional education. For almost the entire existence of accounting as a profession, practitioner and academic groups alike have been at odds over the effectiveness of traditional educational practices. A necessary component of certification was a provision for a minimum educational requirement for candidacy. Prior to 1880, the English and Scottish dominated American accounting community generally favored the training of accountants following the apprenticeship model, reflecting a British "distain for broader liberal education (Langenderfer, 1987, pg. 304)". American accounting leaders envisioned that the elevation of future accountants to a prominence equivalent to members of the medical and legal professions required a significant reform of the current system of accounting education. These groups believed that to be considered truly professional, accountants must have been training following the educational models of the professions with which they sought equality. Langendorfer describes early professional societies as

thirst[ing] for one of the trappings of a true profession, namely, professional schools. Accounting leaders believed that schools of accountancy were needed to serve as the educational foundation to provide this profession with the theoretical underpinnings and respectability that are the hallmarks of the medical and legal professions (Langendorfer, 1987, pg. 304).

In 1892, the fledgling American Association of Public Accountants (AAPA) petitioned and was granted a charter for a two-year professional school for accountants. Its founders envisioned their school as a post-baccalaureate institution, requiring applicants be graduates of a college or university registered by the Regents of the University of the State of New York (Previts and Marino, 1998, pg, 152). The venture was not a success, however, failing for a lack of enrollment due in no small part to a profound shortage of college graduates in the general population that significantly narrowed the available student population. This failure did not spell the end of accounting leaders attempts to professionalize accounting.

Even before the failure of the AAPA's professional accounting school, accounting as an undergraduate academic subject had begun to appear in universities and colleges as early as the first half of the 1880's. Accounting practitioners believed that with the failure of a professional school of

accounting, the inclusion of accounting in universities, even as an undergraduate course, was consistent with their ultimate goal of the an accounting profession. Throughout the period, practitioners worked to overcome the prejudices of university administrators and faculties against so-called vocational programs to create accounting programs. Largely through their efforts, the first college-level accounting course became part of the curriculum at the University of Pennsylvania's Wharton School of Business in 1883. Seventeen years later, the first accounting degree program was created with the creation of the School of Commerce, Accounts, and Finance at New York University (Langenderfer, 1987). The first dean of the school was Charles Waldo Haskins, a cofounder of the major accounting firm Haskins and Sells. That Haskins was willing to leave the practice of accounting to participate in this educational experiment was indicative of the importance that the new profession attached to educationally validating accounting.

The Roots of Controversy

The relationship between academia and the profession begun by Haskins and others soon resulted in a bi-directional flow of both benefits and controversy for the profession and the academy. By the end of the nineteenth century, university accounting programs had begun to supply a steady flow of young

accountants for public accounting firms. Accounting firms in turn made significant financial contributions to fund existing accounting programs at Wharton and NYU and to establish collegiate accounting programs Ohio University, Dartmouth University, the University of Chicago, and the University of California (Previts and Marino, 1998, p. 152). The close association between accounting firms and accounting education was also marked by long and somewhat bitter periods of contention as each group attempted to exert influence over what the other considered to be its "turf".

One such area of contention was the design of the accounting curricula. Previts and Marino (1998) have argued that early practitioners did not see college accounting programs as the preferred means of learning the technical procedures of accounting and auditing.

Most practitioners believed that mastery of the technical procedures . . . was most effectively learned through practical experience; *education's role was to develop a person's analytic ability. Accounting, they believed required a wide range of knowledge and minds trained to think analytically and constructively* [italics added]. They supported a broad program emphasizing theory and philosophy and were disappointed when the evidence accumulated that

accounting educators tended to emphasize narrow, technical education. (p. 200)

Nelson (1995) notes that in spite of practitioner's concerns, the trend away from a liberal education toward technical training continued throughout the 20th century. At time passed, the magnitude and complexity of the required 'common body of knowledge' expanded at an exponential rate. . . This knowledge explosion compounded a classic three-way educational dilemma: breath of education vs. depth of learning vs. technical coverage. (p. 63)

APPENDIX B. SURVEY INSTRUMENT

Epistemological Beliefs Inventory

Please indicate how strongly you agree or disagree with each of the statements listed below. Please circle the number that best corresponds to the strength of your belief.

