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Responding to Changes in Global Accountancy Practice: Knowledge Management, Information Technology, and Cognitive Style

Lewis Shaw

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of
Doctor of Philosophy

University of Durham
Durham University Business School
Durham, UK

2003

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- 7 JUL 2003

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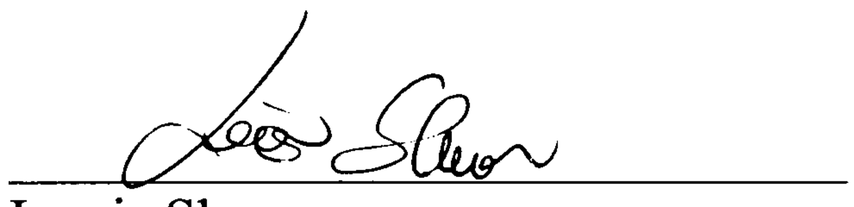
Declaration

I hereby declare that the material contained in this thesis has not been previously submitted for a degree in this or any other university. I further declare that this thesis is solely based on my own research.



Lewis Shaw

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Responding to Changes in Global Accountancy Practice: Knowledge Management, Information Technology, and Cognitive Style

ABSTRACT

The "Knowledge Age" is transforming accountancy firms from traditional organizational structures to more knowledge-based models. Accordingly, one knowledge-management element, the conversion of individually-held tacit knowledge to explicit knowledge, codified in company policies, procedures, and processes, plays an important role in an accountancy firm's adaptation and success. Technology, and specifically network technologies, is a key driver in this transformation. Understanding how accounting firms use technology to create and communicate organizational knowledge is one first step in its management

Studies of technology's impact on individuals' cognitive processes suggest that technology-enhanced accounting will require new skills, personality type, and cognitive style. Accountants will have to be creative, abstract, innovative, non-linear, and intuitive. In contrast, prior studies have identified accountants' traits as concrete, sequential, dependable, non-creative, and adaptive. Do current students exhibit the more abstract cognitive styles?

This study examines these two related questions. First the nature of the new demands on public accounting firms is explored. Semi-structured interview sessions are conducted with fifteen individual practitioners in United States offices of large accountancy firms. The interviews explore these professionals' views on a variety of

areas related to changes in the accounting profession. Practitioners' responses confirm that different skills and traits are demanded of today's accountants. Strong technological skills and training, analytical thinking skills, oral and written communication skills, and the ability to think "outside of the box" are at least as important as proficiency in accounting.

Second, based on strong confirming evidence from the interviews, this study focuses on one aspect of the changes and empirically examines whether the cognitive type of current accounting students appears matched to these demands The cognitive styles of a sample of undergraduate level accounting students is investigated: most students scored as Concrete Sequential (CS). The potential relationship between these styles and technological proficiency is also explored. Those students who scored higher on other styles had a greater proficiency with technology. Further, the study validated previous research on relationships between computer anxiety and attitude with computer proficiency. Contrary to most research, gender was not a factor in this study. Implications for the accounting profession, accounting professional organizations, and accounting education are discussed.

1 – INTRODUCTION

Chapter 1 – INTRODUCTION

Recent events, such as the collapse of Enron, accusations against other large corporations, and the subsequent demise of Andersen Worldwide, largely as a result of accounting irregularities and auditor fraud and negligence, have emphasized both the importance of accounting's role and how changes in our economic environment have affected this important function. The research presented in this thesis examines several aspects of change in accountancy firms, especially the large global firms, and its related impact on accounting education, the accounting profession and firms, and society at large.

The economy's transformation into the Information Age has shifted firm value toward intangible assets and the creation of information resources (see for example, Drucker (1993), Quinn (1992), Reich (1991), and Nonaka and Takauchi (1995)). Firms whose main wealth-generating ability is their capacity for gathering, processing, and codifying information and knowledge into intangible assets which generate revenues, profits, and wealth for stakeholders are surpassing traditional manufacturing companies as the drivers for growth in our economy (Drucker, 1993).

Technological innovations, seamlessly connecting the firm through vast networking configurations, serve as the platform for knowledge management techniques (Duffy, 2000). Innovations such as supply chain management, enterprise-

wide resource management (ERP), computer supported collaborative workgroups (CSCW), electronic data interchange (EDI), executive decision support systems (EDSS), and, of course, the World Wide Web have allowed global firms to manage their information resources and translate them into valuable knowledge commodities. It is this capacity which has distinguished outstanding companies, especially professional services firms.

1.1 The Old Model of the Accountant

The traditional stereotype of the accountant sitting in the corner processing vast amounts of historical financial information to be provided to others in management is vastly outdated. The old model of the accountant and the accounting function within the organization required very different skills and personal characteristics than that of the practitioner in today's organization. Prior to today's technologically-enhanced environment, accountants spent most of their time recording and summarizing historical financial information. There was little remaining time for higher level analysis, decision making, or participation in broad-reaching management strategy. The necessity to constantly learn, absorb large amounts of new information, and share that information within large, diverse, and geographically dispersed organizations was significantly less than it is today.

Thus, the traditional accountant required particular personal traits for success. These describe an individual who is quite methodical, precise, and able to complete

highly routinized tasks in a timely fashion. This individual was rarely required to possess strong communication skills or the ability to conduct high level analytical processes. In terms of cognitive style and personality measures, this could be described as concrete, "number crunching", linear-thinking, adaptive, introverted, uncreative, and other similar descriptors.

1.2 The New Model of the Accountant

Today's accountants rely heavily on information technology (IT) to seamlessly process data from various sources into information tailored for highly sophisticated analysis. Moreover, today's accountant participates in the design of systems which process that data into information, sets controls for those systems, and contributes actively in the analysis of the information (Empson, 1999). This role is dramatically different from what has been traditionally the domain of accounting firms. To do this, today's accountant utilizes specialized technological tools in addition to the proven techniques of knowledge management.

This metamorphosis calls for new skills and a new education curriculum. Professional organizations, accounting firms, and educational institutions have published various reports describing those skills and proposed educational models (AAA and Committee on the Future Structure 1986; AICPA 1996; AICPA 2000a; Albrecht and Sack 2000; IFAC 1996, IMA 1999; and others). In addition to technical proficiency in accounting, accountants need critical thinking skills, strong oral and

written communication skills, development of a global awareness and perspective, and a high degree of knowledge in many areas of emerging technology[1].

1.3 The Knowledge Management Connection

Drawing upon the theory of knowledge management, the AICPA identifies accountants' new mission as "enablers of people and organizations allowing them to harness knowledge from the information value chain" (AICPA, 2001a). This chain begins with business events that create raw data. That data must then be organized into information that is useful. Information is then analyzed, synthesized, and managed so that it can be transformed into knowledge, which is the foundation of sound strategic decision making. Accountants have always seen their role as one of transforming data into useable information. This new model integrates that and carries it to the next level – knowledge creation and strategic decision making.

In a project that has been carried on for several years (AICPA, 2001a), the American Institute of Certified Public Accountants, identifying the increasing changes in the profession, has created the "CPA Vision Project". This initiative has attempted to redefine the role of the accountant in the organization and has further created a core Vision Statement:

---

[1] Although all of these skills are important, a key focus of this study is technological proficiency as it pertains to the accounting profession.

"CPAs are the trusted professionals who enable people and organizations to shape their future. Combining insight with integrity, CPAs deliver value by:

> Communicating the total picture with clarity and objectivity,
> Translating complex information into critical knowledge,
> Anticipating and creating opportunities, and
> Designing pathways that transform vision into reality."

This project further identifies the core purpose of accountants as "making sense of a changing and complex world."

The modern accountancy firm, as a key example of a professional services firm, is at the forefront of the management of knowledge. Knowledge-based organizations, including accounting firms, rely almost exclusively on the knowledge created by individuals within the organization and the ability to codify that knowledge and share it throughout the organization and with clients to generate revenues and wealth for the firm (Nonaka et al., 1995). Today's accounting practitioner is expected to be able to assimilate vast amounts of information and use that information in an organizational, team-based setting to create explicit knowledge required by its demanding client base. Knowledge organizations are expected to recruit and train knowledge managers with different skills and expect them to "make order out of chaos" (Wenger, McDermott, & Snyder, 2002). Without sophisticated technological tools, this process would be impossible.

Because the tasks and skills associated with accounting in this model differ significantly from those associated with the traditional accounting model, it may be

possible that a different sort of person will be more suited to the profession. Also, those who have the skills and traits appropriate for the traditional accounting job description may not be appropriate for a career in accountancy today. One way of examining those traits and propensities is through measurement of cognitive style. A key to this research is an examination of whether cognitive style factors serve as an indicator of whether someone possesses the qualities appropriate for a career in accounting.

1.4 Cognitive Style

Decades of research examine success and failure of individuals in various occupations and relate that to their particular suitability based on cognitive style measures (Riding and Cheema 1991; Jones 1994; and others). To translate that to the accounting profession, traditional accountants, who primarily spent time working with detailed financial papers, needed certain cognitive attributes to be successful. Various cognitive measurement instruments have identified these attributes as systematic, organized, detail-oriented, able to function in highly stable environments, yet not strong in relating to others, and unable to deal with uncertainties. Since the work required of an accountant has changed, we expect that a different cognitive

style should be seen in accounting students (Gul, Huang, & Subramaniam, 1992), those preparing for careers in accountancy [2]. Previous research has identified accounting students as having distinct cognitive styles compatible with the traditional accounting role (Fisher 1995; Laribee 1994; and others). The cognitive attributes needed in today's professional firm include innovative, people-oriented, intuitive, preferring stimulus-rich environments and competition (Glunk & Wilderom, 1998). Hence, this study examines the cognitive style of current accounting students. Further, to determine the link between technology and cognitive style, accounting students' attitudes, anxiety about, and proficiency with technology are also measured.

1.5 The Study

The purpose of this research project is to examine changes taking place in the accountancy profession and changes in the role of the accountant within organizations. This research investigates many of the ramifications of this change by conducting two connected phases of research. The two naturally follow each other in their efforts to identify and examine key questions, which will be developed into formal research questions in the next chapter:

> How do accounting practitioners view the changes in the profession and their firms?

---

[2] Although a degree in accounting is not the only entry point to the profession, the majority of those specifically studying account enter the profession, making them ideal subjects for this research.

Are those currently entering the profession adequately prepared and possess the qualities needed to meet the new challenges placed upon them?

Do those intending careers in the accounting profession (current accounting students) actually possess the appropriate cognitive styles and technological proficiencies to fit into this new model of the accountant in a knowledge organization?

The first phase of this examination, qualitative in nature, validates claims of the technology-centered information revolution in public accounting by utilizing a series of in-depth, semi-structured, in-person or telephone interviews. The subjects of these interviews are accounting practitioners, primarily working in United States offices of large global accountancy firms. All of the interviewees have received an accounting education and have been working for at least several years in various aspects of the profession, including auditing and assurance, tax, consulting, and human resources. Their views on the current state of the profession and their firms, their observations on the competencies necessary to succeed in their jobs, their vision of the future of the profession and their firms, and their comments on the qualifications of new recruits entering the firms provide the motivation and groundwork for the second phase of this study. The interview subjects further discuss their perceptions of changes necessary in accounting curricula to better prepare accounting students for the realities of professional life.

The second phase of the research in this study, a quantitative piece, investigates attributes associated with technological proficiency and an examination

of cognitive styles exhibited by those who will be entering the accounting profession. Undergraduate accounting students are administered a cognitive styles assessment test (The Gregorc Style Delineator) and a self-designed questionnaire related to technological competencies to ascertain a) accounting majors' cognitive styles, b) whether accounting students who demonstrate proficiency with technology show different cognitive styles than those who do not, and c) any interrelationships between computer proficiency, computer anxiety, attitudes toward technology, cognitive style, and a range of demographic characteristics.

Results of this research validate several important assumptions. The interviews with practitioners confirm the immense changes taking place in the profession and in global accountancy firms. These changes involve massive technological initiatives, additional roles assumed by accounting professionals which require additional skills and competencies, and changes in the business environment in general.

This research further identifies cognitive styles of today's undergraduate accounting students. It also shows that these students possess strong technological abilities and training. The relationship between cognitive style and technological proficiency is validated. Lack of relationships between cognitive style and other attributes is noted.

1.6 Organization of the Dissertation

The rest of this dissertation is organized as follows. Chapter two contains the Background and Literature Review. This chapter examines several distinct literature streams which interconnect to form a basis and conceptual framework for this research. The first area concerns the various calls for change in the accountancy profession and accounting education, and observations of these changes as they pertain to the profession and its relationship to the organizational model. The next area of literature review examines knowledge management and its impact on professional services organizations. Since technology, both as a strong set of skills and as a platform for delivery and dissemination of knowledge throughout firms, is a key to knowledge management, its impact is discussed.

With a perceived shift in the role of the accountancy firm and the skill set needed for practitioners, a thorough examination of where an individual's cognitive style fits into the make-up of the "new accountant" must be examined. Therefore, the next section explores various cognitive style theories, instruments for measurement, and several studies that actually measure various populations, including accountants and accounting students.

Finally, at the conclusion of this chapter each of these streams of literature – changes in the accounting profession and firms, technological innovation in accounting, knowledge management theory as it pertains to professional services

firms, and cognitive style - is connected as a rationale for the use of both qualitative and quantitative approaches to explore the key research questions in this thesis.

Next, chapter three develops the framework for the dual-methodological approach to this research. The qualitative phase in chapter four is developed and described. This includes an explanation of the semi-structured interview technique utilized. Although a series of questions in various areas is developed, the semi-structured approach allows significant flexibility in order for subjects to provide responses beyond those elicited by the interviewer. The development of the questions is discussed along with details of the interview technique and the subjects.

Chapter three further develops the methodological framework for the quantitative study (chapter five) concerning cognitive styles and technological proficiency in undergraduate accounting majors. This includes detailed description and validation of the choice of the two research instruments used – the Gregorc Style Delineator and the Technology Questionnaire. The subjects are described, as well as techniques for administering the instruments and analyzing the empirical results.

Chapter four includes detailed results of the semi-structured Practitioner Interviews with selected highlights. These are divided into the various categories of questioning lines (since these are semi-structured, responses often go beyond the initial questions). Practitioners candidly discuss their views on changes in the profession and their firms, the impact of technology on firms' internal workings and

the services provided to clients, predictions about the future of the profession[3], and preparedness of recent graduates of accounting programs. Interviewees are given the opportunity to comment on any changes in accounting curricula they deem appropriate. At the close of each interview, this actual research project is detailed and practitioners have the opportunity to comment on the hypothesis that a different cognitive style may be more appropriate for those entering the accounting profession. Subjects also share other insights as a result of this interview technique.

Chapter five discusses the findings from the quantitative research which was conducted based on a consensus of comments by the interviewees. Those intending to enter the accountancy profession are surveyed concerning two key areas – cognitive style and technological proficiency. Undergraduate accounting majors from four different U.S. universities volunteered to complete the Gregorc Style Delineator and a self-designed questionnaire measuring technological proficiency, attitudes, and computer anxiety, in addition to various demographic data. From this study, it is clear that the typical accounting major fits into one distinct range of cognitive style, Concrete Sequential, as measured by the Gregorc Style Delineator. Further, results in some areas confirm many existing assumptions, especially concerning accounting students' proficiency with technology and this proficiency's relationship to cognitive style.

---

[3] Note that the interviews were conducted before the Enron/Andersen saga.

Chapter six presents overall findings from both the qualitative and the quantitative sections of this study and discusses implications for accounting education, certification, and the profession. Responses to the semi-structured interviews confirm the impact of knowledge management and its related technologies on global accounting firms. These interviews further confirm the major changes that firms are currently undertaking and how well prepared recent accounting program graduates are for the new role accounting firms play in society. This is further validated by empirical results of technological proficiency and cognitive style in undergraduate accounting majors. Interesting results are observed in the relationship between these two measures, and in lack of relationships between other factors identified in previous research.

Chapter seven presents conclusions, limitations, and implications for future research. This chapter summarizes the rationale and results of the dual-methodological approach to examining changes in global accounting firms. This research confirms many things identified in previous research and calls for change. Implications for the profession and accounting education are discussed. In addition, various limitations of this study are outlined as well as several proposals for areas for further research, some of which are currently being conducted.

2 - BACKGROUND AND LITERATURE REVIEW

Chapter 2 - BACKGROUND AND LITERATURE REVIEW

2.1 Introduction

The past thirty to forty years of technological innovations have greatly enhanced accounting and finance activities, procedures, and policies (Lee, Bishop, & Parker, 1996). Although technology is certainly not new to accounting, it is crucial to the creation, storage, and dissemination of knowledge throughout the organization and as the key product offered to clients. Recent advances, especially those related to the codification and transfer of knowledge, have altered all aspects of the accounting function, including: economic measurement, financial reporting, managerial planning and control, and auditing (Burns, 1994). The role of technology and computers within the organization also has changed (Fisher, 1995). Local area (LAN) and wide area (WAN) network activities and knowledge based systems (KBS), including the Internet and the many forms of Electronic Commerce and Electronic Data Interchange (EDI), in addition to Enterprise Resource Planning (ERP) and other applications, have transformed the way accounting is done, calling into question the importance of traditionally valued accounting functions and skills (Elliott 1992; McKenney 1995; Wallman 1997).

Despite numerous calls for changes in the way accountants are trained and educated (AAA and Committee on the Future Structure 1986; AICPA 1996; AICPA

2000a; Albrecht and Sack 2000; IFAC 1996, IMA 1999; and others), most academicians and practitioners agree that there is a long way to go in the updating of accounting education and certification standards.

A key contribution of this dissertation is to examine the present and future role of the public accountancy firm within our modern organizational structure. Technological innovation utilizing knowledge management tools and techniques is essential. Both a qualitative and a quantitative methodological approach are employed in this research. First, a survey of practitioners is conducted to illicit what their perceptions are on changes actually taking place in global accounting firms.

Secondly, in response to practitioners' confirmation of the changes in the profession, a study is conducted to measure various attributes in current accounting students relative to the transformation of the profession. Accounting students are viewed as those preparing to enter the accounting profession, so serve as an indicator of the make up of future practitioners[4]. Specifically this study examines cognitive style characteristics and any relationships with them to technological attributes and other demographic data.

---

[4] It must be noted that public accounting practices draw on individuals with many different educational backgrounds, only one of which is the traditional undergraduate accounting education. However, this study concentrates on the traditional accounting student preparing for a career as a professional in a large public accounting firm. Virtually all of the practitioners who participated in the interviews (Chapter Four) came from that background.