1. It bothers me when instructors don't tell students the answers to complicated problems.
Strongly 1 2 3 4 5 Strongly
Disagree Agree

2. Truth means different things to different people.
Strongly 1 2 3 4 5 Strongly
Disagree Agree

3. Students who learn things quickly are the most successful.
Strongly 1 2 3 4 5 Strongly
Disagree Agree

4. People should always obey the law.
Strongly 1 2 3 4 5 Strongly
Disagree Agree

5. Some people will never be smart no matter how hard they work.
Strongly 1 2 3 4 5 Strongly
Disagree Agree

6. Absolute moral truth does not exist.
Strongly 1 2 3 4 5 Strongly
Disagree Agree

7. Parents should teach their children all there is to know about life.
- | | | | | | |
|------------------------|---|---|---|---|-------------------|
| Strongly 1
Disagree | 2 | 3 | 4 | 5 | Strongly
Agree |
|------------------------|---|---|---|---|-------------------|
8. Really smart students don't have to work as hard to do well in school.
- | | | | | | |
|------------------------|---|---|---|---|-------------------|
| Strongly 1
Disagree | 2 | 3 | 4 | 5 | Strongly
Agree |
|------------------------|---|---|---|---|-------------------|
9. If a person tries too hard to understand a problem, they will most likely end up being confused.
- | | | | | | |
|------------------------|---|---|---|---|-------------------|
| Strongly 1
Disagree | 2 | 3 | 4 | 5 | Strongly
Agree |
|------------------------|---|---|---|---|-------------------|
10. Too many theories just complicate things.
- | | | | | | |
|------------------------|---|---|---|---|-------------------|
| Strongly 1
Disagree | 2 | 3 | 4 | 5 | Strongly
Agree |
|------------------------|---|---|---|---|-------------------|
11. The best ideas are often the most simple.
- | | | | | | |
|------------------------|---|---|---|---|-------------------|
| Strongly 1
Disagree | 2 | 3 | 4 | 5 | Strongly
Agree |
|------------------------|---|---|---|---|-------------------|
12. People can't do too much about how smart they are.
- | | | | | | |
|------------------------|---|---|---|---|-------------------|
| Strongly 1
Disagree | 2 | 3 | 4 | 5 | Strongly
Agree |
|------------------------|---|---|---|---|-------------------|
13. Instructors should focus on facts instead of theories.
- | | | | | | |
|------------------------|---|---|---|---|-------------------|
| Strongly 1
Disagree | 2 | 3 | 4 | 5 | Strongly
Agree |
|------------------------|---|---|---|---|-------------------|

14. I like teachers who present several competing theories and let their students decide which is best.
- Strongly 1 2 3 4 5 Strongly
Disagree Disagree Agree Agree Agree
15. How well you do in school depends on how smart you are.
- Strongly 1 2 3 4 5 Strongly
Disagree Disagree Agree Agree Agree
16. If you don't learn something quickly, you won't ever learn it.
- Strongly 1 2 3 4 5 Strongly
Disagree Disagree Agree Agree Agree
17. Some people just have a knack for learning and others don't.
- Strongly 1 2 3 4 5 Strongly
Disagree Disagree Agree Agree Agree
18. Things are simpler than most professors would have you believe.
- Strongly 1 2 3 4 5 Strongly
Disagree Disagree Agree Agree Agree
19. If two people are arguing about something, at least one of them must be wrong.
- Strongly 1 2 3 4 5 Strongly
Disagree Disagree Agree Agree Agree
20. Children should be allowed to question their parents' authority.
- Strongly 1 2 3 4 5 Strongly
Disagree Disagree Agree Agree Agree

28. People who question authority are trouble makers.
- Strongly 1 2 3 4 5 Strongly
Disagree Disagree Disagree Disagree Disagree Agree
29. Working on a problem with no quick solution is a waste of time.
- Strongly 1 2 3 4 5 Strongly
Disagree Disagree Disagree Disagree Disagree Agree
30. You can study something for years and still not really understand it.
- Strongly 1 2 3 4 5 Strongly
Disagree Disagree Disagree Disagree Disagree Agree
31. Sometimes there are no right answers to life's big problems.
- Strongly 1 2 3 4 5 Strongly
Disagree Disagree Disagree Disagree Disagree Agree
32. Some people are born with special gifts and talents.
- Strongly 1 2 3 4 5 Strongly
Disagree Disagree Disagree Disagree Disagree Agree

What is your major: _____

What is your age (circle the appropriate range): 20-24 25-29 30+

APPENDIX C. DIMENSION SCORING KEY

Simple Knowledge

- It bothers me when instructors don't tell students the answers to complicated problems
- Too many theories just complicate things.
- The best ideas are often the most simple.
- Instructors should focus on facts instead of theories.
- Things are simpler than most professors would have you believe.
- (Reverse Scored) The more you know about a topic, the more there is to know.
- You can study something for years and still not really understand it.

Certain Knowledge

- (Reverse Scored) Truth means different things to different people.
- Absolute moral truth does not exist.
- (Reverse Scored) I like teachers who present several competing theories and let their students decide which is best.
- If two people are arguing about something, at least one of them must be wrong.
- Science is easy because it contains so many facts.
- The moral rules I live by apply to everyone.
- What is true today will be true tomorrow.
- Sometimes there are no right answers to life's big problems.

Omniscient Authority

- People should always obey the law.
- Parents should teach their children all there is to know about life.
- (Reverse Scored) Children should be allowed to question their parent's authority.
- When someone in authority tells me what to do, I usually do it.
- People who question authority are trouble makers

APPENDIX D

FIGURES AND TABLES

Figure D1. Conceptual model.

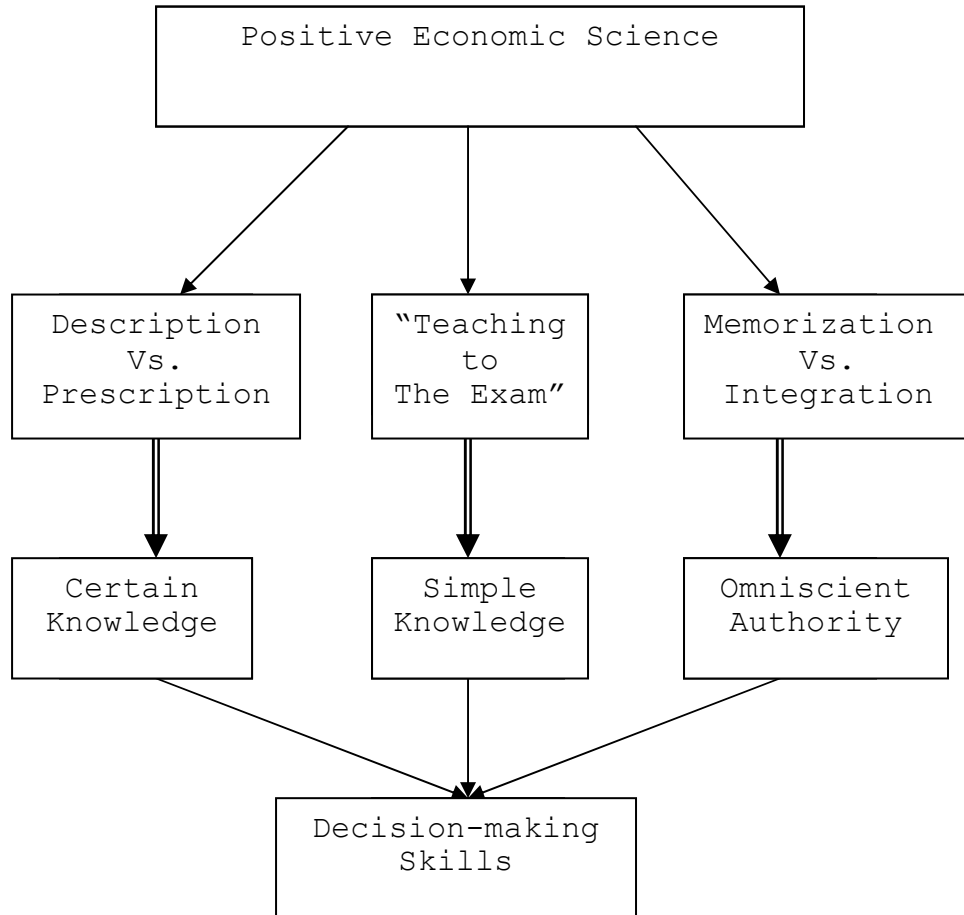


Figure D2. Certain knowledge-score distribution (accounting majors).