It is probable that the transformation of the accounting profession described in the interviews will require practitioners to exhibit different traits and cognitive style attributes than those traditionally associated with accountancy. Further, accountants will need to be proficient in a myriad of technological arenas (especially in the domain of knowledge management) in order to provide value-added services to organizations. To develop a background and framework for this dual-methodological research, various streams of literature are explored.

The following sections in this chapter describe the relevant literature areas, including: 1) the evolution of the accounting profession as it relates to a new paradigm of the knowledge organization, 2) the impact of technology on accountancy firms, other knowledge firms, and society, 3) the role of cognitive style as it pertains to both knowledge management and technology, 4) pertinent background on Knowledge Management theory itself (including specific applications of that theory in management practice, such as organizational learning and communities of practice), and 5) the synthesis of these distinct streams into the basis for a final presentation of the key research questions.

2.2 A New Era for Accountancy

Today's information economy has drastically transformed the way in which accounting supports the organization. The modern global accountancy firm exemplifies the knowledge organization (Empson, 1999). No longer do accountants

limit their services to organizing and summarizing financial data into meaningful information. Today, the accounting professional transforms that information into valuable knowledge used for high-level strategic decision making and participates in the actual decision making process. This is illustrated well in the AICPA's core Vision Statement (AICPA, 2001a) (as outlined in the previous chapter). The accountant as a knowledge worker utilizes many tools not available even a few years ago. The transformation of raw financial data into information for decision making is now done seamlessly by various technological tools. The accounting professional of today takes that information and converts it into knowledge that, in turn, generates value for the firm and its clients. The skill set called upon to succeed in the profession is quite different from that of the pre-technological era (as confirmed by the interviews in chapter 4 and discussed in other sections).

Early applications of computers in accounting required the practitioner to view the computer's linear functionality as merely a "giant calculator". Thus, the computer process exhibited by early users could be characterized as linear in nature, utilizing concrete, sequential processing steps (Turkle, 1995). The practitioner used historical information for a myriad of decision-making purposes; however, the timeliness (and accuracy and relevance) of the information became an issue (Christensen, 1997). Intangible assets such as branding and innovation are becoming central to the competitiveness in all industries, including both manufacturing and service. The discrepancy between the valuation of physical assets as recorded on the

company's balance sheet from the value of the company judged by the market is widening (Leadbeater, 1998).

During these early days of computer implementation, there was a clear distinction between designers of computerized applications and the users of those applications. The designers of the automated accounting systems were generally not overly knowledgeable of accounting processes (Lee et al., 1996). Instead, they were from a systems or software design background, familiar with the relational capability of computers that exhibited non-linear, geometrically accessible information (Lee et al., 1996). Davis and Monroe (Davis & Monroe, 1987) mention the differences as one reason why information systems analysts had trouble communicating with system users (in this case, accounting practitioners). Thus, systems were designed in a non-linear, geometric context to be used by those exhibiting linear, sequential cognitive styles; including accountants (see later section for background on accountants' cognitive styles).

The fact that accountants took a very small role in the design of accounting systems may suggest that the profession did not understand the impact of technology on accounting. Current accounting software applications are designed utilizing non-traditional processing models, and non-accountants have been quick to take advantage of this. Limited examples of this approach in management accounting exist, such as the Inter-Organizational Systems model (IOS) (Williams, 1991).

By the mid-1990's we have seen the dominance of a different type of accounting software (Christensen, 1997). Packages such as Intuit's Quicken and QuickBooks, which require no (or minimal) prior knowledge of accounting or accounting systems software, have replaced other application packages (Christensen, 1997). Relational databases and database management systems (DBMS) are replacing the traditional double-entry bookkeeping system. (Romney & Steinbart, 2003) The use of computers over the last forty years has led to the dominance of a database-centered view of organizational informational resources and processes (Quintas, Lefrere, & Jones, 1997). Enterprise resource planning (ERP) applications strive to incorporate all the data available to a firm, both financial and non-financial, from sales to personnel to customer to supplier to financial, into one massive database, data warehouse, or data vault that can be used to harvest any conceivable information necessary to satisfy a firm's needs.

The implementation of accounting innovation has tended to lag implementation of more productive technological innovation (Dunk, 1989). Exceptions exist, in rare instances, where charismatic leaders recognize innovation in accounting systems as a driving force for economic advantage in an industry. McKenney (McKenney, 1995) illustrates how the banking and airline industries utilized technology to deal with crisis, thus making their industries innovators for change. Banking was driven to develop sophisticated check clearing and electronic funds transfer (EFT) processes, while the airline industry's electronic

reservations/pricing systems (e.g. SABRE) revolutionized the industry. McKenney and others further describe the cutting edge financial reporting and data warehousing sophistication of firms such as WalMart, Dell, and Amazon.com as one of the key reasons for their dominance in their industries. Management may have been more amenable to implementing technology in areas where a direct economic benefit from the costs associated with new hardware, software, training, and related costs could be directly measured by productive output (Dunk, 1989).[5]

In a study of fifty high level executives, Fisher (Fisher, 1995) found that accountants have begun to develop more positive attitudes towards computers than other high level administrators; however resistance at all levels still exists. Fisher further states that the reason accountants are ahead of other professionals in the adoption of technology is probably due to the fact that accountants have been using computers to automate routinized accounting functions for many years, rather than their recognition of the transformative nature of technological impact on knowledge management.

The metaphor of the computer as a filing cabinet, text processing or calculating tool is being replaced with the metaphor of the computer as a communications device, a window, channel, or lens through which to access information (Quintas et al., 1997). Dunk and Roohani (Dunk & Roohani, 1997)

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[5] Since accounting is an administrative function, there may be no measurable direct economic benefit to justify the cost of implementing new technological innovation.

noted that although information technology (IT) has made bookkeeping more comprehensive, accurate, timely, and frequent, the way in which IT is often applied does not produce more tailored information. Hawker and Crane (Hawker and Crane 1993) suggest this failure may be due to a "culture gap" between those who specialize in information technology and those professionals with whom they work. Further, this gap may also represent differences between traditional accounting roles and those expected to predominate in the future. The advent of today's information technologies and the associated changes in the business environment created by them are heralding an ever changing role for accounting, requiring a different skill set for practitioners.

Accounting education concerning technology has mirrored the profession's reaction to technology. Traditional accounting theory courses are still generally taught separately from accounting information systems courses. Early attempts to incorporate an accounting information systems approach were viewed in the same "giant calculator" context as noted with practitioners. Accounting education and information technology are today interrelated (Goldsworthy, 1996). Integration of the relevant theory of information technology, use of accounting software, implementation and assessment of controls, and knowledge of personal computers and networks as part of the accounting curriculum are called for (Hanno & Turner, 1996).

2.2.1 Beginnings of a Shift

Although virtually all areas of accounting have overwhelmingly become automated over the past half century, the profession has been slow to assess the impact of these changes. Until the emergence of the knowledge organization, technological implementation in accounting has served to eliminate repetitive, tedious functions, rather than serve as a driver for a new model of information generation. Accounting, as an example of the professional services industry, can be described as the typical Knowledge Management-style organization (Empson, 1999). Technology has allowed accountants to transcend beyond the mere compilation of financial information for decision making. Because computers now compile the information seamlessly, accountants can devote more time to analyzing the information generated and converting it into knowledge, the key to adding wealth and value to firms. (A comprehensive summary of Knowledge Management theory will be presented in a later section.)

This new era of technological advancement brings with it a significant new dimension: the ability to access and communicate vast amounts of information virtually instantaneously. Information sharing is instantaneous and the amount of data available is overwhelming. The sources of information are relationally interconnected[6]. As advanced technology becomes more and more prevalent, there exists the risk of being swamped by the data input and information generated

(Drucker, 1988). Through high-speed machines connected globally through local area networks (LAN), wide area networks (WAN), and the Internet, information gathering, sharing, and processing have expanded to demand a new way of fully utilizing financial information. This drastic shift in the way information is gathered, communicated, and processed will have a significant impact on the way our society will function in the future (Quinn, 1992). Filtering and prioritizing into a hierarchy the vast quantities of data available in data repositories and warehouses has become an important function in the decision making process (Debrecency, 1998). This affects many aspects of the accountancy profession, including auditing and managerial control.

The emergence of network applications is a major driver for change. Some of these applications include: electronic commerce, enterprise resource planning applications (ERP), supply chain, customer chain and value chain approaches, decision support systems (DSS), executive support systems, and computer supported collaborative work (CSCW). Many of these applications are designed to facilitate the communication and sharing of knowledge. All of these new technologies have not only transformed many aspects of how organizations operate, but also how they interact with other businesses and customers. Furthermore, these applications have also altered the role of the accountant within these organizations.

Enterprise resource planning (ERP) applications are being adopted by most of

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[6] With today's technology, we are shifting from the challenge of not getting enough information to the

the large Western corporations. Companies such as SAP, Baan, Oracle, PeopleSoft, and J. D. Edwards are providing these organization-wide systems that take months or years to install in companies around the world. Consulting firms, including the large public accountancy firms, are being called upon to assist with installation and training for these ERP systems[7]. Several authors have examined the major impact organizationally and on employees of the transformation from traditional systems to ERP systems within firms (Cooper & Kaplan 1998; Appleton 1997).

With the increased ability to provide decision makers with vast amounts of accounting information in a very cost-effective manner, there is also a trend toward using multidimensional visual representations which have been shown to be much more effective analytical tools for those interpreting the information (Dull & Tegarden, 1999). Using Ijiri's model of Momentum Accounting (Ijiri, 1989), Dull and Tegarden design a study that illustrates that using multidimensional visualization technology to match the dimensionality of momentum accounting information enhances the understanding of that information. With today's technological advances, even desktop computers can represent multidimensional data by generating complex graphics rather than the limited formats through which accounting information has been traditionally presented. As our business systems become more

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challenge of surviving too much information (Dede, C. 1996).

[7] A survey of the Web sites of the Big 5 accounting firms shows a major emphasis placed on their expertise in various ERP-related services, including needs identification, product selection, implementation of system changeover, training employees, and the requisite assurance services needed for an enterprise-wide system.

and more complex, it is vital that decision makers have the appropriate tools and models available to them so that they may most effectively interpret and analyze complex financial (and non-financial) information.

Electronic commerce, both business-to-consumer and business-to-business, has rapidly achieved a place of prominence in our economy. Various estimates as to its rate of growth and the number of new and viable areas opening are staggering and not even imagined a few brief years ago. The growth of the Internet as a vehicle for commerce and its impact on our economy is both a challenge and an opportunity within the accounting profession.

The role of the accountant within the organization will be significantly different from what it has been in the past (Taylor, 1993). The AICPA (AICPA, 1996) and other professional bodies have identified several changes taking place in the accounting profession. One large component of this transformation is due to innovative technological applications in the field and in our society in general (McKenney, 1995). Sociologists (Turkle 1995; Zuboff 1988; and others) have identified the impact of technology on various aspects of our professional and personal lives. The next section traces the impact that technology and computer innovation have played on the transformation of the accounting function.

2.2.2 Technology's Role in the Accounting Transformation

Technology plays a vital role internally within organizations. It provides the vehicle by which workers and managers communicate actively. Information systems make it possible to automate office transactions and create a vast overview of an organization's operations, with many levels of data coordinated and accessible for a variety of analytical efforts (Zuboff, 1988).

Through the use of e-mail, tele-conferencing, electronic bulletin boards, and the like, ideas are generated and shared throughout entire worldwide organizations. Groupware and computer supported collaborative work software (CSCW) are being examined as a set of tools which make communication of ideas within organizations much more effective, therefore allowing the creation of intellectual capital to expand rapidly through firms and across borders (Kies et al. 1998; and others). Technologies such as executive support systems are also being systematized and incorporated into the cultures of organizations to increase the effective flow of ideas in an extremely efficient manner. Continuous lifelong learning would not be possible without these technologies (Wenger et al., 2002).

For example, the former Andersen Worldwide had developed an electronic system that linked over 88,000 people in 360 offices in 76 countries. This network system, known as ANet, utilized data, voice, and video technologies and connected over 85% of Andersen's professionals. Problems were posted on electronic bulletin boards, followed by visual and data contacts. ANet thus tapped into otherwise

unavailable capabilities and expanded available energies and solution sets for customer problems. This problem-solving capacity was further enhanced through centrally collected and indexed subject, customer-reference, and resource files accessible directly through the network or from CD-ROMs distributed through its offices (Quinn, 1992). Each of the other global accountancy firms has a similar system[8] (see descriptions in Chapter 4). Other examples of such utilization of technology to harness intellectual resources exist.

Brown (Brown, 1991) observes that as computing power increases and its cost plummets, more and more technology will be incorporated into everyday office devices that will allow users to tailor technology to meet their specific needs. This technology will become invisible and the next great breakthrough of the information age will be the disappearance of discrete information technology products. In the future, organizations will not be compelled to shape how they work to fit narrow parameters of inflexible technology.

Former AICPA Chairman Robert K. Elliott (Elliott, 2000) sees technology as providing new opportunities and challenges to the accounting profession. The accounting profession has previously assumed that the value of the information it provides to clients is unique and valuable. With today's technological innovations, information is often readily accessible and cheap. The competitive marketplace has

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[8] For example, KPMG utilizes an internally generated Knowledge Management set of tools called K-Web.

invaded territory previously dominated by the accounting profession. Elliott identifies several steps that the accounting profession must undertake to adapt to changes due to technology and organizational change. These include: continuing to develop new services, reforming of accounting education, increasing continuing professional development, and strengthening feedback loops from the marketplace to ensure constant adaptation to changing client needs. He predicts a time when accountants will need to become experts in all phases of leveraging information and knowledge.

This new era of accounting, largely driven by innovative technological tools, requires accountants who have different skills and training than in the past. Various studies and surveys (AICPA 2000; Albrecht and Sack 2000; Elliott 1992; and others) have described many of these, including oral and written communication skills (Morgan, 1997), analytical thinking skills, development of a global perspective, and, especially, technology. The practitioner interviews (Chapter 4) in this research highlight all of these competencies. It is highly likely that individuals who possess these newly identified competencies have a different range of cognitive style characteristics from those of someone in a more traditional accounting role.

Today's powerful accounting and management information systems have the ability to provide decision makers with much more information than has ever been available previously. This increase in the amount of information available has been

compounded by the rapid movement from separate information systems within various areas of firms to enterprise-wide information systems that integrate all aspects of a business, both financial and non-financial (Dull et al., 1999). Multidimensional data for decision making has further led to innovations such as on-line analytical processing (OLAP), knowledge discovery, and data mining. These are incredibly powerful tools allowing practitioners to access and communicate much more information more rapidly than ever before. The next section explores the transformation to capitalization of knowledge assets.

2.2.3 From Automated Accounting to Knowledge Building

Accounting has adopted technologies to make accounting processes automated and thus more efficient (Lee et al., 1996). Drucker (Drucker, 1988) cites that most computer users still use new technology only to do faster what they have always done before, in the instance of accountants, "crunch" conventional numbers. The history of technology implementation in accounting began with basic mechanical bookkeeping machines, progressing through the electronic data processing advances during the eras on the mainframe, minicomputer, desktop environment, and client/server networks. Each of these technologies allowed the profession to provide accounting information in less time and with more precision. Yet until very recently, the process of accounting within the organization has changed little as a result of technological innovation (Lee et al., 1996).

Until the introduction of network technologies, the steps in the process and the reports generated under an automated accounting information system were almost identical to those produced by hand. The presence of technology allowed more and more of the processing to be automated, thus freeing the practitioner from these tasks (Lee et al., 1996). Essentially the conceptual mapping involved in producing financial reports changed very little as the technology advanced. The only gains for the practitioner were related to a reduction in: 1) the time necessary to do the work and prepare the reports, 2) task tedium, and 3) reduction of report errors. Potentially, practitioners are now given more time to devote to analysis and decision making.

Thus, the implementation of technology in accounting primarily served to "automate" an existing process, rather than to create a new system or to "informate"[9] (Zuboff 1988; Johnson 1992). Zuboff's (Zuboff, 1988) groundbreaking case study examines the introduction of computerized manufacturing processes into the traditional factory and how it impacted the workers. She observes that as the workers learned to adapt to the new technology, a change in how they viewed the nuances of the manufacturing process altered their reality of the process. Rather than observing first-hand the machinery and its complex set of gauges and systems, the workers now observed computer screens that rely a myriad of technical data second-hand on the processes, or viewing a "virtual" production facility. The distinction between

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[9] Zuboff (1988) creates the term, "informate", to refer to generating information about the underlying productive and administrative processes through which an organization accomplishes its work. In this way, information technology supersedes the traditional logic of automation.

automating and informating provides one way to understand how technology represents both continuities and discontinuities with the traditional organization. Zuboff notes that some workers were able to make this transition, whereas some were not. The process of this transformation was a difficult one for all involved in the factory. A similar analogy in the accountancy profession can also be observed.

With the changes brought about largely due to technology's influence, accountancy firms have been able to offer more and higher-level services. In addition to preparation of various forms of financial information, now these firms have been able to participate in the generation and sharing of knowledge, both throughout the firm and to its client base. This same phenomenon has been witnessed throughout the professional services industry. This has caused a change in all modern organizations' management structure, not merely accounting or other professional service industries. This change is described in the next section.

2.2.4 Shifts in Organizational Structure

To accommodate the availability of information and knowledge delivered rapidly and efficiently through network technological innovations, firms have needed to modify or drastically change their organizational structure. The traditional hierarchical system employed in the industrial-age manufacturing enterprise is not suited for an organization whose wealth generation capacity is based on the ability to

harness knowledge within individual workers, share that knowledge within the firm, and capitalize on that knowledge by providing it as a product to clients.

Nonaka and Takeuchi (Nonaka et al., 1995) describe a Japanese style organization as having a "middle-up-down" management style. This refers to a process of knowledge creation by middle managers, whose function is to lead project and other cross-functional teams consisting of employees at all levels in a cycle of spiral conversion of tacit and explicit knowledge through the organization. Providing information about important firm developments (top-down communication) as well as being open to employee suggestions (bottom-up communication) have been shown to be important predictors of performance (Glunk et al., 1998). Wenger (Wenger, 1998) asserts that the social nature of learning is a "bottom-up" process, which cannot be based on forced distinctions and divisions of labor of a hierarchical organization. Leadbeater (Leadbeater, 1998) describes a hybrid organization that is designed to more efficiently generate, disseminate, apply, and utilize knowledge.

The purpose of managers in this knowledge-creating environment is to orient this "chaos" toward purposeful knowledge creation by providing employees with a conceptual framework that helps them make sense of their own experience (Nonaka, 1991). This style of management has great advantages in the areas of product and idea development, employee participation and satisfaction, and the ability to stay in touch with the needs of the marketplace and customers. Nonaka and Takeuchi use the example of charismatic leader, Jack Welch of General Electric, to show how a top-

down firm can be successful. Vision and strategy were provided from Welch that created a direction understood by everyone within the company.