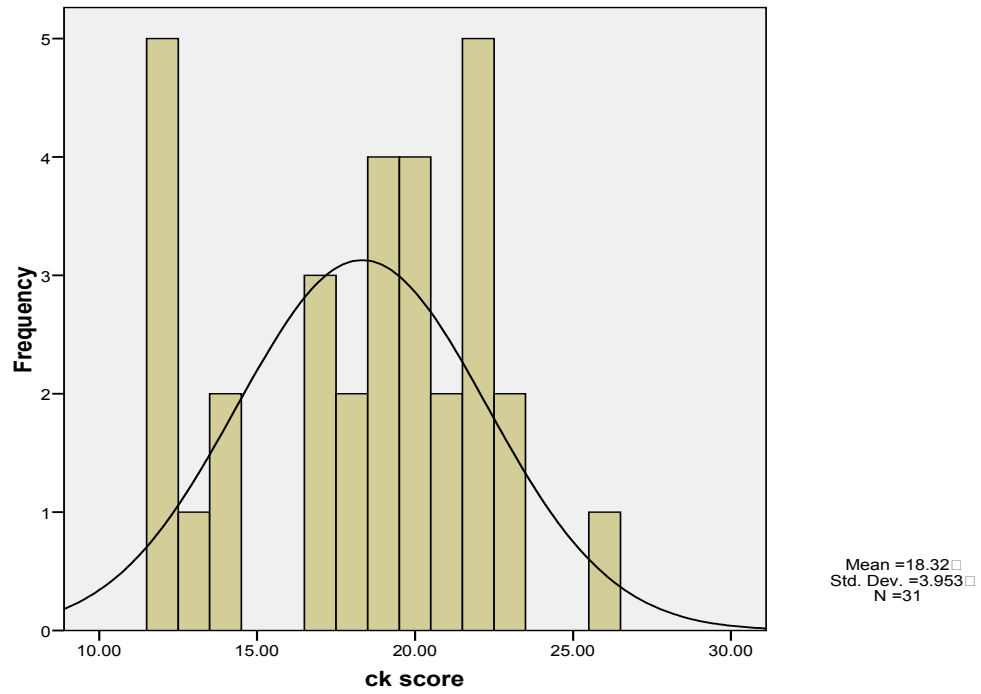


Figure D3. Certain knowledge-score distribution (non-accounting majors).

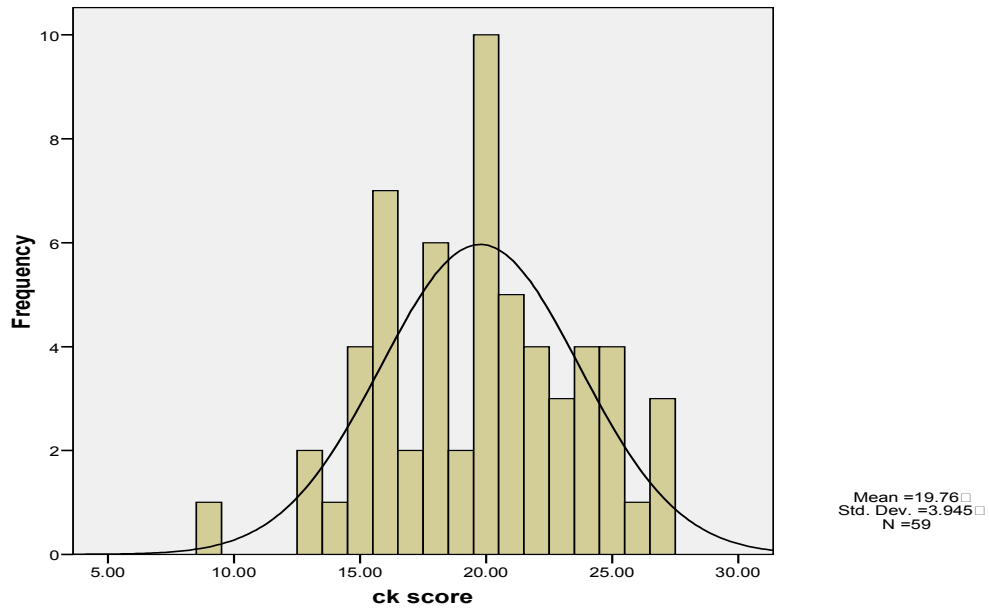


Figure D4. Simple knowledge-score distribution (accounting majors).

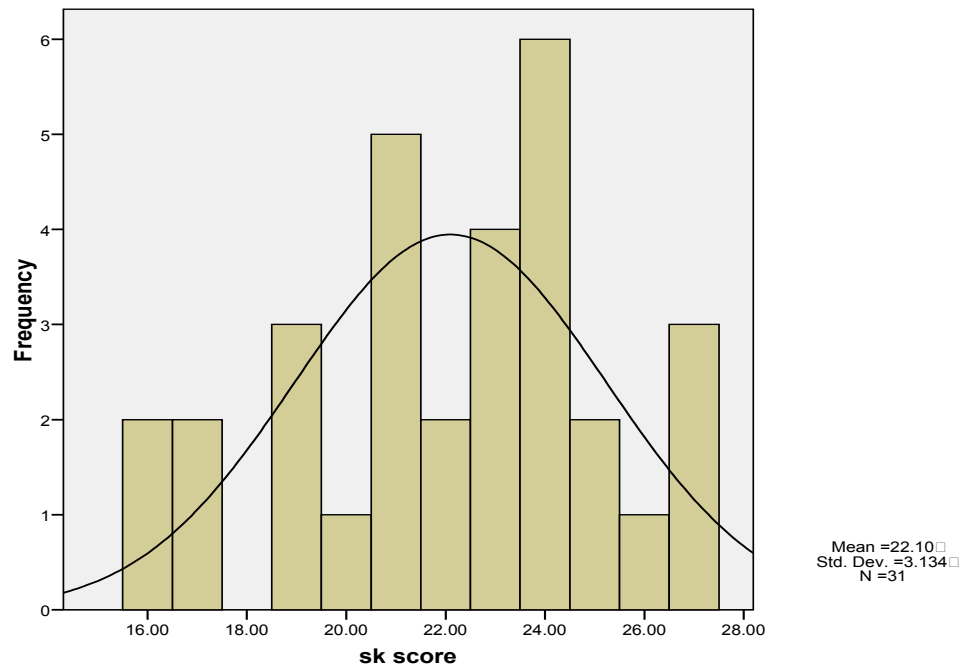


Figure D5. Simple knowledge-score distribution (non-accounting majors).

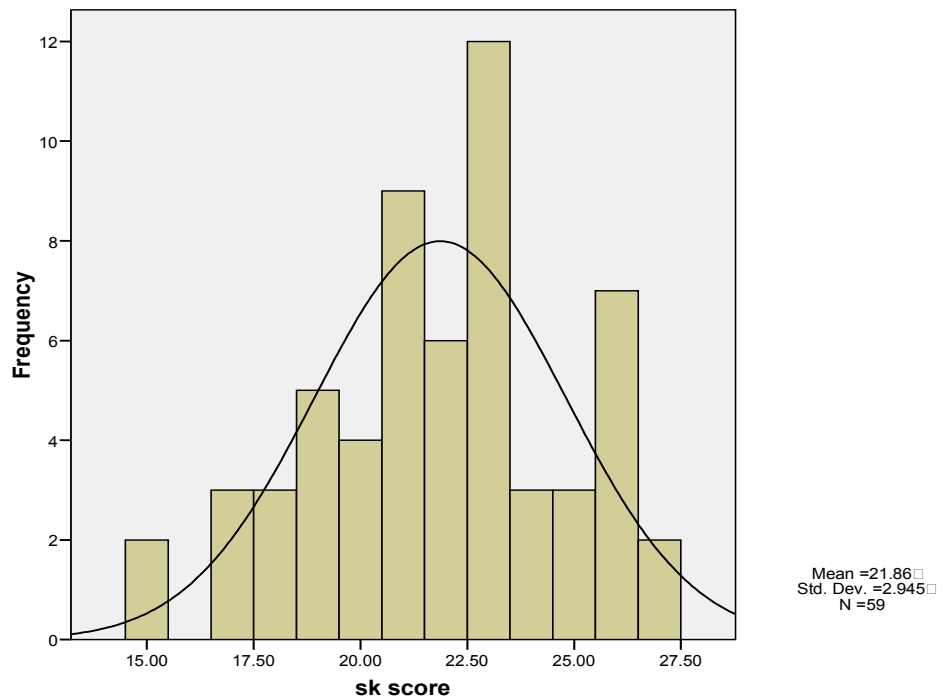


Figure D6. Omniscient authority-score distribution (accounting majors).

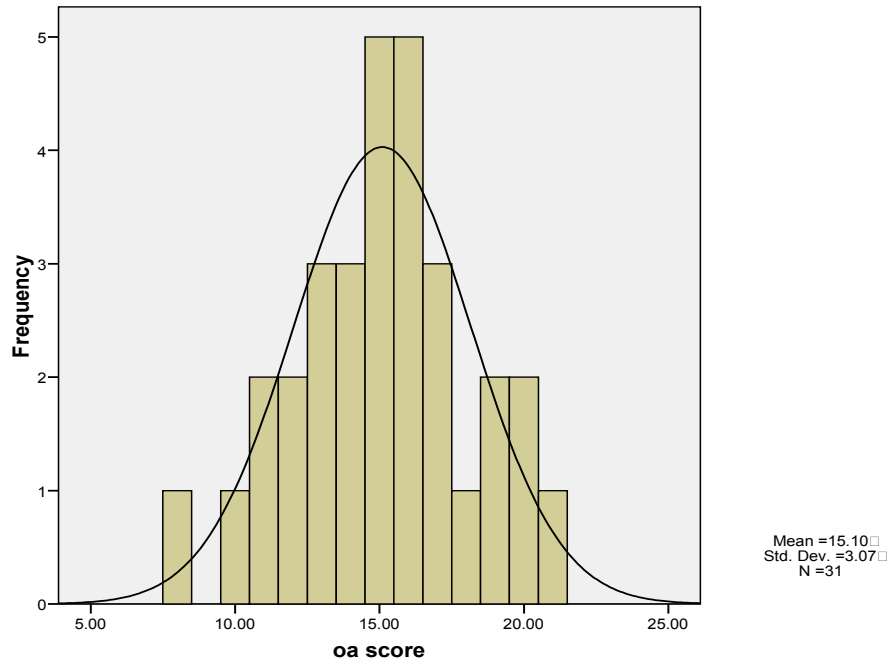


Figure D7. Omniscient authority-score distribution (non-accounting majors).