Since a major part of knowledge is tacit, held by individuals, the traditional hierarchy is ineffective as a mechanism for knowledge integration, since no manager can efficiently integrate the tacit knowledge of large groups of subordinates (Grant, 1997). Bottom up management describes many entrepreneurial-style organizations, where there are fewer levels of management and input from all employees is sought. An example of bottom-up management is 3M Corp., in which the contributions of individual employees, even when acting against the orders of their superiors, have created products and ideas that have generated great profits for the firm. The development of Post-It Notes™ is an example of one such product.

Firms such as PricewaterhouseCoopers, the former Arthur Andersen, and McKinsey Consulting measure employee contributions to collaborative efforts as part of their formal evaluation process (Hildebrand, 1996). A team-based structure with fluid team membership is one response to the deficiencies of the traditional corporate hierarchy. Teams permit an organization to access and utilize individuals' knowledge, which is located at lower levels of the organization. Delayering tends to increase the speed of decision-making, as well (Grant, 1996). The ubiquity of team-organized processes is implicit recognition that knowledge is located among individuals and only they can integrate it, or convert it, to explicit knowledge (Grant, 1997).

Several researchers (Grant 1996; and others) have examined interaction within groups as a basis for establishing organizational hierarchies. At every level, interaction within the substructure is more intense than between substructures. Organizations, therefore, should structure their hierarchies by group first in those who are reciprocally interdependent, and then based on sequential and pooled interdependent structures. This implies that awareness of cognition of individuals within groups is a key to success.

Drucker (Drucker, 1988) describes organizations in the Information Age as shifting away from the tradition command-and-control structure to ones with departments and divisions comprised of "knowledge specialists". Nonaka and Takeuchi (Nonaka et al., 1995) further describe how knowledge creation has implications for organizational structure. They describe the theoretical basis for a new organizational structure that they refer to as the "hypertext" organization, which strategically enables an organization to acquire, create, exploit, and accumulate knowledge continuously and repeatedly in a cyclical process. The term, hypertext, comes from computer science and the Internet, and refers to multiple layers of text, providing an operator with multiple layers of data, information, and the ability for knowledge creation. Like an actual hypertext document, the hypertext organization consists of multiple layers or contexts: the business system which is organized as a traditional hierarchy, the project team which is organized as a typical task force, and the knowledge base which is generated by the previous bases then recategorized and

recontextualized. The knowledge base, through corporate vision and organizational culture, is able to effectively and continuously tap tacit knowledge while technology taps the explicit knowledge generated by the other layers of hypertext.

The traits of an individual capable of successfully functioning in and contributing to the success of a firm in the model described here may be quite unique, certainly different than those on someone in a traditional hierarchical organization. Hierarchical organizations tend to require individuals who are concrete thinkers, who respond well to orderly, predictable work patterns, conforming to the structure established by leadership. Various researchers (see Nonaka and Takeuchi 1995, for example) have noted that the newer models for organizational structure may command significantly different personal attributes. In order to determine what these traits might be, it is necessary to examine the role of Cognitive Style as it pertains to organizational structure, and specifically its relationship to the knowledge organization. The next section discusses cognitive style and examines its role in organizational dynamics. The relationship between cognitive style and other pertinent issues, such as technology and other areas affecting the accountancy function, is examined.

2.3 The Role of Cognitive Style

Cognitive (or learning) styles can be defined as "distinctive behaviors that serve as indicators of how a person learns from and adapts to his/her environment. It

also gives clues as to how a person's mind operates" (Gregorc, 1979). It has also been defined as "information processing habits representing the learner's typical mode of perceiving, thinking, problem solving, and remembering" (O'Brien, 1994). Leonard and Straus (Leonard & Straus, 1997) in their examination of thinking styles within the knowledge organization define cognitive differences as "varying approaches to perceiving and assimilating data, making decisions, solving problems, and relating to others".

Individuals' cognitive styles[10] can be directly related to their skills and proficiencies (Tucker & Warr 1996; and others). Scholars have begun to explore the relationship between computer abilities and general cognitive processes (Evans & Simkin, 1989). As described earlier, information systems with a knowledge or intelligent component are becoming more common (Rastogi, 2000), including knowledge-based systems, decision support systems, intelligent agents, and other knowledge management systems. The theoretical base of these models focuses on a cognitive perspective (Gregor & Benbasat, 1999). Gregor and Benbasat examine intelligent systems (IS), a type of knowledge based system, and note that certain characteristics of individual users of these systems (novice vs. expert, those with certain cognitive styles, etc.) have differing approaches to these technology tools. Therefore, as the accountancy profession undergoes a revolutionary transformation

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[10] Cognitive style can also be defined as the characteristic processes used by an individual in the acquisition, analysis, evaluation, and interpretation of data used in decision making (Igbaria & Parasuraman 1989).

due to the predominance of network technology applications and the emergence of the knowledge organization, this study examines whether the cognitive styles of accountants who can successfully integrate the characteristics of a knowledge worker and demonstrate advanced technological proficiency (which is necessary for knowledge dissemination) will differ from those attributable to the traditional accountant.

Vasarhelyi (Vasarhelyi, 1977) studied the influence of cognitive characteristics of decisionmakers on the decision-making process. Using a self-designed cognitive style measurement instrument and a detailed case study, he examined fifty business executives' decision-making styles to conclude that the design of a tailored management information system specifically related to the individual manager's cognitive style will enhance the decision-making process.

Other studies have examined the relationship between cognitive style and various professions, as well as the relationship between cognitive style and computer use and aptitude (Jones 1994; and others). The typical accountant, when given a cognitive styles assessment test, generally scores within a given range of style (Fisher 1995; Laribee 1994; and others). Various assessment tests categorize this as sensing/thinking, adaptive, concrete, sequential, or linear-thinking.

With the changes that are transforming the accounting function as a result of both the emphasis on knowledge creation and technological advances, it is possible that the cognitive style of the accountant who is suited for a role in this new

organizational structure will perhaps be different. Stone, et al. (Stone, Arunachalam, & Chandler, 1996) discuss the call from all sectors of the accounting profession for increased training in several technology areas, including accounting information systems, task-specific applications, and other areas. Morgan (Morgan, 1997) notes that employers expect graduates to exhibit a wide range of personal attributes in addition to the acquisition of a specific, vocationally-based body of knowledge, such as accounting. Jones (Jones, 1994) and others have identified a relationship between cognitive style and computer use. In the terminology of cognitive styles measurement instruments, the accountant who would be proficient with technology would be characterized as intuiting/perceiving, innovative, abstract, and non-linear-thinking.

The stereotype of the accountant who must be expert in the precise tabulation of numerical information as the key task is no longer appropriate. Thankfully, computers and other technologies have reduced the tedious tasks traditionally associated with the profession. This has created the opportunity for accountants to broaden their function within organizations, as illustrated by the AICPA Vision Statement (AICPA, 2001a).

It is important to first examine the evolution of the accounting profession and the impact knowledge management and information technology has played in this transformation, as has been done in the previous sections. Further examination of Knowledge Management theory is described in a later section. The next section

develops the basis of cognitive style theory. Included is a discussion of how this relates to changes in the accountancy profession, increased dependence on technology, and knowledge age firms.

2.3.1 Cognitive Style Theory

Modern neuroscience is providing increasingly rich insights into how individuals perceive the world and process the information they receive through their senses (Quintas et al., 1997). One must understand the dimensions of how an individual processes information and perceives reality in order to efficiently harness the tacit knowledge within each individual's brain and cycle that knowledge through the process of creating organization-wide explicit knowledge to be converted into intellectual capital that adds value to firms.

As early as 1937, Allport described cognitive style as "a person's typical or habitual mode of problem solving, thinking, perceiving, and remembering" (Riding et al., 1991). Cognitive styles further provide information on how a person's mind processes information, which affects the individual's typical mode of perceiving, thinking, problem solving, and remembering (Odom & Pourjali, 1994). Tacit knowledge is embodied in cognitive skills, which are learned through experience and reside in the unconscious or semiconscious (Leonard & Sensiper, 1998). The study

of cognitive (or learning) styles[11] is rich with examples of the correlation between various personal traits and skills and the related styles of individuals and groups (Tucker & Warr 1996; and others). Understanding our own and others' cognitive styles helps us to communicate and collaborate (Leonard et al., 1997), a key to today's accountancy practices.

The literature clearly illustrates that one's cognitive style is relatively constant and does not change over time or due to the introduction of specific training or other influences (Gregorc 1979; and others). Therefore, merely increasing technological or other training will not significantly alter one's innate cognitive style. Further it must be emphasized that one's categorization into one cognitive style or another is neither inherently good nor inherently bad (Leonard et al., 1997).

Distinguishing preferences emerge early in our lives and strongly held ones tend to remain fairly stable through our lives. Although we can expand our repertoire of behaviors, changing one's cognitive style has been likened to changing from being right-handed to left-handed. Studies have shown that people retain their dominant preferences throughout a variety of work and social circumstances. However there is some evidence that a successful learning will be able to adapt his or her approach to learning, which has been described as "learning strategy" (Atkins, Moore, Sharpe, & Hobbs, 2001).

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[11] "Learning style" seems to have emerged as a more common term or a replacement term for cognitive style in the 1970's. "Cognitive style" has been reserved for theoretical, academic descriptions (Riding & Cheema, 1991).

Wenger (Wenger, 1998), in his work on "communities of practice", notes that learning is primarily a social rather than an individual phenomenon. Much of knowledge acquisition is gained through participation and engagement in social enterprises. Therefore it is possible to compensate for less dominant inherent cognitive style traits through communities of practice.

In terms of organizational learning (Argyris, 1991), accountants traditionally operated within the realm of structured or single-loop learning processes. With the shift towards technology-rich knowledge organizations, accountants are being called upon to apply adaptive learning (double loop) styles (Junnarkar & Brown, 1997). This may create implications for cognitive style differences among traditional and modern accountants. This is discussed in the next section.

Wenger (Wenger, 2000) further examines the social theory of learning. He depicts learning as consisting of four interrelated components:

A. Identity – learning as becoming (on the part of the learner)
B. Meaning – learning as experience (of the learner)
C. Practice – learning as doing (in the community)
D. Community – learning as belonging (to a social group)

The transfer of learning, key to conversion of information into knowledge (as described in a later section), focuses on the actions and roles of persons, and cognitive artefacts link between different dominant style traits to allow all members of a firm or "community" to participate in the process of sharing knowledge which adds value to the firm and its clients.

Hill et al. (Hill, Bullard, Capper, Lawes, & Wilson, 1998) observe that changes in organizations and their management are the result of the need for individuals to rapidly learn in an environment of uncertainty. New developments in information technology, increased employee responsibility for quality, multitasking, new approaches to human resource management, and internationalization create an environment of complexity and considerable uncertainty. The ability of individuals in organizations to create a "workplace community" in spite of individualistic difference is the key to continuous learning and improvement and, ultimately, success.

2.3.2 Cognitive Style and Accountants

Numerous studies of cognitive style over the past two decades have either focused on or included accounting professionals or accounting students. These studies have utilized various instruments that use different terminologies to describe attributes to cognitive style; such as verbal, imagery, adaptive, innovative, concrete, sequential, linear, abstract, random, and many others (these instruments are discussed in a later section). Further, the seemingly contradictory assumptions of "linear, sequential" thinking and "non-linear, geometric" systems pose major challenges for the profession in attracting and retaining accounting professionals. The effect of cognitive styles on the accountancy profession offers insights into retention and professional services. The majority of those studies (several are described in the

following few paragraphs) attribute similar descriptors to accountants and accounting students. These characteristics can be summarized as adaptive, verbal, concrete, and sequential.

Fisher and Ott (Fisher & Ott, 1996) confirm prior research in their study of practicing auditors. The subjects in the study were administered the Myers-Briggs Type Indicator (MBTI) (Myers & McCaulley, 1985). The dominant cognitive style of accountants surveyed was Sensing/Thinking (ST). This confirmed previous studies, including that of Geary and Rooney (Geary & Rooney, 1993) examining accounting students[12].

Recent studies, such as Wolk and Cates (Wolk & Cates, 1994) examine the problem solving techniques of accounting students as compared to other business majors at the undergraduate level. Results indicate that accounting students are predominantly adaptive in problem solving style. Statistical analysis showed a significant difference between the problem solving style of accounting students and of other business majors. Other business majors' problem solving style tends to be much more innovative.

Booth (Booth, 1993) used the Myers-Briggs Type Indicator (MBTI), a test of cognitive style, personality type, and emotional type, on a group of accounting students in Australia. The findings show a strong tendency for accounting students to

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[12] Since network technology's impact on the accounting profession and accounting education are very recent, it can be assumed that the accounting students evaluated in these various studies had limited or no training or background in these more modern technological innovations.

have common preferences on three out of four Myers-Briggs personality dimensions. Booth further posits that those with similar personality traits should have similar learning styles. The accounting students in the study show strengths in the areas of intuition, feeling, and perception, and show weaknesses in sensation, thinking, and judgment areas. In addition, this study shows correlations between MBTI scores and career choice. The profiles of the accounting students are very similar to those of practicing accountants. The implications of their study focus mainly on how educators should adopt specific educational methods for teaching these students. However, the similarity in cognitive/learning style of accounting students is also evident.

Soroko (Soroko, 1988) uses the Gregorc Style Delineator to examine undergraduate accounting students. Her focus is on learning styles as a consideration in teaching the accounting principles course. Results of the study show accounting students to have a similar cognitive style (Concrete Sequential) with implications for tailoring the teaching style to match the learning style of the students.

Gul (Gul 1986; Gul 1987; Gul et al. 1992) uses the Kirton Adaptor-Innovator Inventory in several studies with accounting students and accountants. In one study (Gul, 1986) Gul finds a very strong relationship in a group of undergraduate accounting majors and cognitive style. The students score very strongly in the "adaptor" range. He further surveys the students to determine if this was a factor in

their career choice. A second study (Gul et al., 1992) investigates the field dependent-independent cognitive dimension perception of the importance of career choice factors among accounting students. The instrument used is the Group Embedded Figures Test (GEFT). This test not only measures cognitive style, but also an individual's perception of cognitive style.

In a third study, also using the Group Embedded Figures Test, Gul (Gul, 1987) examines auditors. He performs a laboratory experiment designed to assess the moderating role of field dependence cognitive style in the effects of management consultancy services and qualified audit reports on the subjects' perceptions of auditor independence. Results indicate a strong bias towards auditors' independence as a function of their cognitive style, concrete, adaptive, and the like.

Auyeung and Sanders (Auyeung & Sanders, 1996) uses Kolb's Learning Style Inventory in a cross-cultural study of the learning style of accountants. Their findings indicate that accounting students from Hong Kong and Taiwan tend to be more abstract and reflective than their Australian counterparts. The Australian accounting students, on the other hand, are much more concrete and active. The authors further hypothesize that the difference may be due to adaptive styles among the Asian students in their attempts to adjust to studying in Australia, arguing that accounting students generally fall within the range of the concrete.

Two studies investigate relationships between cognitive/learning styles of accounting students and their performance in accounting classes. Oswick and Barber

(Oswick & Barber, 1998) compare scores in the Selection Ratio Type Tables (SRTT), to distinguish between "top performers" and "poor performers" in a UK-based undergraduate accounting program and any association with personality traits identified in the Myers-Briggs Type Indicator (MBTI). Results of this study show no significant relationship. Duff (Duff, 1997) uses Honey and Mumford's Learning Styles Questionnaire and Schmeck's Inventory of Learning Processes on a group of third-year undergraduate business students studying accounting in the UK. The findings of this study also indicate no significant relationship between academic performance and learning style.

Laribee (Laribee, 1994) compares accounting students to students with other majors. His study utilized the Myers-Briggs Type Indicator (MBTI). The findings of his study are that both male and female accounting students significantly differed from other traditional-age college students. Further, the personality types of the accounting students were virtually indistinguishable from those of professional accountants.

Rasch and Harrell (Rasch & Harrell, 1990) examine accounting professionals' cognitive style characteristics as they affect individuals' turnover intentions directly and indirectly, through work related stress and job satisfaction. Summers (Summers, 1998) looks at the problem solving style between auditors and accounting consultants. The results of both studies again indicate cognitive styles consistent with other studies. They look further at stress and job dissatisfaction within public

accountancy. They find a correlation between job stress and dissatisfaction and inconsistency in cognitive style. That is, individuals with cognitive styles incompatible with others in the field exhibit higher stress and job dissatisfaction. If, in fact, individuals with cognitive styles suited for the traditional accounting role enter the profession, the resulting incompatibility in traits could lead to significant job stress and dissatisfaction.

Foxall (Foxall, 1986) studies cost accountants and financial accountants using Kirton's Adaptor-Innovator Inventory. The results of his study show that cost accountants are clearly "adaptors", whereas financial accountants tend to be more in the range of "innovator", however results here are mixed.

Chan (Chan, 1995) explores the relationship between audit judgment and cognitive style. He studies the order effects of gathering data during the audit. Evaluating two types of order effects, primacy and recency, he examines whether people's opinions differ after receiving information in different sequences. He notes that information received in the early phases of an audit has a greater impact on an auditor's judgment that information received at later phases of the process. This is known as the "recency effect". The field dependence (FD)/field independence (FI) cognitive style affects an individual's decision making processes, measured using the Embedded Figures Test (GEFT) (Witkins, Oltman, Taskin, & Karp, 1971). Results of this study (Chan, 1995) show a strong interaction between cognitive style and recency effects and the author notes that other dimensions of cognitive style probably

have a strong role in auditor judgment. Research has shown that auditors rely heavily on judgment and tacit knowledge (Tan & Libby, 1997) in performing their duties during audit field work.

Although several studies have looked at the issue of learning styles and cognitive styles as they relate to professionals in the field of accounting and accounting students (summarized in Table 2-1), little research has been done to examine the relationship between the new technological innovations in the field and its relationship to these styles. One study, however, (Landry, Raymond, Rogers, & Harrell, 1996) shows that accounting students who were predisposed toward the use of computers had a similar distinct cognitive style. Numerous other studies (Wood et al., 1996; and others) show a distinct range of cognitive styles among those who utilize technology, especially network technology applications.

With the change predicted in the function of the future accountant due to knowledge management and its related innovative technologies (AICPA, 1996; and others), it is possible that cognitive style of accountants within this new organizational model will require different styles. As previously hypothesized, in terms of cognitive style, these traits can be identified as creative, abstract, innovative, non-linear, and intuitive.