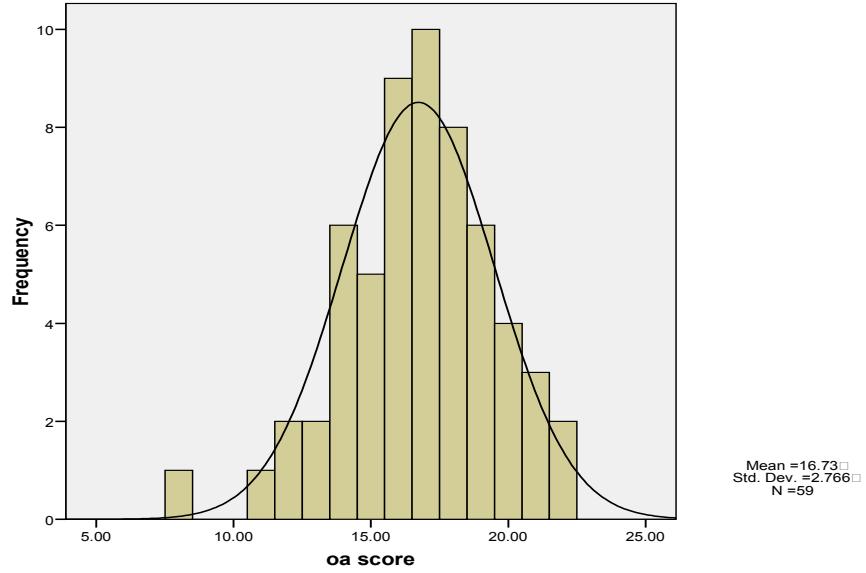


Table D1. Descriptive statistics-certain knowledge.

	N	Range	Minimum	Maximum	Mean	Std. Dev.	Variance
All Subjects	90	18.00	9.00	27.00	19.2667	3.98537	15.883
Accounting Majors Only	31	14.00	12.00	26.00	18.3226	3.95295	15.626
Non-Accounting Majors Only	59	18.00	9.00	27.00	19.7627	3.94505	15.563

Table D2. Individual item descriptive statistics-certain knowledge (all subjects).

	Mean	Std. Deviation
(Reverse Scored) Truth means different things to different people.	2.33	1.281
(Reverse Scored) Absolute moral truth does not exist.	3.31	1.158
(Reverse Scored) I like teachers who present several competing theories and let their students decide which is best.	2.54	1.093
If two people are arguing about something, at least one of them must be wrong.	1.84	.959
Science is easy because it contains so many facts.	2.59	1.121
The moral rules I live by apply to everyone.	2.51	1.052
What is true today will be true tomorrow.	2.19	.947
(Reverse Scored) Sometimes there are no right answers to life's big problems.	1.94	.940

Table D3. Summary item descriptive statistics-certain knowledge (all subjects).

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance
Item Means	2.408	1.844	3.311	1.467	1.795	.209
Item	1.155	.885	1.640	.756	1.855	.069
Variances						
Inter-Item	.119	-.150	.390	.540	-2.591	.017
Covariances						
Inter-Item	.104	-.143	.336	.479	-2.342	.014
Correlations						

Table D4. Individual item descriptive statistics-certain knowledge (accounting majors only).

	Mean	Std. Deviation
(Reverse Scored) Truth means different things to different people.	2.03	1.110
(Reverse Scored) Absolute moral truth does not exist.	2.90	1.136
(Reverse Scored) I like teachers who present several competing theories and let their students decide which is best.	2.90	1.350
If two people are arguing about something, at least one of them must be wrong.	1.58	.807
Science is easy because it contains so many facts.	2.58	1.259
The moral rules I live by apply to everyone.	2.42	1.089
What is true today will be true tomorrow.	2.13	.957
(Reverse Scored) Sometimes there are no right answers to life's big problems.	1.77	.956

Table D5. Summary item descriptive statistics-certain knowledge (accounting majors only).

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance
Item Means	2.290	1.581	2.903	1.323	1.837	.245
Item Variances	1.200	.652	1.824	1.172	2.799	.144
Inter-Item Covariances	.108	-.365	.577	.942	-1.584	.050
Inter-Item Correlations	.094	-.303	.554	.857	-1.830	.039

Table D6. Individual item descriptive statistics-certain knowledge (non-accounting majors only).