In summary, numerous studies have been conducted to examine cognitive style issues in relation to accountants and accounting students. A selection of these studies, dating from 1986 to 1998 (Table 2-1), have looked at various groups,

including auditors, cost accountants, financial accountants, and consultants, as well as students. They have utilized several different cognitive styles assessment instruments. Although the results are mixed, the majority of the studies, however, have identified common characteristics among accountants and accounting students. Depending on the instrument used, these can be described as sensing/thinking, adaptive, concrete, sequential, and the like. Further, some of the studies indicate relationships between cognitive style and other critical factors, such as technological proficiency, job satisfaction, and specific area within the accountancy profession. The following section provides more detail on selected cognitive style assessment instruments (many of which have been referred to here).

Table 2-1 – Summary of Representative Studies of Cognitive Styles of Accountants and Accounting Students

Author (Date)	Assessment Instrument	Population Studied	Summary of Findings
Fisher & Ott (1996)	MBTI	Auditing practitioners	Dominant style was Sensing/Thinking (ST)
Wolk & Cates (1994)	KAI	Accounting students vs. other business majors	Accounting students were "adaptive" vs. other majors ("innovative")
Booth (1993)	MBTI	Australian accounting students	Strengths in intuition, feeling, perception. Weaknesses in sensing, thinking, judgment
Soroko (1988)	Gregorc Styles Delineator	Undergraduate accounting students	Dominant style was Concrete Sequential
Gul (1986)	KAI	Undergraduate accounting students	Strength as "adaptors"
Gul, Huang, et al. (1992)	GEFT	Accounting students	Field dependent
Gul (1987)	GEFT	Auditors	Field dependent
Auyeung & Sanders (1996)	Kolb LSI	Australian and Asian accounting students	Australians – concrete/active, Asians – abstract/reflective
Rasch & Harrell (1990)		Accounting practitioners	Correlation between cognitive style and turnover/job satisfaction/stress
Summers (1998)		Auditors vs. accounting consultants	Correlation between cognitive style and job satisfaction/stress
Foxall (1986)	KAI	Cost accountants vs. financial accountants	Cost accountants – adaptors, financial accountants – innovators
Chan (1995)	GEFT	Auditors	Strong relationship between auditor judgment and cognitive style
Landry, Raymond, et al. (1996)		Accounting Students	Correlation between computer usage and cognitive style.
Laribee (1994)	MBTI	Accounting Students	Different personality traits than other accounting students, but similar to accounting professionals.
Duff (1997)	Mumford's Learning Styles Questionnaire	Accounting Students	No relationship between academic performance and learning style.

2.3.3 *Measurement of Cognitive Style*

Dozens of diagnostic tools and descriptive analyses of human cognitive approaches to problem solving, communication, and personality have been developed (see Table 2-2). These include the Myers-Briggs Type Indicator, the Decision Style Indicator, Kolb's Learning Style Inventory, Lifescripts, Kirton's Innovator-Adaptor Inventory, Paivo's Verbal-Imagery Questionnaire, Riding's Cognitive Styles Analysis Test, and the Gregorc Styles Delineator (Bokoras et al. 1992; Riding & Cheema 1991). Each of these instruments uses different terminology (and other design features) to describe behavioral traits that the tests are designed to measure. For example, the Kirton Innovator-Adaptor Inventory (KAI) describes those who are non-creative followers as "adaptors" and those who are more creative leaders as "innovators". The Gregorc Style Delineator (described in detail in Chapter 3) refers to four ranges of measure: Concrete Sequential, Concrete Random, Abstract Sequential, and Abstract Random. This refers to a range of cognitive styles from those who are rigid and linear in their processes to a range of those who think more abstractly and are more creative.

It must be noted here that the most frequently used instrument for measuring cognitive style and related personality characteristics is the Myers-Briggs Type Indicator, with other popular instruments including Kolb's Learning Style Inventory, and Kirton's Innovator-Adaptor Inventory. Later in this thesis, a case is made for using a less well-known instrument, the Gregorc Style Delineator.

As previously mentioned, in most instances within the psychology literature, learning styles and cognitive styles may be used interchangeably. Measurement instruments examine both similarly, although goals of the tests may differ. Learning styles testing deals with how people process and integrate information as it pertains to learning patterns, cognitive styles measurement focuses on actual information processing (Riding et al., 1991). In this thesis, the focus is on the generic term, cognitive style, referring primarily to the characteristics of an individual in gathering, processing, and communicating information. Although accounting students are being used in this study, how they learn in the classroom (generally the domain of "learning style" studies) is not specifically addressed. Rather this thesis examines what Wenger (Wenger, 2000) describes as transfer of learning, how the skills and knowledge applied by persons in one domain can be transferred and applied to another domain.

In respect to the management of the knowledge-based organization, Leonard and Straus (Leonard et al., 1997) observe that although managers often value the mix of employees with differing cognitive styles, they frequently do not understand how to manage them. Harnessing the capacity of cognitively diverse people is a key to transformation from tacit knowledge embedded in individuals into explicit knowledge incorporated into the knowledge organization's intellectual capital. Understanding how to assess and utilize various thinking styles, analytical or intuitive, conceptual or experiential, social or independent, is a major key to

exploiting fully the resources within the firm. Leonard and Straus (Leonard et al., 1997) observe that over time (or by initial design) firms can become dominated by one particular cognitive style. Examples can be found in such firms as IBM and other engineering-based firms.

In a study of new product development teams (NPD) engaged in knowledge creation, Madhavan and Grover (Madhavan & Grover, 1998) look at individuals' cognitive styles in the context of "cognitive team processes" rather than purely social processes. Their study separates individuals into two distinct cognitive styles – those with T-shaped skills and those with A-shaped skills. T-shaped individuals possess superior knowledge and expertise in one particular area or a broad set of professional and personal interests, experiences, and a diverse network of professional and personal contact. A-shaped individuals have knowledge or expertise in two or more knowledge areas. They may have degrees in multiple fields or significant on-the-job experience in multiple fields. It is the combination of individuals with differing cognitive styles that create teams (NDP's) that possess a collective knowledge and initiate unique processes for integration of tacit knowledge within the individuals and brings it to the level of explicit knowledge. This can all take place in an atmosphere of informality that fosters creativity.

The literature shows many studies of different groups of individuals that illustrate similarities in cognitive styles among these groups. Students within various areas of study as well as individuals within a given profession have been shown to

demonstrate similar styles. Henry (Henry, 1989) examines backgrounds and cognitive styles of medical students, demonstrating many similarities and indicators of success. Stewart and Felicetti (Stewart & Felicetti, 1992), using the Gregorc Style Delineator, examine undergraduate marketing majors and find similar scores in cognitive style. Using the Kirton Innovator-Adaptor Inventory, Richards and Gaston (Richards & Gaston, 1995) examine business students in a university in England, finding distinct ranges of style. Similarly, Murphy et al. (Murphy, Kelleher, Doucette, & Yo, 1998) examine undergraduate business majors and findings are consistent with other studies.

Boreham and Watts (Boreham & Watts, 1998) test education and applied physics students in Australia using the Myers-Briggs Type Indicator (MBTI). Their results are consistent with theoretical prediction of cognitive style theory and with similar studies done on students in the U. S. Their findings illustrate that dominant cognitive groups are attracted to education, physics, and other areas of study. Further, distinct differences in cognitive style exist between education students and applied physics students.

The study of cognitive styles has included a thorough examination of the relationship between cognitive styles and computer programming proficiency (Evans et al., 1989). It appears that cognitive style may play a stronger role in one's programming abilities than any prior training or experience. Important cognitive characteristics of computer programmers include, the ability to understand abstract

concepts, the ability to translate word problems into equations or other symbolic notation, the ability to outline logic in steps, and the ability to follow complex directions listed in a procedure (Evans et al., 1989). Using the Myers-Briggs Type Indicator (MBTI), Evans and Simkin show a strong relationship between computer programming proficiency and cognitive style.

One sees very different problem solving approaches among accountants, entrepreneurs, social workers, and artists (Leonard et al., 1997). Several studies (see for example, Wolk and Cates 1994; Fisher and Ott 1996) have examined accountants to determine patterns and consistency of cognitive styles among accountants. Results show that accountants involved in what has been described as traditional accounting functions (primarily non-technology based) show distinct ranges of cognitive style.

Previous sections have discussed the major transformation of the accounting function within our organizational structure and the related changes in large accountancy firms. Much of this is due to technological innovations related the knowledge utilization and capitalization as the major resource of professional services firms. To fully comprehend the impact of technologically-empowered knowledge generation and dissemination, it is now necessary to examine the fundamental basis of this phenomenon – Knowledge Management. A well-documented management theory, knowledge management describes the tools and characteristics of today's knowledge organization and the individuals who operate within it, knowledge workers. Technologies such as videoconferencing, Web sites,

and e-mail can aid communication and sharing of knowledge. Strong human relationships are keys to the integration across geographically distributed business units as well as to effective partnerships outside the firm (Wenger et al., 2002). The next sections highlight relevant issues in knowledge management theory as they pertain to changes in accountancy firms and accounting education and, specifically, this study.

Table 2-2 - Summary of Various Cognitive Style Assessment Tools

Cognitive Style Test	Instrument Design	Applications/ Implications
Myers-Briggs Type Indicator Isabel Myers Katherine Cook Myers	Self-reported personality inventory that consists of 126 items yielding four scale scores. Uses 4 pairs of attributes to create a matrix of 16 personality types.	Developed after WWII to assess personality preferences in workforce. Helps understand basic learning preferences and method of instruction, as well as career suitability.
Decision Style Inventory A. J. Rowe (1987)	Identifies four styles: directive, analytic, conceptual, behavioral, within two dimensions: tolerance for ambiguity and concern for people.	Examines propensity to use information in decision-making and idea generation.
Kolb's Learning Style Inventory D. Kolb (1976)	Self-report based on a rank ordering of four possible words in each of nine different sets. Four learning modes: feeling (CE), watching (RO), thinking (AC), doing (AE).	Emphasis is placed on individual awareness of personal learning style and available alternative modes. Encourages emphasis on individual strengths and develops non-dominant orientation.
Canfield Learning Styles Inventory A. A. Canfield (1976)	Self-report based on rank ordering of choices for each of 30 questions.	Tool to aid in understanding difficulties in completing academic tasks and counseling. Emphasis is placed on attitudinal and affective dimensions.
Lifescripts T. D. Christensen (1980)	Scale defines four styles: analyzer, controller, supporter, and promoter.	Designed for use in management consulting. Relates more to social interaction than cognitive functions.
Kirton's Innovator-Adaptor Inventory M. J. Kirton (1976)	Identifies two categories: Innovators and Adaptors	Widely used in management consulting, education, and psychological research.
Individual Difference Questionnaire A. Paivio (1971)	Self-report measures imaginal and verbal abilities. Inclusion of both positively and negatively worded versions to control for response.	Endeavor to tap imaginal and verbal abilities, habitats, and preferences.
Cognitive Styles Analysis Test R. J. Riding (1976)	Ten short prose paragraphs, each followed by a question based on each paragraph.	Used to measure imagery range in elementary school children.
Gregorc Styles Delineator Anthony Gregorc (1982)	Self-report based on rank ordering of four words in each of 10 sets. Applicable for junior high students through adults.	Emphasis is placed on matching cognitive style and teaching methods to meet range of individual preferences.

2.4 Knowledge Management Theory

As the Western economic model has moved more towards a services dominated one and away from the manufacture of products, various prominent researchers and writers have examined the importance of the creation of knowledge as the key to a firm's success. The importance of intellectual capital[13] is reflected in the growing number of firms whose main assets are intangible. These include the fields of biotechnology, software and other computer services, consultancy, and other professional service firms (Jordan & Jones, 1997). This is extremely relevant to the accountancy profession, since the largest of the global firms are classic examples of this (Empson, 1999).

Drucker (Drucker 1993; and other writings) was among the first (although admittedly preceded by others) to identify knowledge as the most important resource of a firm in the creation of wealth, exceeding the traditional factors of production (labor, land, and capital). Drucker made a significant contribution to popularizing and integrating key concepts into modern management theory. Grant (Grant, 1997) states that knowledge management plays a central role in conferring competitive advantage and providing a foundation for a firm's long-term strategy. Quinn (Quinn, 1992) expands this notion further by noting that intellectual and service capabilities of a modern corporation are more vital than hard assets. He states that value creation

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[13] Intellectual capital is used to refer to the intangible creations of human intellect which include technical expertise, problem-solving capability, creativity, and managerial skill (Jordan & Jones 1997).

of most products and services depends primarily on how "knowledge-based intangibles" and customer satisfaction can be developed.

The "knowledge worker" (Reich 1991; Drucker 1993; Quinn 1992) is one who knows how to allocate knowledge to productive use. These authors are the first to introduce us to the notion of the shift from the "Industrial Age" to the "Information Age". It must be mentioned that previous societies certainly have brought information to bear on their endeavors, however there has been a qualitative change brought about by the ability to produce, reproduce, and communicate vast amounts of data and information electronically (Quintas et al., 1997). The traditional environment of an organization, even one with a rich technological infrastructure, supports the transfer of information, but does not consciously support the transfer of knowledge (Harris, 1995).

Leadbeater (Leadbeater, 1998) describes a new breed of company that does not have a top-heavy management hierarchy. It is comprised of motivated, committed employees capable of solving complex problems and coming up with new ideas specifically motivated at satisfying the needs of customers and clients. The most important assets, and most of the products, are intangible, and within which competition will turn on the application of knowledge, ideas, and creativity to generating growth and profits. These knowledge-intensive companies differ quite fundamentally from traditional companies in their ownership and purpose, as well as

in their style. Leadbeater states that by 2010, services will account for close to 80% of economic activity in the UK.

Knowledge management is about internal collaborative endeavors and the sharing of information and experience (Kocharekar, 2001). Effective performance and growth in a knowledge-intensive organization requires integrating and sharing highly distributed knowledge (Zack, 1999). Duffy (Duffy, 2001) defines knowledge management as a formal process that engages an organization's people, processes, and technology in a solution that captures knowledge and delivers it to the right people at the right time. Arthur Andersen, the global accounting and consulting firm, defined it as the discipline of enabling individuals in an organization to collectively acquire, share, and leverage knowledge to achieve business objectives (Duffy, 2001).

To define knowledge, one must examine the various levels of its creation (Harris, 1995). The lowest level of known facts is *data*. Data must be sorted, grouped, analyzed, and interpreted. Once this has occurred, it is transformed into *information*. Information has substance and purpose, but does not yet have meaning. When information is combined with context and meaning, it becomes *knowledge.* Context implies the influences of social values, religion, heritage, gender, cognitive style, and other factors. It is this knowledge that leads to strategic decision-making capabilities. Drucker (Drucker, 1988) states that information is data endowed with relevance and purpose. Converting data into information thus requires knowledge, which is specialized.

The transfer of knowledge within an organization is the basis for the theory of knowledge management. To become a successful Information Age knowledge-based firm, a systematic process of knowledge transfer among individuals within the organization is vital. Knowledge can only be transferred among individuals if the context is similar. Distinctions can be made between subjective and objective knowledge, implicit or tacit and explicit or codified knowledge, personal and prepositional knowledge, and procedural and declarative knowledge (Grant, 1996).

Creativity is essential in the process of knowledge creation (Newman, 1997). Creativity allows an organization to adopt new perspectives in order to identify and create new patterns, to reverse old patterns, and, more importantly, to manage the process of learning through anticipating and solving the problems of implementing a technology infrastructure to support knowledge management.

Zack (Zack, 1999) states that knowledge processing can be segmented into two broad classes: integrative and interactive, each addressing different knowledge management objectives. Integrative applications tend to focus on the repository rather than on the contributors, users of tacit knowledge. These applications range from electronic publishing, policy manuals, and the like. Interactive applications focus primarily on supporting interactions among individuals holding tacit knowledge. Its content is dynamic and emergent. Discussion forums are an example of interactive knowledge applications. Zack further posits that integrative applications exhibit a sequential flow of explicit knowledge in and out of a

repository. In contrast, interactive applications rely on indexing contributions to an ever-changing, dynamic collaboration that requires individuals to adapt to as the forum or repository (a by-product of collaboration) flows and changes.

2.4.1 From Tacit to Explicit Knowledge

Nonaka and Takeuchi (Nonaka et al., 1995) posit that the Western organization takes for granted that information processing automatically ensures that knowledge is transferred within the organization. They note that the traditional Western view is that knowledge is fundamentally "explicit", meaning that it can be expressed in words and numbers and therefore is easily communicated and shared in the form of hard data, scientific formulae, codified procedures, or universal principles. Explicit knowledge is created through analytical skills and through concrete forms of oral and visual presentation, such as documents, manuals, and computer databases. They further state that, in contrast, the Japanese view of knowledge is that it is primarily "tacit"; that is, highly personal and hard to formalize, making it difficult to communicate or to share with others. Examples included insights, intuitions, and hunches, which are deeply rooted in actions, experiences, ideals, values, emotions, interaction among people, and professional judgment. Tacit knowledge contains an important cognitive dimension. It consists of schemata, mental models, beliefs, and perceptions that are highly ingrained. This cognitive dimension reflects our image of reality. It is the relationship between tacit and

explicit knowledge creation and communication that is the basis for current thinking in the area of knowledge management. Intelligent systems, a key knowledge component, can be described as a computerized version of the tacit to explicit knowledge cycle (Gregor et al., 1999).

> Zuboff (Zuboff, 1988), in describing the traditional manufacturing organization as one which utilizes technology to automate its processes, states that when technology also "informates" the processes to which it is applied, it increases the explicit information content of tasks and sets into motion a series of dynamics that are able to reconfigure the nature of work and the social relationships that organize productive activity.
>
> Knowledge is central to several quite distinct research traditions, notably organizational learning, the management of technology (including computer-supported collaborative work (CSCW) and executive support systems (ESS)), and managerial cognition (Grant, 1996). Communities of practice describe organizations where learning is more than a matter of merely acquiring and storing explicit information. Organizations consider learning as a communal rather than individual phenomenon. Knowledge sharing is a matter of practical competence gained through participation and engagement in the social enterprises of particular communities of practice. (Wenger, 2000)

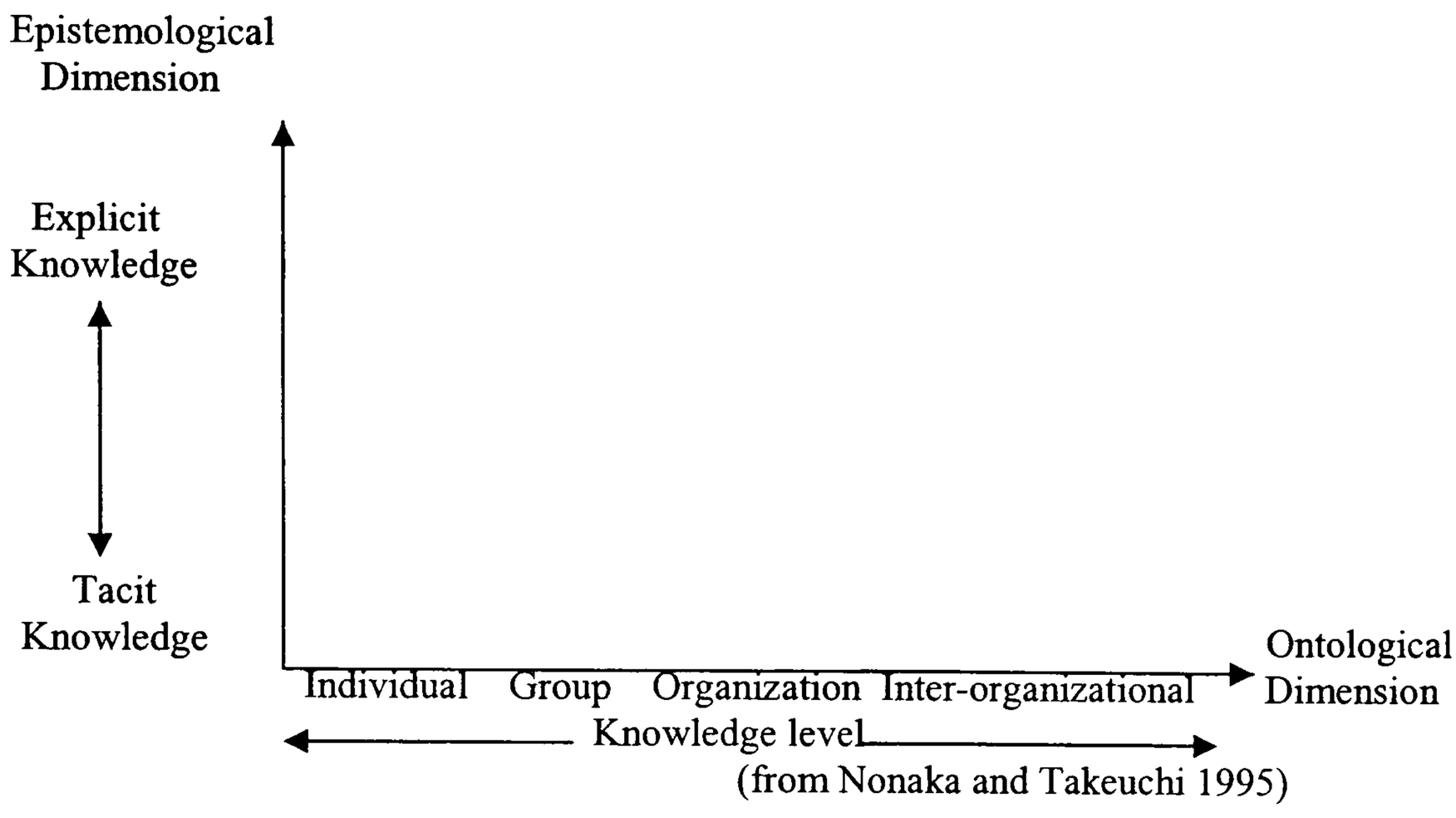
The creation and communication of knowledge throughout an organization is accomplished through two kinds of activities. The first is obtaining knowledge in

order to solve specific problems based upon existing premises. The second kind of learning is establishing new premises (paradigms, schemata, mental models, or perspectives) to override the existing ones. The term "single-loop learning" has been coined to describe the first type of learning, and "double-loop learning" for the second type (Argyris & Schon, 1989). Effective double-loop learning is a reflection of how individuals think, the cognitive rules or reasoning they use to design and implement their actions (Argyris, 1991). Nonaka and Takeuchi (Nonaka et al., 1995) hypothesize that the creation of knowledge involves the interaction between the two types of learning, in a spiraling dynamic. Wenger (Wenger, 2000) identifies learning as a "bottom-up" process, which cannot be based on forced distinctions and divisions of labor between learners and non-learners, since it is enmeshed in the culture of the knowledge organization.

2.4.2 The Knowledge Spiral

Nonaka and Takeuchi (Nonaka et al., 1995) begin to develop their model of knowledge management by citing that knowledge, unlike information, is about beliefs, actions, meaning, and commitment. It is context-specific and relational. It is a "dynamic human process of justifying personal belief toward the 'truth'". From an ontological dimension, only individuals create knowledge. An organization cannot create knowledge without individuals. From an epistemological dimension, there is a distinction between tacit and explicit knowledge (Figure 2-1).

Figure 2-1 - Dimensions of Tacit and Explicit Knowledge



It is this acquisition of knowledge by individuals that relates to cognitive style (as described in a previous section). Tacit knowledge is highly subjective and includes cognitive and technical elements (mental models). Mental models, such as schemata, paradigms, perspectives, beliefs, and viewpoints, help individuals perceive and define their world or their reality and visions for the future. This notion is the basis of cognitive style as identified in Gestalt psychology (Polanyi 1996; and others).

Nonaka and Takeuchi's (Nonaka and Takeuchi 1995) dynamic model of knowledge creation is based on the critical assumption that knowledge is created and expanded through the social interaction between tacit and explicit knowledge,

knowledge conversion. Knowledge conversion consists of four different modes (Figure 2-2):

Socialization – from tacit knowledge to tacit knowledge
Externalization – from tacit knowledge to explicit knowledge
Combination – from explicit knowledge to explicit knowledge
Internalization – from explicit knowledge to tacit knowledge

Figure 2-2 - Nonaka and Takeuchi's Dynamic Model of Knowledge Creation

	Tacit Knowledge to	Explicit Knowledge
Tacit Knowledge To	**Socialization** Sympathized Knowledge	**Externalization** Conceptual Knowledge
Explicit Knowledge	**Internalization** Operational Knowledge	**Combination** Systematic Knowledge

(from Nonaka and Takeuchi 1995)

Socialization starts by building a team whose members share their experiences and mental models. Successive rounds of meaningful dialogue then trigger *externalization*. This enables team members to articulate their own perspectives and thereby reveal hidden tacit knowledge that is otherwise hard to

communicate. The *combination* mode is facilitated when the concept formed by the team is combined with existing data as well as with knowledge that is outside of the team. The *internalization* mode is induced when team members begin to internalize the new explicit knowledge that is shared throughout the organization. They use it to broaden, extend, and reframe their own tacit knowledge.

The Knowledge Spiral occurs through the continuous and dynamic interaction between tacit knowledge and explicit knowledge as it is converted through the processes of socialization, externalization, internalization, and combination. Thus knowledge works its way through an organization and becomes amplified through the four modes of knowledge conversion and crystallized at higher ontological levels. Through this process it crosses sectional, departmental, divisional, and organizational boundaries.

Zack (Zack, 1999) states that management of explicit knowledge utilizes four primary resources:

1. Repositories of explicit knowledge,
2. Refineries for accumulating, refining, managing, and distributing that knowledge,
3. Organizational roles to execute and manage the refining process, and
4. Information technologies to support those repositories and processes.

The pure knowledge-based company differs fundamentally from the traditional model in terms of the assets it employs, the ownership structure that makes the most of those assets, and the management style compatible with that structure (Leadbeater, 1998).

At Lotus Development Corporation, knowledge management is seen as a discipline to systematically leverage information and expertise to improve organizational responsiveness, innovation, competency, and efficiency (Lotus, 2001). Lotus has created several knowledge management tools to allow both traditional and non-traditional companies to face challenges and allow them to:

- Improve the flow of information and knowledge across operating units,
- Improve competitive response or identify new opportunities fast,
- Reduce operating costs, or to operate more efficiently as a global organization,
- Accelerate the rate of innovation and/or reduce cycle times,
- Reduce loss of intellectual assets due to employee turnover,
- Improve customer retention.

Knowledge management theory describes quite accurately the transformation taking place in the accountancy function in our economic society and changes in the global accountancy practices. Technology is one of the most important drivers for that transformation. In fact, without technology's powerful organizational and communication tools and platforms, global accounting firms would not be able to harness the knowledge base within them to provide essential, value-added services to their broad client bases.

As previously discussed, it is very possible that the cognitive style of today's accountant may need to be significantly different than that of the accountant within the traditional role and organization. Although it is possible to compensate for less dominant inherent cognitive style traits through participation in various social

enterprises (Wenger, 2000), traits associated with individuals functioning successfully within a global, technologically rich knowledge organization appear to be significantly different from those traditionally associated with the accountancy function. This research attempts to examine that issue. Further, the relationship between cognitive style and technological attributes such as proficiency is key to understanding what type of individual is best suited for the accounting profession. The next section examines prior contributions to the examination of factors that possibly contribute to an individual's technological proficiency, a key to a knowledge worker's success.

2.5 Factors Contributing to Technological Proficiency

This section describes numerous criteria that have been demonstrated to influence one's proficiency in computer literacy and technological abilities. Gender, prior experience with technology, number of computer courses taken, years of computer experience, computer ownership, overall knowledge of computers, grade point average (GPA), anticipated future computer use, innate aptitude, cognitive style, computer self-efficacy and attitude, and issues related to anxiety concerning technology are mentioned in various studies over the past two decades (Qureshi & Hoppel 1995; and others) (see Table 2-3). The main areas related to technological proficiency appear to be centered around attitude and anxiety issues and technology.

Several studies have identified females as having lower self-efficacy[14] relative to computers and technology. Busch (Busch, 1996) found that female students have significantly lower self-efficacy in computing, less previous computer experience, and they have received less previous encouragement to work with computers. These findings are based on a study of 150 college students in business administration who are enrolled in a computer course. In a study of computer attitudes among college students, Shashaani (Shashaani, 1997) shows that females are less interested in computers, have less confidence in their computer abilities, and have less experience with computers than male students. Her results show that one semester of computer training improves their attitude towards computers. Ayersman and Reed (Ayersman & Reed, 1995/1996) note that there is a negative correlation between computer use and computer anxiety. Increased emphasis on computer training in curricula may alleviate gender differences, however there is much evidence that these differences still exist.

Several other studies (Betz & Schifano 2000; Landry et al. 1996; Gilroy & Desai 1986) illustrate the fact that females have lower self-efficacy and confidence with the use of computer technology that do male students. Young (Young, 2000) notes that part of female students' computer anxiety and lower self-efficacy may be due in large part to less experience with computers than male counterparts. Since at

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[14] Consistent with Bandura (Bandura 1977), self-efficacy is described as personal judgments of one's capability to organize and execute courses of action to achieve goals.

least fifty percent of those entering the accountancy profession are female (Flynn, Leeth, & Levy, 1997), with the increasing emphasis on technological proficiency in the profession, this has significant implications.

Self-efficacy is a major component of one's ability to utilize technological applications and computers, as measured by Bandura's (Bandura, 1977) social cognitive theory. Harrison and Rainer (Harrison & Rainer Jr., 1997) study the self-efficacy performance model on over 700 university employees and students and find that performance with computers significantly predicts perceptions of high and low self-efficacy, providing additional support to Bandura's theory. Increased performance with computer-related tasks is found to be significantly related to higher levels of self-efficacy. Conversely, decreased performance with computer-related tasks is found to be significantly related to lower levels of self-efficacy.

Campbell (Campbell, 1992) notes that students have many perceptions about the usefulness of computers in future educational and career goals. Many students assume that their current level of computer proficiency will determine their ability to be successful in computer courses. She cites a strong level of stereotyping of computers as a male domain. She further states that computer proficiency has joined mathematics as a filter for limiting educational and career choices of students.

Research has further shown that one's attitude[15] towards computers and technology influences one's openness to learning new technologies and attempting to master them. Evans and Simkin (Evans et al., 1989) note that no single set of variables – demographic, behavioral, cognitive, or problem solving – dominate others as the best set of predictors of computer proficiency. However, they note that several factors from all of these areas may be useful in forecasting computer aptitude. Fisher (Fisher, 1995) reports the correlation between attitude towards computers and the extent of computer training one has. His study examines accounting professionals, whom he found to be generally positive in regard to computers. He posits that this is because of the amount of computer usage necessary in accounting today. Since accountants have significant computer training, their attitude towards computers is generally positive. There was a direct correlation between attitude and level of use and intention to use computers. (Fisher's study further examines the relationship between computer attitude and cognitive style, to be discussed in further detail in another section of this study).

Mills (Mills, 1997) conducts a study of accounting professionals that confirms previous studies' contentions that there is a direct relationship between computer use and attitude. She states that since accountants have become increasingly familiar with computers in their professional endeavors, their attitudes towards computers

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[15] Attitude may be defined as "a predisposition to respond in a favorable or unfavorable way to objects, person, concepts, or whatever." (Ebert & Mitchell 1975)

have become increasingly favorable. Walters and Necessary (Walters & Necessary, 1996) find that attitude related to number of university computer courses completed, years of computer experience, overall computer knowledge, and ownership of a personal computer. Interestingly, their study shows little gender differences in computer attitudes, in contrast to other studies.

Table 2-3 - Summary of Studies of Factors Contributing to Technological Proficiency

Study	Factor	Finding
Busch 1996	Gender	Females have lower self-efficacy, less experience, less encouragement
Shashaani 1997	Gender	Females less interested in computers, less confident, less experience
Ayersman and Reed 1995/96	Gender	Females with less experience exhibit higher computer anxiety
Young 2000	Gender	Inverse relationship between proficiency and anxiety
Harrison and Rainer 1997	Self-efficacy	Direct relationship between experience and self-efficacy
Campbell 1992	Self-efficacy	Self-efficacy with computers key to career self-selection
Evans and Simkin 1989	Demographic, behavioral, cognitive, problem-solving	No single set of variables dominate as predictors of computer proficiency
Fisher 1995	Attitude and training	Increased training positively influences attitude
Mills 1997	Use and attitude	Direct relationship between increased use and positive attitude towards computers (little gender differences noted)

Technological proficiency is essential to an individual's ability to participate in the learning and sharing processes described in the previous sections. Individuals' cognitive styles may impact how individuals will apply skills and knowledge from one domain to another within the knowledge organization or community of practice environment. The next section explores prior contributions to the relationship between cognitive style and various technological attributes.

2.5.1 Cognitive Style and Technology

Cognitive style has been identified as a factor in one's abilities in relation to technology. Atkinson (Atkinson, 1998) shows different levels of understanding of technology and completion of technology-related projects depending upon cognitive style of high school students. Using the verbalizer-imager model (Riding et al., 1991), Atkinson notes that the tendency for individuals to represent information in a verbal or imagery context has an impact on how they design a technology project. This is partially a factor of how creative an individual is. She also notes that knowledge of cognitive/learning style has an implication for the strategy to be adopted in teaching students to utilize technology.

Using the Myers-Briggs Type Indicator (MBTI), Jones (Jones, 1994) examines university students and notes a strong relationship between cognitive style and computer use. His study also measures a strong relationship between computer usage, attitude, and computer anxiety measures. He further notes that the relationship

between gender and computer attitude and anxiety are quite compelling. In another study using the MBTI (Landry et al., 1996), accounting students demonstrate a high level of computer phobia in relation to the cognitive type of "sensing-thinking-judgment". This study also looks at relationships of technology, cognitive style, gender, and GPA, with findings consistent with other research.

Using Kirton's Adaptor-Innovator Inventory to measure students who use computers at home, Foxall and Bhate (Foxall & Bhate, 1991) note that there is direct evidence to support a relationship between scores on this cognitive styles test and the extent of adoption of computing practices. Those more proficient with technology score higher in the "innovator" range, whereas those less proficient tend to be "adaptors". Use of the computer for a wide variety of tasks presumably is the outcome of a search for stimulation and change within the working environment and reflects innovative rather than adaptive orientation, using Kirton's terminology.

Huber (Huber, 1992), in contrast, questions whether there is a relationship between technology and cognitive style. In examining Decision Support Systems (DSS) design guidelines, he ponders whether they conform to the user's cognitive style or merely compliment the user's cognitive style in order to overcome the dysfunctional effects of any cognitive disposition. In other words, is it the DSS design that accommodates cognitive style differences or do cognitive style differences determine the design of a decision support system?

Alavi and Leidner (Alavi & Leidner, 2001) examine the impact technology has on knowledge management, from a strategic and theoretical framework. They note that the majority of knowledge management initiatives involve, at least in part if not to a significant degree, information technology. The view of organizations as "knowledge systems" represents a cognitive dimension as well as a social nature to organizational knowledge, its embodiment in the individual's cognitive make-up in addition to the collective of the organization as a whole. Therefore, one's cognitive style will affect one's ability to utilize technologies as they are implemented to facilitate knowledge management.

Although research as previously described is inconclusive as to the contribution of cognitive style to the technological tools employed in knowledge organizations, some studies do indicate that the process of formulating tacit knowledge, as well as the process of codifying explicit knowledge, indicate that individuals with certain cognitive styles fit the model of the "knowledge worker" more that others. Clearly further research is necessary to determine whether those who adapt to the knowledge organization and its accompanying technological tools fit into any specific cognitive style categories.

At the core of this research is the examination of the relationship between technological attributes and cognitive style in accountants. Since technological proficiency is key to contribution to a knowledge organization, workers in a professional services firm such as a large accountancy firm must be fluent in a

myriad of computer tools, applications, systems, and techniques. This may require a specific range of cognitive style. Measurement of cognitive style has been described in a previous section and will be further developed in the discussion of the methodology employed in this study (Chapter 3). Previously developed instruments have been designed to measure various attributes related to technology. These attributes include proficiency, attitude, anxiety, and other factions. The next section details some of those measurement instruments of technological attributes.

2.5.2 Measurement of Computer-Related Attributes

Several instruments have been developed to evaluate attitudes toward computers (see Table 2-4). Among the first such instruments developed was one by Loyd and Gressard (Loyd & Gressard, 1984) called the Computer Attitude Scale. It is designed to measure one's anxiety about using computers, confidence in ability to use computers, and how much one likes using computers to complete job-related tasks. Francis (Francis, 1993) developed the Attitude Toward Computer Scale (ATCS). This instrument consists of a 24-item questionnaire designed to measure college students' attitudes towards computers. Other measurement tests of computer attitude include Wagman's (Wagman, 1983) Cybernetics Attitude Scale, Popovich et al.'s (Popovich, Hyde, Zakrajske, & Blumer, 1985) Attitudes Toward Computer Usage Scale, Dambrot et al.'s (Dambrot, Watkins-Malek, Silling, & Marshall, 1985) Computer Attitude Scale, and Nickell and Pinto's (Nickell & Pinto, 1986) Computer

Attitude Scale. Each of these is designed to measure one's attitude toward computers, illustrating the importance of that variable as a measure on computer usage and proficiency.