	Mean	Std. Deviation
(Reverse Scored) Truth means different things to different people.	2.49	1.344
(Reverse Scored) Absolute moral truth does not exist.	3.53	1.120
(Reverse Scored) I like teachers who present several competing theories and let their students decide which is best.	2.36	.886
If two people are arguing about something, at least one of them must be wrong.	1.98	1.008
Science is easy because it contains so many facts.	2.59	1.052
The moral rules I live by apply to everyone.	2.56	1.038
What is true today will be true tomorrow.	2.22	.948
(Reverse Scored) Sometimes there are no right answers to life's big problems.	2.03	.928

Table D7. Summary item descriptive statistics-certain knowledge (non-accounting majors only).

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance
Item Means	2.470	1.983	3.525	1.542	1.778	.234
Item Variances	1.101	.785	1.806	1.021	2.301	.104
Inter-Item Covariances	.121	-.123	.462	.584	-3.762	.021
Inter-Item Correlations	.107	-.127	.364	.491	-2.856	.016

Table D8. Descriptive statistics-simple knowledge.

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
All Subjects	90	12.00	15.00	27.00	21.9444	2.99573	8.974
Accounting Majors Only	31	11.00	16.00	27.00	22.0968	3.13427	9.824
Non-Accounting Majors Only	59	12.00	15.00	27.00	21.8644	2.94465	8.671

Table D9. Individual item descriptive statistics-simple knowledge (all subjects).

	Mean	Std. Deviation
It bothers me when instructors don't tell students the answers to complicated problems.	4.21	.868
Too many theories just complicate things.	3.37	1.065
The best ideas are often the most simple.	3.97	.893
Instructors should focus on facts instead of theories.	3.01	.918
Things are simpler than most professors would have you believe.	2.99	.977
(Reverse Scored) The more you know about a topic, the more there is to know.	2.22	.845
You can study something for years and still not really understand it.	2.18	.907

Table D10. Summary item descriptive statistics-simple knowledge (all subjects).

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance
Item Means	3.135	2.178	4.211	2.033	1.934	.615
Item Variances	.860	.714	1.134	.420	1.588	.020
Inter-Item Covariances	.070	-.145	.344	.489	-2.381	.021
Inter-Item Correlations	.075	-.154	.361	.515	-2.343	.026

Table D11. Individual item descriptive statistics-simple knowledge (accounting majors only).

	Mean	Std. Deviation
It bothers me when instructors don't tell students the answers to complicated problems	4.35	.877
Too many theories just complicate things.	3.32	1.077
The best ideas are often the most simple.	4.13	.846
Instructors should focus on facts instead of theories.	2.97	1.080
Things are simpler than most professors would have you believe.	3.03	1.080
(Reverse Scored) The more you know about a topic, the more there is to know.	2.19	.910
You can study something for years and still not really understand it.	2.10	.944

Table D12. Summary item descriptive statistics-simple knowledge (accounting majors only).

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance
Item Means	3.157	2.097	4.355	2.258	2.077	.752
Item Variances	.956	.716	1.166	.449	1.628	.040
Inter-Item Covariances	.075	-.226	.523	.748	-2.314	.041
Inter-Item Correlations	.069	-.293	.450	.743	-1.533	.044

Table D13. Individual item descriptive statistics-simple knowledge (non-accounting majors only).

	Mean	Std. Deviation
It bothers me when instructors don't tell students the answers to complicated problems	4.14	.860
Too many theories just complicate things.	3.39	1.067
The best ideas are often the most simple.	3.88	.911
Instructors should focus on facts instead of theories.	3.03	.830
Things are simpler than most professors would have you believe.	2.97	.928
(Reverse Scored) The more you know about a topic, the more there is to know.	2.24	.817
You can study something for years and still not really understand it.	2.22	.892

Table D14. Summary item descriptive statistics-simple knowledge (non-accounting majors only).

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance
Item Means	3.123	2.220	4.136	1.915	1.863	.551
Item Variances	.817	.667	1.139	.472	1.707	.025
Inter-Item Covariances	.070	-.129	.383	.512	-2.980	.020
Inter-Item Correlations	.082	-.158	.433	.591	-2.735	.027

Table D15. Descriptive statistics-omniscient authority.

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
All subjects	90	14.00	8.00	22.00	16.1667	2.96136	8.770
Accounting Majors Only	31	13.00	8.00	21.00	15.0968	3.06980	9.424
Non-Accounting Majors Only	59	14.00	8.00	22.00	16.7288	2.76574	7.649

Table D16. Individual item descriptive statistics-omniscient authority (all subjects).

	Mean	Std. Deviation
People should always obey the law.	3.79	1.086
Parents should teach their children all there is to know about life.	2.99	1.147
(Reverse Scored) Children should be allowed to question their parent's authority.	3.49	1.154
When someone in authority tells me what to do, I usually do it.	3.66	.781
People who question authority are trouble makers.	2.24	.928

Table D17. Summary item descriptive statistics-omniscient authority (all subjects).

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance
Item Means	3.233	2.244	3.789	1.544	1.688	.397
Item Variances	1.059	.610	1.331	.721	2.181	.099
Inter-Item Covariances	.174	-.038	.323	.361	-8.608	.013
Inter-Item Correlations	.174	-.042	.314	.356	-7.474	.013

Table D18. Individual item descriptive statistics-omniscient authority (accounting majors only).

	Mean	Std. Deviation
People should always obey the law.	3.48	1.208
Parents should teach their children all there is to know about life.	2.71	1.131
(Reverse Scored) Children should be allowed to question their parent's authority.	3.29	1.071
When someone in authority tells me what to do, I usually do it.	3.39	.761
People who question authority are trouble makers.	2.23	.956

Table D19. Summary item descriptive statistics-omniscient authority (accounting majors only).

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance
Item Means	3.019	2.226	3.484	1.258	1.565	.288
Item Variances	1.075	.578	1.458	.880	2.520	.117
Inter-Item Covariances	.202	-.217	.587	.804	-2.703	.051
Inter-Item Correlations	.198	-.252	.509	.761	-2.014	.057

Table D20. Individual item descriptive statistics-omniscient authority (non-accounting majors only).

	Mean	Std. Deviation
People should always obey the law.	3.95	.990
Parents should teach their children all there is to know about life.	3.14	1.137
(Reverse Scored) Children should be allowed to question their parent's authority.	3.59	1.191
When someone in authority tells me what to do, I usually do it.	3.80	.761
People who question authority are trouble makers.	2.25	.921

Table D21. Summary item descriptive statistics-omniscient authority (non-accounting majors only).

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance
Item Means	3.346	2.254	3.949	1.695	1.752	.466
Item Variances	1.023	.579	1.418	.839	2.451	.115
Inter-Item Covariances	.127	-.030	.327	.357	-10.864	.015
Inter-Item Correlations	.136	-.022	.312	.335	-14.048	.015

Table D22. Independent Samples Tests.

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	95% Confidence Interval of the Difference	
								Upper	Lower
Certain Knowledge	.027	.870	-1.645	88	.104	-1.44013	.87572	-3.18043	.30017
Simple Knowledge	.240	.625	.348	88	.729	.23237	.66784	-1.09482	1.55956
Omniscient Authority	.334	.565	-2.561	88	.012	-1.63204	.63731	-2.89856	-.36552

Table D23. Factor Analysis.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy. 0.580

	<i>Loading</i>
<i>Factor 1 (eigenvalue = 2.611)</i>	
If you don't learn something quickly, you won't ever learn it (QL)	0.770
If you haven't understood a chapter the first time through, going back over it won't help (QL)	0.737
If two people are arguing about something, at least one of them must be wrong (CK)	0.575
Working on a problem with no quick solution is a waste of time (QL)	0.525
If a person tries too hard to understand a problem, they will most likely end up being confused (QL)	0.421
<i>Factor 2 (eigenvalue = 2.366)</i>	
Some people will never be smart no matter how hard they work (FA)	0.826
Smart people are born that way (FA)	0.636
Absolute moral truth does <u>not</u> exist (CK REV)	-0.628

Table D23. Factor Analysis (Continued).

Factor 3 (eigenvalue = 2.300)

Students who learn things quickly are the most successful (QL)	0.726
How well you do in school depends on how smart you are (FA)	0.682
Really smart students don't have to work as hard to do well in school (FA)	0.659

Factor 4 (eigenvalue = 2.140)

What is true today will be true tomorrow (CK)	0.739
Parents should teach their children all there is to know about life (OA)	0.605
The moral rules I live by apply to everyone (CK)	0.586
People should always obey the law (OA)	0.507

Factor 5 (eigenvalue = 1.862)

Too many theories just complicate things (SK)	0.794
Instructors should focus on facts instead of theories (SK)	0.630
Things are simpler than most professors would have you believe (SK)	0.468

Factor 6 (eigenvalue = 1.713)

When someone in authority tells me what to do, I usually do it (OA)	0.731
Children should be allowed to question their parents' authority (OA REV)	0.676
People who question authority are trouble makers (OA)	0.583

Table D23. Factor Analysis (Continued).

Factor 7 (eigenvalue = 1.667)

Sometimes there are no right answers to life's big problems (CK REV)	0.768
You can study something for years and still not really understand it (SK REV)	0.663
It bothers me when instructors don't tell students the answers to complicated problems (SK)	-0.418