Harrison and Rainer (Harrison and Rainer 1997), measuring self-efficacy and performance with computers, utilize the 32-item Computer Self-Efficacy Scale (CSE) developed by Murphy, Coover, and Owen (Murphy, Coover, & Owen, 1989). Their findings, in addition to adding further validity to Bandura's (Bandura, 1977) social-cognitive theory model in regards to computers, help validate this computer self-efficacy measurement instrument. Increased performance with computer-related tasks is found to be significantly related to higher levels of self-efficacy. Conversely, decreased performance with computer-related tasks is found to be significantly related to lower levels of self-efficacy.

In an earlier study (Harrison and Rainer 1992), Harrison and Rainer compare three different instruments, each designed to examine a different component of computer proficiency. The first instrument is designed to measure attitudes toward computers (Nickell et al., 1986), the second measures computer anxiety (Heinssen, Robert et al. 1987), and the third measures computer self-efficacy (Murphy et al., 1989). Data collected from almost 700 university personnel are used to evaluate the factor structures and concurrent validity of each of these three instruments – the Computer Attitude Scale, the Computer Anxiety Rating Scale, and the Computer

Self-Efficacy Scale – respectively. Intercorrelations among the derived factors clearly demonstrate the concurrent validity of these three instruments.

Bookman (Bookman, 1989) notes that among human resource personnel it is well known that there is a relationship between computer attitude and proficiency with computers. As a result of this, many firms (including public accountancy firms) require potential new recruits to submit to a computer attitude assessment test. In recent years, evidence of the relationship has prompted industry to attempt to assess this variable on its employees and employment candidates.

The relationship between anxiety about computers and technological proficiency has been well established. Using the Computer Anxiety Rating Scale (CARS), Heinssen et al. (Heinssen, Robert et al. 1987) observe that individuals actually avoid the use of computers due to their anxiety. Use of computers actually increases the anxiety state of individuals who scored high on the CARS. Further, they find that greater computer anxiety is associated with lower expectations and poorer task performance. Their findings are similar between males and females.

Rosen and Maguire (Rosen & Maguire, 1990) examine anxiety around computers and "computerphobia". Their findings illustrate that those who exhibit anxiety with computers are equally likely to be younger or older, male or female. Their findings indicate that more experience with computers does not eliminate computerphobia. This indicates the possible correlation with cognitive style and computer anxiety, rather than a result of lack of exposure to computers.

An early study (Simonson, Maurer, Montag-Torardi, & Whitaker, 1987) attempts to correlate computer literacy with computer anxiety. Using an eighty-question survey of computer literacy, students are measured for their proficiency with computers. This was compared with a computer anxiety index (CAIN). Although the study's main purpose is to validate the two instruments used, results indicate that those with lower computer literacy scores tend to have higher anxiety ratings, and the reverse is also shown.

Tseng et al. (Tseng, Tiplady, Macleod, & Wright, 1998) examine students' anxiety measures around the use of personal digital assistants (PDAs) in a group of paid participants between the ages of 16 and 60. In their study they administer the Computer Anxiety Rating Scale (CARS) (Heinssen, Robert et al. 1987) and a self-designed Computer Use Questionnaire (CUQ), consisting of three questions about frequency of computer usage at home, school, or work. In addition, they administer a self-consciousness test and a mood scale test. Results show that PDAs may cause less anxiety than conventional computers.

McInerney et al. (McInerney, Marsh, & McInerney, 1999) administer the Computer Anxiety and Learning Measure (CALM) to a group of undergraduate students enrolled in four different faculties of a regional Australian university. The CALM measures competence with computers, handling computer equipment, receiving feedback on computing skills, learning about basic computer functions, and relates them to factors of fear, worry, distractibility, and other physiological

symptoms of anxiety. Results indicate a high relationship between computer proficiency measures and various symptoms of anxiety.

In a study of accounting students (Stone et al., 1996), the relationship between computer knowledge, skills, self-efficacy, and anxiety are examined. The study is intended to illuminate the need to reexamine the core skills that are taught in the traditional undergraduate accounting education program. The findings suggest that increased training in computer skills (including spreadsheet and database usage) increase self-efficacy and also reduce computer anxiety. The study calls for increased training for undergraduate accounting students in specific accounting applications, accounting information systems, and information technology. This increase in training should begin with the first course in accounting and be integrated throughout the accounting curriculum. Their study relies on several specially-designed questionnaires measuring computer self-efficacy, spreadsheet self-efficacy, computer knowledge, and computer anxiety, as well as an existing anxiety measurement instrument (COMPAS©, designed by Eugene Oetting).

Table 2-4 summarizes some of the various instruments designed to measure computer attributes. These attributes include proficiency, self-efficacy, anxiety, attitude towards computers, and other factors. As noted in Chapter 3, for several reasons, none of these instruments was deemed suitable for use in this research. However they were used as a framework for the design of the Technology Questionnaire developed for this study.

Table 2-4 - Summary of Selected Measurement Tests of Computer Attributes and Anxiety

Measurement Test	Author(s)	Attributes Tested	Description
Computer Attitude Scale	Loyd and Gresard (1983)	Anxiety, confidence, preference	23-Item test of college students.
Attitude Towards Computer Scale	Francis (1993)	Attitude	24-item questionnaire for college students
Attitudes Toward Computer Usage Scale	Popovich, Hyde, Zakrajsek, Blumer (1985)	General attitudes towards computers and computerized machinery.	40-item measure revised to a 20-items using a 7-point Likert scale.
Computer Attitude Scale	Dambrot, Watkins-Malek, Seilling, Marshall, Garver (1985)	Related math anxiety and experience to computers	20-item responses on a 5-point Likert scale.
Computer Attitude Scale	Nickell and Pinto (1987)	Positive and negative attitudes	20-item, self-reporting.
Computer Anxiety Rating Scale	Heinssen, Glass, Knight (1987)	Computer Anxiety	19-item, self-reporting.
Computer Literacy and Anxiety Index	Simonson, Maurer, Montag-Torardi, Whitaker (1987)	Computer literacy and computer anxiety	Three components of computer literacy and 26-item test of computer anxiety.
COMPAS	Oetting (1983)	Anxiety	Questions on how students feel about using computers, ranked from "confident" to "worried"
Computer Self-Efficacy Questionnaire	Stone and Arunachalam (1996)	Computer self-efficacy, spreadsheet self-efficacy, database self-efficacy, and computer anxiety	72-questions divided into four categories.
Computer Self-Efficacy Scale	Murphy, Cover, and Owen (1989)	Self-efficacy	32-item self-report. Measures of beginning level, advanced level, and mainframe computer skills.
General Statements Questionnaire	Zolton and Clapanis (1982)	Assesses subjects' beliefs about and reactions to both specific features of computers and applications of computers.	23-item questionnaire.
Cybernetics Attitude Scale	Wagman (1983)	Measures individual's response to computerization in each of 10 sectors of society.	100 items (10 for each sector) using a 7-point Likert scale.
Computer Anxiety and Learning Measure (CALM)	McInerney et al. (1999)	Measures factors of computer proficiency and anxiety indicators.	100-item questionnaire

2.6 The Research Questions

The two primary research questions at the center of this study are:

RQ_1 How do accounting practitioners view the changes in the profession and their firms, and are those currently entering the profession adequately prepared to meet the new challenges placed upon them?

RQ_2 Given the changes identified by practitioners, do those intending careers in the accounting profession actually possess the appropriate cognitive styles and technological proficiencies to fit into this new model of the accountant in a knowledge organization? Is there a relationship between cognitive style and technological proficiency?

A series of semi-structured interviews are conducted with practitioners in United States offices of primarily global accountancy firms to ascertain insights into the first research question. The methodology employed is discussed and developed in the first part of Chapter 3. The results of the interviews are detailed in Chapter 4, including selected excerpts from the extensive interview sessions. This research method proves highly effective in providing a rich, detailed picture of the transformation of the profession and the firms. Its core contribution is to support the hypotheses related to differing cognitive style requirements of today's practitioner and the importance of technological proficiency to success in the profession.

The second research question and subsidiary research questions are described further in the second part of Chapter 3. Results of the empirical study of cognitive styles and technological attributes are presented in Chapter 5. Further discussion of

the findings and the implications for the profession and accounting education are discussed in Chapter 6.

For the empirical part of this research, computer proficiency is measured by using a questionnaire (Appendix C), which assesses technical proficiency in the areas of computer usage and knowledge of computers, computer applications, network applications, and computer systems. These attributes have been identified as essential skills for success in today's accountancy role. As discussed earlier, all knowledge workers need to be proficient in various technology areas in order to utilize and share the collective knowledge available within organizations.

Cognitive Style is measured using the Gregorc Style Delineator, evaluating strengths in the four mediation channels – Concrete Random, Concrete Sequential, Abstract Random, and Abstract Sequential, as well as the two mediation abilities – Perception (concrete or abstract) and Ordering (sequential or random), as described in a previous section. Attitude and Anxiety will be assessed based on rank scores on the questionnaire (described in the next chapter).

In addition to gathering data on the cognitive styles of accounting students, information on computer attitudes and anxiety, as well as selected demographic information is collected. The relationship among various components of this information is also examined. One question of interest is the relationship between the computer measurements – attitude and anxiety - to computer proficiency. Another area of exploration is the relation between computer proficiency and various

demographic data; i.e., age, gender, GPA, and the like. Previous research studies (Seidel & England 1999; and others) have examined these relationships with other sample groups, therefore this study compares a sample of accounting students to these populations.

2.7 Summary

As we have moved from the Industrial Age to the Information Age and more recently to the Knowledge Age, the impact of this shift on every aspect of organizations and our society is significant. The compiling of data into information, information into knowledge, and utilizing that knowledge for strategic decision making is what will determine the success of today's firms. An individual's contribution to this new model is based on one's ability to create and communicate knowledge, both tacit and explicit. Technology has freed the accountant from a large number of tasks necessary to provide the firm with financial and non-financial performance and control information. Technology has further provided a platform to facilitate the broad sharing of knowledge within the firm and to its strategic partners. This has allowed the accountant to assume a broader role within the organization, in effect making the accountant a key knowledge worker.

That technology is rapidly transforming not only the accounting function within organizations, but also the entire foundations of organizations and our economic and social framework, has been well established. Today's technological

advances through network systems (the Internet, electronic commerce, electronic data interchange, supply management systems, enterprise resource planning systems, decision and executive support systems, and the like) have exponentially advanced the accounting function beyond the well-established automated accounting systems and applications of the last half-century. Further, these technologies have allowed firms to collect and share the knowledge resources within the firms and to provide this knowledge to clients.

Today's accountancy firm is a key example of a knowledge organization. Accountants today are called upon to codify their vast resources of information into explicit knowledge shared by all members of the organization and sold to a demanding client base. It is through a broad array of technological tools and platforms that this is made possible. Today's accountancy practitioner, therefore, must be proficient in these technologies in order to share knowledge resources.

The implications of this phenomenon for accounting and accounting education are significant. Not only has the tedium of bookkeeping, routine accounting operations, systems of planning and control, and related assurance services been transformed, but also the entire role of the accountancy function within organizations has changed. Accountants who routinely spent their days compiling financial summaries now devote the majority of their time to communication, analysis, and decision-making. The accounting information systems which gather, compile, summarize, report, attest, and validate economic activity are now seamlessly

interwoven and virtually self-generating. Accounting and non-accounting functions and systems are connected in ways that were never imagined even a decade ago.

With these transformations (a paradigm shift) a multitude of opportunities and demands are placed on the practicing accountant and the accounting education system. Preparing future accountants with the skills necessary to function in this new environment is an extraordinary challenge. Determining the skills necessary to be successful is another challenge.

It has been established that those working with these newest of network technologies, the very technologies that make sophisticated knowledge sharing possible, may have a different range of cognitive style that those who have more difficulty integrating them into their work environment. This may have implications for the accountancy profession. It is possible that the cognitive style of the traditional accountant who focused on gathering and summarizing financial information either by hand or with an automated accounting system may differ from the cognitive style needed by the accountant who can maneuver within the network environment of today's knowledge organization. If so, the implications are significant.

Prior studies have documented numerous factors that contribute to technological proficiency. These include gender, age, prior experience with computers, grade point average (GPA), aptitude, attitude towards computers, computer self-efficacy, computer anxiety, and cognitive style. The main attributes associated with proficiency based on prior literature, appear to be attitude, aptitude,

and anxiety. This study examines the incremental contribution of cognitive styles assessment to proficiency given variables of attitude and anxiety.

This chapter has attempted to survey several interrelated streams of literature in order to form a framework for this research. The literature begins with changes described in the profession, largely due to knowledge management and its related technological component and continues by discussing cognitive style and its relationship to technological competencies. A detailed review of knowledge management theory is used to highlight the importance of the changes in professional service firms, such as the large global accountancy practices. These pieces form the foundation for the dual-methodological approach employed in this study, aimed at exploring the key research questions at its core.

This study is two-fold. The first phase (Chapter 4) involves a series of semi-structured interview sessions with experienced accounting practitioners. These practitioners are given the opportunity to comment on perceived changes in the accounting profession and their firms. They further comment on issues such as the preparedness of recent recruits (a large number of whom are graduates of accounting programs), skills needed for success in the profession, and the impact of technology on the practice.

The second phase (Chapter 5) draws on insights from these interviews and investigates the cognitive style range of a group of undergraduate accounting students. The study also looks at attributes associated with technological proficiency

in relationship to the cognitive styles exhibited by accounting students (a significant source of future accounting professionals). Specifically, this study investigates whether accounting students who demonstrate proficiency with technology show different cognitive styles than those who do not. To determine the cognitive style of the students in the study, the Gregorc Style Delineator, a well-validated assessment tool, is utilized. This instrument is not as widely used as several other tools, however there are several distinct advantages to utilization of this instrument over other choices. A self-designed questionnaire is also administered. The purpose of the questionnaire is to determine the students' proficiency with and attitude toward technology, various computer applications, and information systems. A rationale is presented for the choice and design of this questionnaire over several existing instruments.

The results of this study have implications for the profession and for accounting education. Implications for accounting education are significant. Attracting students with the necessary skills and cognitive and learning styles to the study of accounting is essential. Also, it is imperative to redesign accounting curricula that will train students in these newest of technologies and will develop the proper analytical skills necessary to be successful. Educators can provide guidance concerning the skills necessary for professional advancement and success.

Accounting educators are called on to keep in touch with practitioners working in the

field in order to determine what the latest technological innovations are, and to incorporate them in the classroom.

3 – RESEARCH METHODOLOGY FOR PRACTITIONER INTERVIEWS AND STUDY OF COGNITIVE STYLE AND TECHNOLOGICAL PROFICIENCY

Chapter 3 – RESEARCH METHODOLOGY FOR PRACTITIONER INTERVIEWS AND STUDY OF COGNITIVE STYLE AND TECHNOLOGICAL PROFICIENCY

3.1 Introduction

Today's accounting firms are knowledge-based organizations. Since technology is a key to the creation, storage, and dissemination of knowledge throughout an organization, proficiency with a wide variety of technological skills is essential for an individual's success in any knowledge organization, including the accountancy firm.

The overarching purpose of this two-phase research project is to determine how the changes as a result of knowledge management and its related technological tools have impacted the practice of accountancy, especially in the largest of public accountancy firms. This research explores whether a gap exists between professionals' expectations about recruits' cognitive style characteristics and the actual style they demonstrate. Further, this research attempts to find answers to questions related to accounting students' (and perhaps accounting professionals') cognitive styles and these styles' relationship to technological proficiency.

Researchers (Empson 1999; and others) note that professional service firms exemplify the knowledge organization, and the largest of the global accountancy firms clearly fit into this category. Technological innovation is essential to any

knowledge organization. Accounting education has a mission to adequately prepare students for careers in the profession by educating students in the latest knowledge management techniques and the technological tools. Further, educators and accounting professionals need to find ways to alter perceptions of what accountancy tasks actually entail today. It is conjectured that those self-selecting accounting as a course of study may be ill-suited to be contributing members of a community of practice such as a modern global accountancy firm.

The methodologies employed in this research are two-fold. This is an unusual approach to examining series of research questions, however because this research draws on several theories and literature streams, it can prove very effective. Hill et al. (Hill et al., 1998) utilize a mix of qualitative and quantitative methods to identify skill formation in organizations operating in an environment of uncertainty. Their approach combines case studies with a more quantitative approach. Vasarhelyi (Vasarhelyi, 1977) relies on both quantitative and qualitative data (with nonbiased toward either) to examine management decision-making characteristics (including cognitive style).

The next section describes the first, a qualitative approach to examining the main research questions. This involves a series of semi-structured interviews with experienced practitioners. A later section describes the second, an empirical phase of this study. This involves the administration of two research instruments on a sample of undergraduate accounting majors at several U. S. universities.

3.2 The Qualitative Research

A key component of this current research is to determine if the largest accountancy firms are in fact utilizing knowledge management tools and techniques in actual practice. Another is to determine how well prepared recruits are for professional careers. In the next chapter, the results of interviews with accounting practitioners are presented. These interviews attempt to determine the practical reality of how much of knowledge management theory is actually utilized in real situations. These interviews also shed light on how well prepared in practitioners' views recent entrants to the profession have been for careers in accountancy.

The format of these interviews is semi-structured. Although the semi-structured interview format is a pure qualitative strategy of naturalistic inquiry, qualitative measurement and content analysis is inductive rather than deductive. However, the qualitative nature of unstructured or semi-structured interviewing can provide a greater breadth of information than other types of data collection (Denzin & Lincoln, 2000). The semi-structured format of these interviews allows interviewees to expand in areas not anticipated by the interviewer. Reponses are not bound by a predetermined set of questions (Gummesson, 2000). The interviewer prepares a series of questions; however opportunities for unanticipated questions and responses are encouraged. The interviewee, therefore, is given a chance to introduce new topics of his or her own in the interview (Flick, 1998).

The role of the interviewer, on the other hand, is to cover the topical range by introducing new topics or initiating changes in the topic. This means that the interviewer must lead the interviewee back to topics that are important to the research. A similar approach has been employed by other accounting researchers. Grey (Grey, 1998) uses interviews and other qualitative methods to explore practitioners' views on professionalism in large accounting firms. Marriott and Marriott (Marriott & Marriott, 2000) use this method to examine changes in small accounting practices.

Qualitative methods, such as surveys and interviews, are strong mediums for understanding the meanings people attach to their behavior, discovering new things about phenomena, and generating hypotheses (Herndon & Kreps, 1993). Initially these methods were developed in the context of a critique of quantitative methods and research strategies (Yin, 1994). Quantitative methods are suited for testing hypotheses or exploring research questions. For this research, interviews illuminate a new phenomenon (changes in the accounting profession) and provide the meaning for the later quantitative results. The pluralistic methodology employed in this research (both qualitative and quantitative) is complimentary rather than competitive, in its attempt to illustrate a research question and provide empirical evidence to substantiate it.

A series of in-depth, semi-structured interviews was conducted in order to confirm theoretical assumptions about changes in the accountancy profession.

Appendix B presents the list of questions developed as a guideline or road map to the various lines of questions described later. These interviews were conducted with fifteen practitioners in United States offices of large accountancy practices. Ten of the interviewees were accountants or auditors in Big Five accounting firms, three worked in global accountancy firms that are not considered part of the Big Five, and two worked at larger regional firms. Each of the Big Five firms was represented. The tenure of these interviewees at their firms ranged from six years to thirty years. All except one had graduated from an undergraduate accounting program[16]. Practitioners ranged from managers to partners, and worked in the areas of audit, tax, consulting, and human resources. Table 3-1 describes the interview subjects.

Subjects were solicited through various networks including advisory boards of Beta Alpha Psi (the national accounting honors society) and a major university's accounting program, the American Accounting Association, and other contacts (see Interview Request – Appendix A). Each interview lasted between thirty minutes and one hour. Ten interviews were conducted in person, in the practitioner's office. Five of the interviews were conducted over the telephone. All interviews were audio-taped, then transcribed. From the many hours of interviews significant responses were identified for inclusion in Chapter 4. The extensive material gathered through these interviews sheds much light and offers support for the key research questions at

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[16]One subject earned an undergraduate degree in economics and a graduate degree in accounting. He began working as an accountant during his undergraduate studies.

the core of this study. The responses validate the purpose of the empirical study conducted as a follow-up to the interviews.

Table 3-1 – Description of Interview Subjects

Firms represented in sample	PricewaterhouseCoopers KPMG Deloitte Touche Ernst & Young Andersen Grant Thornton BDO Seidman 2 large regional firms
# of subjects	15 interviewees
Gender	12 males 3 females
# of years in practice	Minimum = 6 years Maximum = 30 years Mean = 16 years
Titles	3 Managers 1 Senior Manager 11 Partners
Professional Areas	6 Audit 3 Tax 2 Audit Research 4 College Recruiting
Educational Backgrounds	14 Undergraduate Accounting Majors 1 Economics Major (with graduate Accounting degree)

3.2.1 Areas of Questioning

A set of questions was developed that guided the interview, but the sequencing and phrasing of the questions varied as each interview progressed. An outline of the question areas is presented in Appendix B. As much as possible,

questions were non-directive, other than specifying the topic area, and prompts were used only to ask for clarification or expansion of points the respondents made. Respondents were not told the exact nature of the research, in an attempt to minimize bias. They were also assured that confidentiality would be maintained in the final presentation of the research. The next chapter presents an in-depth description of responses, including selected excerpts.

The questions followed several distinct lines. The first area concerned the subjects' perceptions of how the profession of accountancy has changed since they first entered it. This was followed by a similar question concerning perceptions of changes within their firms.

The next series of questions concerned technology in accountancy. This line of questioning was broken down into two distinct components. The first area addressed how technology has improved the services provided to clients. The second areas dealt with innovative technologies and how they allow members within the firm to increase productivity. Although knowledge management often was not specifically identified, these areas clearing were designed to shed light on how much of the actual practices described in knowledge management literature (see Chapter 2) are actually employed in accountancy firms.

The next area of questions was designed to illicit practitioners' perceptions of future trends in accountancy. The intent was to gather insights into the make-up necessary for a practitioner to succeed in a modern knowledge environment.

Responses did, in fact, validate the hypothesis that perhaps someone with skills different from those traditionally associated with accountants will be very important in the modern firm. This area illuminated many other areas which practitioners identified as changing the face of the accountancy profession.

The interviews then shifted to a series of questions on how well-prepared practitioners thought that new entrants into the profession are. This included a discussion of areas identified in Chapter 2, such as technological proficiency, oral and written communication skills, critical thinking skills, and the like. Since the subjects had much to share on this subject, they were further questioned on any changes they thought appropriate to accounting curricula.

Once the interviews had progressed through these areas, the main thesis of this work was described to each subject, who was then asked to comment on the study. This was not done until the end in an effort to allow the subject to remain objective. It was thought that if subjects knew the main thesis prior to the interviews, responses would be targeted to the specific study.

The responses collected through this series of in-depth interviews led to the development of the design of the empirical research described next. Although the interview subjects provided much evidence on the real scope of changes taking place in accountancy practice today, this study focuses on cognitive style fit of recent entrants to the profession. Further, this study explores technological proficiencies and related attributes in those entering the profession, since these proficiencies are

vital for anyone in a knowledge-based organization. The next section describes the methodology employed in the empirical investigation.

3.3 The Quantitative Research

The empirical investigation undertaken in Chapter 5 attempts to measure students' cognitive styles, technological proficiencies, and any relationships between proficiency and cognitive styles. A self-designed technology questionnaire (described in a later section) and The Gregorc Style Delineator (also described later) were administered to undergraduate accounting students.

This section describes the subjects of the study, gives a detailed description of the survey instruments utilized, and discusses data gathering techniques. Chapter 5 presents a detailed analysis of the results of this study. Chapter 6 discusses potential implications of those results, as well as those gathered from the practitioner interviews.

3.3.1 Subjects of Quantitative Study

Approximately 170 undergraduate accounting majors (reduced to a final sample size of 132) at four northeastern United States universities volunteered to participate in this study. Two of the universities are public, two are private institutions. Three of the four schools are accredited by the International Association for Management Education (formerly the American Assembly of Colleges and

Schools of Business (AACSB)), the most prestigious of accreditation agencies of higher education in business and management in North America. Two of the universities maintain chapters of Beta Alpha Psi, the accounting and financial professionals' honors society, on campus. The data were collected through arrangements with individual faculty in each of the schools who allocated class time for students to complete the survey. The administrator of the study was not their instructor, nor did the students know him (minimizing any biases). Participation in the study was voluntary, however no students refused to participate.

Of the students in the survey, 43 were juniors, 88 were seniors, and one was a graduate student (although all surveys were administered in undergraduate accounting classes) (See Tables 3-2 to 3-6). There were 54 males and 78 females. The majority were between the ages of 21-25[17]. Grade Point Averages (GPA) ranged from 2.0 to 4.0 (on a 4.0 scale), with an average GPA of 3.235 (SD=.426)[18]. While four of the students indicated no prior computer-related course work, 128 of the students reported taking between 1 and 6 computer-related courses during their college careers, with an average of 2.2 computer-related courses taken (SD=1.25) (Table 3-5). Only 11 students reported membership in Beta Alpha Psi (Table 3-6). Since only two of the schools have chapters of the fraternity, and since membership is generally only available only during students' senior year, this is not surprising. The

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[17] The typical age of a university Junior or Senior is between 19 and 22 years of age. Non-traditional students tend to be older.
[18] Typically the large accounting firms recruit from a pool of those students with GPA's above 3.0.

majority of the students in the sample intended to enter public accountancy upon graduation.

Table 3-2 - Gender

Gender	Frequency	Percent
Male	54	40.9
Female	78	59.1
Total	132	100.0

Table 3-3 - Grade Level

Year	Frequency	Percent
Junior	43	32.6
Senior	88	66.7
Other	1	.8
Total	132	100.0

Table 3-4 - Ages of Sample

Age	Frequency	Percent
16-20	22	16.7
21-25	76	57.6
26-30	18	13.6
31-35	7	5.3
36+	9	6.8
Total	132	100.0

Table 3-5 - Number of Computer-Related Courses Taken

#	Frequency	Percent
0	4	3.0
1	39	29.5
2	46	34.8
3	20	15.2
4	17	12.9
5	4	3.0
6	2	1.5
Total	132	100.0

Table 3-6 - Membership in Beta Alpha Psi

BAP	Frequency	Percent
Yes	11	8.3
No	121	91.7
Total	132	100.0

3.3.2 Administration of the Field Research

In the summer prior to conducting this study, a sample of 50 students was used to pilot test the instruments. This was done to determine how long the researcher would need to request for administration of the actual study. Also the pilot test showed if scores fell within a given range, minimizing "ceiling effect" and other anomolies that could affect results. The pilot test also helped to determine if further instructions were necessary for students to understand how to complete the cognitive styles test or the technology questionnaire.

The research instruments were administered directly in the classroom, facilitated by the author. Accounting faculty at several universities were contacted to provide subjects for the project. The universities chosen were a random sample of mid-tier schools with geographic proximity to the researcher. Upon receiving several affirmative responses, this researcher was invited to visit upper level undergraduate accounting classes. Approximately twenty minutes was allocated to presentation and administration of the technology questionnaire and the cognitive styles assessment instrument. The instructor for the classes was not present during the administration

of this study and the administrator was not someone the students knew prior to this meeting. All respondents were given the option of not participating in the study.

All field testing was done under the direct supervision of the researcher. Data were later entered on a spreadsheet by an assistant. The researcher reviewed all data entry for correctness. Thirty responses needed to be discarded due to respondents' failure to complete one or both of the instruments according to instructions (not considered an unusually high number based on similar studies). The remaining 132 complete responses were analyzed in this study. Data were converted to a statistical analysis software package (SPSS Version 10, and later 11) for further analysis.

3.3.3 Instruments for Measuring Cognitive Style and Technology

The following sections describe the instruments used in this study. Following a brief discussion of cognitive style, the Gregorc Style Delineator is introduced. This well-validated instrument was chosen to measure students' cognitive styles. Further, validity of this measurement tool is presented. This is followed by a discussion of the development of the self-designed technology questionnaire used in this study. Next is a discussion of the techniques employed and the statistics gathering processes used to prepare results for analysis.

3.3.4 The Gregorc Style Delineator

Cognitive style was measured using the Gregorc Style Delineator. Designed by Anthony Gregorc, the Gregorc Style Delineator is a self-scoring test based on Mediation Ability Theory (a person's capacity to use channels of information), assessing the channels through which the mind receives and expresses information most efficiently and effectively (Gregorc, 1982). It was designed as a self-analysis tool to aid an individual in recognizing and identifying channels through which he/she receives and expresses information efficiently, economically, and effectively. These channels provide a person with "mediation abilities," referred to as "style" (Gregorc, 1984).

The Styles Delineator focuses on two types of mediation abilities: *perception* and *ordering*. Perception refers to a person's ability to grasp information, and its measures are *abstract* and *concrete*. Abstractness is the mental quality that leads to apprehension of intangible information through the use of reason, emotion, and intuition. Concreteness is the mental quality whereby one apprehends tangible information through the physical senses. Ordering refers to the means through which one arranges, systemizes and disposes of information, and its measures are *sequential* and *random*. The sequential end of the continuum entails linear, methodical, and systematic processing of information with discrete categorization of stored data. Randomness entails non-linear, unstructured, simultaneous, and holistic processing of information with broad categorization of memory representations. Gregorc states that

there are other individualities that are not measured by The Style Delineator which affect human behavior, however perception and ordering are two of the more salient measures of style (Gregorc, 1982).

Gregorc combines these characteristics - abstractness, randomness, concreteness, and sequentialness - to arrive at four mediation channels: *concrete sequential* (CS), *concrete random* (CR), *abstract sequential* (AS), and *abstract random* (AR). In the Style Delineator, individuals are administered a test consisting of ten sets of four words, which they are asked to rank ('1' indicating "least like me" to '4' indicating "most like me"). Each word corresponds to a particular mediation channel, and, when summed up, gives an accurate measure of an individual's propensity for operating within a specific cognitive style. With a possible score of 4 to 40 in each of the four mediation channels, Gregorc divides the scores in each area into: strong orientation as 27-40, moderate orientation as 16-26, and low orientation as below 16.

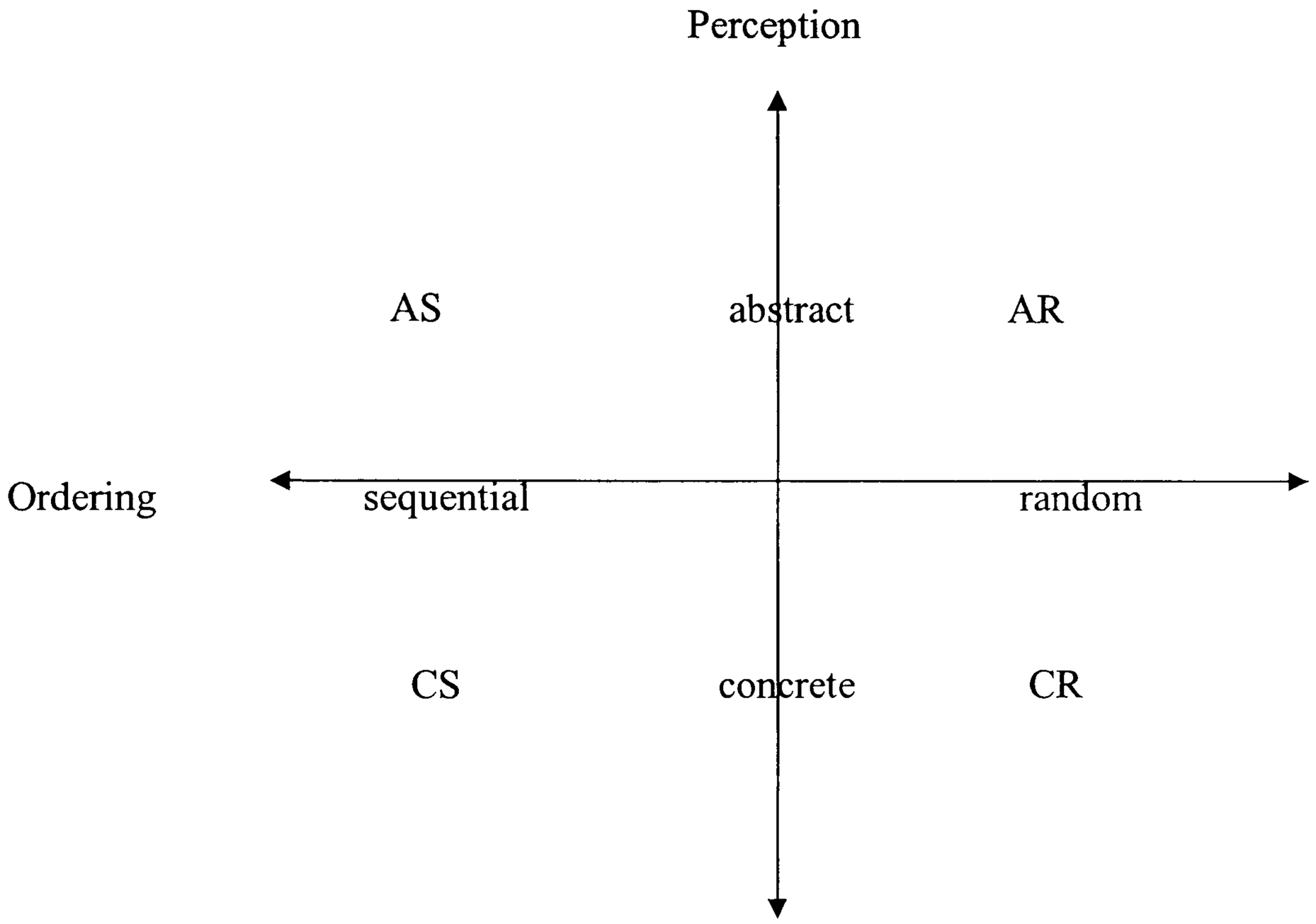
Gregorc asserts that roughly 90% of individuals have a natural predisposition toward one or two of these channels and those channels serve to mediate how the individuals learn and act upon their environment (Gregorc, 1982). The remaining 10% of individuals either have a strong orientation in more than two areas or equally balanced scores in all four areas. Research studies have further shown that approximately 37% of the general population is Concrete Sequential, 34% is Abstract Random, 19% is Concrete Random, and only 10% is Abstract Sequential (Seidel et

al., 1999). Correlations between the ratings and the attributes were: 0.85 for Concrete Sequential, 0.72 for Abstract Sequential, 0.82 for Abstract Random, and 0.86 for Concrete Random ($n=100$, $p<0.001$) (Gregorc, 1984). A detailed description of the development process of the Gregorc Style Delineator and a summary of various research studies done to show the validity of the instrument are described in Chapter 4.

There are several reasons for the choice of The Gregorc Style Delineator for this study over more popular instruments (Myers-Briggs Type Indicator, Kolb's or Canfield's Learning Style Inventory, Kirton's Adaptor-Innovator Inventory, and the like). The Gregorc, as stated above, is very well validated (see section on validity of instrument) and considered quite reliable for a range of applications, including cognitive style and learning style research. It is quite simple for the respondent to complete and can be finished in less than five minutes. This researcher is currently using this instrument in a series of studies of practitioners in the United States and United Kingdom as a follow-up to this study. (Shaw, 2002; Shaw & Pant, 2003) In order to be able to gain entry into large firms to administer a study, a minimum of time can be requested from a large number of respondents. Other instruments are much more time consuming and complicated to administer. Also, most of the other instruments surveyed tend to collect data on attributes beyond cognitive style (personality traits and the like) which are not examined in this study. Further, the

Gregorc has been used as a tool internally in at least two global accounting firms in the US as an evaluation and assessment tool for several years[19].

Figure 3-1 - Mediation Channels in The Gregorc Style Delineator:



(from Gregorc 1982)

3.3.4.1.1 Learning Characteristics in The Gregorc Style Delineator

Individuals classified as *Concrete Sequential* (CS) tend to be practical,

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[19] Efforts to gain access to data gathered by the firms in their own cognitive style studies by this researcher have been unsuccessful.

thorough, well-organized and prefer quiet, stable, structured environments. They tend to perceive reality as the concrete world of the physical senses, and think in a sequential, orderly fashion. These individuals can detect minute details and can work with the precision of a machine. They tend to do what they are told to do (Butler, 1984), do not like to go against the norm, and view work as a job assignment. Other characteristics include practical, persistent, objective, careful with detail, thorough, perfectionistic, ordered, realistic, solid, and product-oriented. CS's are most comfortable when the system tangibly rewards hard work. They prefer highly structured meetings and work environments, and have difficulty with people who exhibit strong mood swings or frequently change their minds.

Individuals classified as *Concrete Random* (CR) process information in three-dimensional patterns and think intuitively, instinctively, impulsively, and independently. They prefer competitive, unrestricted, and stimulus-rich environments. They tend to be risk-takers and can easily jump to conclusions, often correctly. Such individuals are divergent thinkers, thriving in areas that encourage exploration. Other descriptors include creative, trouble-shooters, concerned with multi-solutions, insightful, perceptive, risk-takers, and dreamers. CS's enjoy reducing attention to facts and details and trying to discover relationships that tie them together.

Individuals classified as *Abstract Sequential* (AS) tend to be evaluative, analytical, and logical individuals with a preference for mentally stimulating, orderly,

and quiet environments. They have academic-type minds driven by a thirst for knowledge. Such individuals perceive knowledge as powerful, and the ability to synthesize and relate concepts enables them to transmit ideas (through oral and written communication) intelligibly and eloquently. AS's tend to learn more effectively through lecture-style teaching (Butler, 1984). AS's can be described as logical, concerned with proof, referential, concerned with quality, judging, and rational. AS's prefer to take the time to study and discuss an issue rationally by gathering data, checking correlations, and weighing various viewpoints. They would much rather discuss serious philosophical and substantive issues rather than administrative detail and the like. They are comfortable reviewing, comparing, or synthesizing the thoughts of others and building on them. They do not relate well with adventurous people, dreamers, or people who use humor to convey ideas.

Individuals classified as *Abstract Random* (AR) are highly focused on the world of feeling and emotion and are sensitive, spontaneous, attuned, person-oriented people. Their thought processes tend to be nonlinear, multidimensional, emotional, perceptive, and critical. They prefer active, free, and colorful environments and thrive on building relationships with others. They tend to dislike extremely structured environments. AR's like to know that it is acceptable to change their minds or change tasks based on changes in their moods. They prefer meetings with flexible agendas. They have difficulty with practical matters and dislike individuals who get to the point rapidly, bypassing discussion and process.

Table 3-7 - Dominant Style Characteristics of the Four Mediation Channels

Frames Of Reference	Concrete Sequential CS	Concrete Random CR	Abstract Random AR	Abstract Sequential AS
KEY WORDS	Practical	Probable	Potential	Possible
WORLD OF REALITY	Concrete world of the physical senses	Abstract world of the intellect based upon concrete world	Abstract world of feeling and emotion	Concrete world of activity and abstract world of intuition
ORDERING ABILITY	Sequential step-by-step linear progression	Sequential and two-dimensional; tree-like	Random web-like and multi-dimensional	Random three-dimensional patterns
VIEW OF TIME	Discrete units of past, present, future	The present, historical past, and projected future	The moment: time is artificial and restrictive	Now: total of the past, interactive present, and seed for the future
THINKING PROCESSES	Instinctive, methodical, deliberate	Intellectual, logical, analytical, correlative	Emotional, psychic, perceptive, critical	Intuitive, instinctive, impulsive, independent
VALIDATION PROCESS	Personal proof via the senses: accredited experts	Personal intellectual formulae: conventionally accredited experts	Inner guidance system	Practical demonstration: personal proof: rarely accepting of outside authority
FOCUS OF ATTENTION	Material reality; physical objects	Knowledge, facts, documentation, concepts, ideas	Emotional attachments, relationships, and memories	Applications, methods, processes, and ideals
CREATIVITY	Product, prototype, refinement, duplication	Synthesis, theories, models, and matrices	Imagination, the arts, refinement, relationships	Intuition, originality, inventive, and futuristic
ENVIRONMENTAL PREFERENCE	Ordered, practical, quiet, stable	Mentally stimulating, ordered and quiet, non-authoritative	Emotional and physical freedom; rich; active and colorful	Stimulus-rich, competitive, free from restriction
USE OF LANGUAGE	Literal meaning and labels, succinct, logical	Polysyllabic words, precise, rationality; highly verbal	Metaphoric, uses gestures and body language; colorful	Informative, lively, colorful; "words do not convey true meaning"
PRIMARY EVALUATIVE WORD(S)	Good, Not Bad	Excellent	.Super, Fantastic, Marvelous	Great, Superior
NEGATIVE CHARACTERISTICS	Excessive conformity; unfeeling, possessive	Opinionated, sarcastic, aloof	Spacey, overly sensual, smothering	Deceitful, unscrupulous, ego-centric

(from Gregorc 1982)

3.3.4.1.2 Validity of The Gregorc Style Delineator

Jung first identified the notion of two opposite sets of relationships (Gregorc, 1984). From his research he found empirical evidence that man is born with one function consciously in command, another working closely with it, and two other functions pushed down toward the subconscious. This "duality" is also identified in many traditions throughout history, including Egyptian, Hindu, and esoteric writings up through William James, Sartre, Buber, Freud, and others. Kolb (Kolb, 1976) uses this model to develop his early cognitive styles assessment instrument, the Learning Style Inventory, in which he uses the terms, abstraction/concreteness and impulsivity/reflection.

More than 400 individuals were involved in the research leading up to the development of the Gregorc Style Delineator (Gregorc, 1984). The research interviews focused on actual experiences, known as *noema*. The next step focused on individuals' reflections on the experiences, called *noesis*. The noema and noesis were analyzed and created a *noetic correlation*. As the data emerged, the neotic correlates that had strong importance could be divided into two sets of polar opposite relationships that yielded four reasonably distinctive clusters with interconnecting themes. These themes were the driving forces of perception and ordering.

> Stability (or reliability) of the Gregorc Style Delineator has been demonstrated through multiple administration of the test to the same individuals over a period of time (Gregorc, 1984). The correlation coefficients between two

administrations of the instrument range from 0.85 for Concrete Sequential to 0.88 for Abstract Random. Predictive validity, that the instrument actually predicts what it is said to predict, is also within acceptable ranges. On a sample of 110 individuals, Gregorc (Gregorc, 1984) correlates self-ratings of attributes presented in random order in the range of r=0.55 for Concrete Random to r=0.76 for Abstract Sequential. The reliability and validity of the Gregorc Style Delineator can be characterized as strong.

Numerous studies have been conducted to investigate the Gregorc Style Delineator's efficacy as a cognitive styles inventory measurement tool. Drummond and Stoddard (Drummond & Stoddard, 1992) investigate the relations between the Myers-Briggs Type Indicator and The Gregorc Style Delineator to examine the construct validity of the Gregorc. Their findings confirm that both instruments result in similar assessments, although using different terminology. Harasym (Harasym, 1996) confirms Drummond and Stoddard's findings.

O'Brien (O'Brien, 1990) examines construct validity of the Gregorc Style Delineator through factor analysis. In his study, he measured the cognitive styles of 263 undergraduate university students using Kolb's Learning Style Inventory and the Gregorc Style Delineator. Results indicate that the four scales contained in the instrument were reliable and represented mediation theory.

Sewall (Sewall, 1986) compares the Gregorc Style Delineator to several other instruments (Myers-Briggs Type Indicator, Kolb Learning Style Inventory, Canfield

Learning Styles Inventory). His findings suggest that the Gregorc is comparable in convergent validity to these other instruments. Riding and Cheema (Riding et al., 1991) reach the same conclusion.

Joniak and Isaksen (Joniak & Isaksen, 1988) compare the Kirton Adaptor-Innovator Test to the Gregorc and show consistency and validity in both instruments. Bokoras et al. (Bokoras et al., 1992) review five measures of cognitive style, including the Gregorc, and suggest three underlying dimensions despite differences in terminology and theoretical bases of the instruments.

Atkins et. al (Atkins et al., 2001) in their observations of computer mediated communication compare several cognitive/learning style theories and measurement instruments. They note that those of Kolb (Kolb, 1976), Honey and Mumford (Honey & Mumford, 1992), and Gregorc in effect are quite similar. Only in extreme cases will the instruments reveal differences.

As described earlier, cognitive style can be defined as "distinctive behaviors that serve as indicators of how a person learns from and adapts to his/her environment. It also gives clues as to how a person's mind operates" (Gregorc, 1979). The Gregorc Styles Delineator classifies individuals along four mediation channels – Concrete Sequential, Concrete Random, Abstract Sequential, and Abstract Random. Although the general population is more or less divided equally in these

four classifications[20], specific groups of individuals may not necessarily be as evenly divided in these channels. At least one study (Soroko, 1988) indicates that accountants are predominantly Concrete Sequential. Traits of individuals within this channel apply to skills necessary for traditional accounting functions – methodical, precision-based, facts and numbers driven, and the like. In contrast, individuals involved in creating, utilizing, and communicating knowledge, specifically through network channels, may need to call on traits that have other descriptive characteristics to accomplish their tasks.

As indicated in the chapter describing the results of this study, students are either ranked as "high Concrete Sequential," meaning that their scores on this channel are 27 or higher, or students who score below 27 on the Concrete Sequential scale are ranked as "low Concrete Sequential." These ranges have been well established and are described in detail in an earlier chapter. The study further classifies those who scored high on Concrete Sequential and at least one other mediation channel. This selection of categories is the result of the large number of high scores on Concrete Sequential, and the very small number scoring high in other channels. Further discussion on this can be found in Chapter 5.

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[20] Research studies (previously cited) have shown that approximately 37% of the general population is Concrete Sequential, 34% is Abstract Random, 19% is Concrete Random, and only 10% is Abstract Sequential.

3.3.5 The Technology Questionnaire

After examining a large number of instruments designed to determine aptitude, proficiency, computer literacy, attitude, and anxiety issues around computers and technology in general (see Chapter 2), the author determined that it was necessary to create a new questionnaire that draws on existing instruments and updates them with new questions related to the most recent advances in computers and technology. The tests available were generally designed before the implementation of the newer technological innovations (network-based) and knowledge management technologies that this study is intended to measure.

Zakrajsek et al. (Zakrajsek et al., 1990) survey seven instruments designed to measure computer-related attitudes among users. Walters and Necessary (Walters et al., 1996) refer to the "Users Attitude Toward Computer Scale" designed by Francis in their study of students' attitudes towards computers. Stone et al. (Stone et al., 1996) use a self-designed computer efficacy instrument, COMPAS (Computer Anxiety Scale) in their study of Accounting Information Systems students, Qureshi and Hoppel (Qureshi et al., 1995), using the Bath County Computer Scale, record measurable differences in students' attitudes toward computers due to gender, status, GPA, major, prior computer experience, and anticipated future use of computers (Refer to Table 3-8).

Other computer measurement instruments surveyed include: the Computer Anxiety Rating Scale (CARS) (Heinssen Jr. et al., 1987), the Computer Attitude

Scale (CAS) (Loyd et al., 1984), the Computer Self-Efficacy Scale (CSE) (Murphy et al., 1989), and the Computer Attitude Scale (CAS) (Nickell et al., 1986). As previously mentioned, these well validated instruments and several others were designed before the introduction of the Internet and other network applications, which this study is designed to examine (Refer to Table 2- 3).

The questionnaire created for this study is based on existing research instruments designed by Murphy et al. (Murphy et al., 1989), Loyd and Gressard (Loyd & Gressard, 1984), and Francis (Francis, 1993). Questions were updated to take into account significant advances in technology since the design of these instruments, especially advanced accounting and knowledge management applications and network systems, which are highly utilized by accounting professionals.

The questionnaire (Appendix C) used in this study is broken down into two components. The first section contains forty questions aimed at evaluating students' self-assessed proficiency (15 questions), attitude (10 questions), and anxiety (15 questions) about computers. Section one utilizes a five-point Likert Scale to measure degree of self-assessed proficiency, attitude, and anxiety, scored where 1 is the lowest possible range and 5 is the highest. Further, the section measuring students' self-assessed computer proficiencies is divided into questions at three levels. The first level is basic computer literacy skills. The second level is proficiencies well established as essential to success in accounting (for example, setting up a financial

spreadsheet application). The third section focuses on advanced computer applications and skills. These include proficiency with higher-level functions of database management programs, familiarity with networked accounting application, and the like.

It must be noted here that the technology questionnaire is based on respondents' self-assessed measures of their proficiency, attitudes, and level of anxiety around computers and technology. It was not possible to assess participants' actual levels of technological proficiency, attitudes, and anxiety for the purposes of this study. Perceived knowledge is measured instead because these perceptions have been found to be important in influencing cognition, decision making, and behavior (Radecki & Jaccard, 1995). There are, however, limitations to the extent that individuals do not always have good insight into their own knowledge levels (Kennedy & Peecher, 1997). Concerning technology acceptance specifically, Ellen et al. (Ellen, Bearden, & Sharma, 1991) suggest that individuals' perceived abilities to use information technology successfully affects their evaluative and behavioral response.

Attitude as used in this study may be defined as "a predisposition to respond in a favorable or unfavorable way to objects, persons, concepts, or whatever" (Fisher, 1995). Anxiety indicators in individuals include: avoidance of computers and the area where they were located, excessive caution when using computers, negative remarks toward computers and computing, and attempts to shorten periods when

computers were being used (Simonson et al., 1987). The relationship between proficiency, attitude, and anxiety have long been held as related (see discussion in Chapter 2).

The second section of the questionnaire gathers typical demographic information on the subjects. This includes age, gender, GPA, major field of study, specific university attended, membership in Beta Alpha Psi (the accounting honors fraternity), and number of computer-related courses previously taken.

3.3.6 Statistics

Table 3-8 shows the various data gathered through the questionnaire and the cognitive styles assessment test. These will be described later in the chapter.

Table 3-8 - Descriptive Statistics Collected

Description	**Measurement/Range**
Computer Proficiency - Level 1	5 questions (5-point Likert) 5-25
Computer Proficiency - Level 2	5 questions (5-point Likert) 5-25
Computer Proficiency - Level 3	5 questions (5-point Likert) 5-25
Concrete Sequential (CS)	10-40 (27+ considered "high")
Concrete Random (CR)	10-40 (27+ considered "high")
Abstract Sequential (AS)	10-40 (27+ considered "high")
Abstract Random (AR)	10-40 (27+ considered "high")
Computer Attitudes	10 questions (5-point Likert) 5-50
Computer Anxiety	15 questions (5-point Likert) 15-75
University	4 different universities in study
Major	Accounting (Undergraduate) or other
Grade level	Junior, Senior, Other
Gender	Male, Female
Age	6 age ranges
GPA	On a 4.0 scale
# of computer courses	0 - 6
Beta Alpha Psi membership	Yes or No

In response to comments of the interview subjects on recent entrants to the accountancy field, the study also examines the relationships between cognitive style and computer proficiency, given attitudes towards computers and anxiety around technology. The study compares cognitive styles of technologically proficient accounting students to those who have less proficiency with the technologies employed within the knowledge-based organization. These technologies relate to knowledge areas including designing, auditing, and consultative areas, and such technologies as electronic commerce, electronic data interchange (EDI), enterprise

resource planning (ERP), computer supported collaborative work (CSCW), and other network accounting applications. The study further examines other relationships that may affect an accounting student's computer-related skills and proficiencies. These include relationships between computer proficiency, computer anxiety, attitudes toward technology, gender, age, GPA, and other factors.

Expanding on the second primary research question as outlined in Chapter 2, the main research question at the center of the empirical part of this study is:

RQ_1: Is there an incremental contribution of cognitive style to computer proficiency in a group of undergraduate accounting students?

Other related research questions examined through this study include:

RQ_2: Is there a relationship between computer attitude and computer proficiency in a group of undergraduate accounting students?

RQ_3: Is there a relationship between computer anxiety and computer proficiency in a group of undergraduate accounting students?

RQ_4: Are there any relationships between computer proficiency and any demographic attributes in a group of undergraduate accounting students?

3.3.7 Data Analysis Techniques

Completed questionnaires were coded onto an Excel spreadsheet, which was used to both collect data and further reclassify data. "Yes/No" questions were coded

as 0's and 1's, as was Gender (Male=0, Female=1). Technological proficiency, anxiety, and attitude were scored on a 5-point Likert scale, where 1 is the lowest possible score through 5, highest possible score. Selected questions were inverted to control for repetitive responses. The Gregorc Style Delineator was scored directly on the instrument. Scores in each mediation channel were entered on the Excel spreadsheet.

Several manipulations of data were explored, especially in the area of cognitive style. In addition to raw scores on the four mediation channels, data were examined and ranked as high (27+) or low (below 27) on each of the mediation channels. As described in the next section, since a predominant ranking of high in Concrete Sequential was observed in the sample, further iterations of data were examined as either "not high CS," "high CS," or "high CS and one or more other styles" (0, 1, 2 prospectively). Because such a large number of the subjects scored high in CS or CS and another style, it was not possible to conduct similar statistical analysis on those who scored high in other mediation channels. These students were coded merely as "not high CS".

Descriptive statistics, regressions, correlations, t-tests, and ANOVAs were analyzed through conversion of the spreadsheet data to SPSS (version 10.0). All analyses were double checked by both the author and the author's graduate research assistant prior to inclusion in this study. Results of the various analyses are described in Chapter 5.

3.3.8 Summary

This chapter describes the dual-methodological approach employed in this study. The overarching purpose of this study is to explore those changes in global accountancy firms, specifically those related to knowledge management and the technologies it utilizes. The major focus of this research is cognitive style and its relationship to knowledge-based technological competencies in future accounting professionals.

The next chapter summarizes and highlights results of the practitioner interviews conducted in the first step in this project – a series of semi-structured interviews with accounting practitioners. These interviews confirm the rationale for the empirical study then conducted. Chapter 5 summarizes and analyzes the results of this second part of the study, an empirical examination of cognitive style and technological attributes in a group of undergraduate accounting majors at several United States universities.

4 - ACCOUNTING PRACTITIONER INTERVIEWS

Chapter 4 - ACCOUNTING PRACTITIONER INTERVIEWS

4.1 Introduction

Fifteen seasoned practitioners at global accountancy firms agreed to be interviewed for this study. Interviews were conducted utilizing the semi-structured format, described in the previous chapter. Information about these subjects is also outlined in the previous chapter. Table 4-1 summarizes the various questioning streams developed in these interviews. Table 4-2 summarizes the make up of the fifteen interviewees. Appendix B gives a basic outline of the typical questioning areas followed throughout each of the 15 interviews. This chapter contains selections culled from the transcribed audiotapes. These excerpts are representative of responses to the major lines of questions. The responses presented here are not edited and are direct quotations (including any grammatical errors)[21].

Over 20 hours of audio transcripts were collected, providing rich qualitative results validating much of the literature discussed in Chapter 2. Further, the statements and comments made by the practitioners in this process provide much insight into the actual research questions at the heart of this study. Namely, what is the magnitude of change experienced in the accountancy profession, especially due to techniques of knowledge management and its related technologies? Further, are today's accounting students, those preparing to enter the profession, in possession of

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[21] The entire collection of transcripts is available for examination.

the skills and other qualities necessary for success as accounting practitioners? This chapter describes the various questioning lines and includes selected responses of the interview subjects. These interviews form the basis for the examination of cognitive style and technological attributes undertaken in the next chapter.

4.2 Changes in the Accounting Profession

Professionals had a variety of responses about how the accounting profession and their firms had changed over the years they have worked there, a variety of responses ensued. Areas identified ranged from a broader array of services now provided in accounting firms, the increase in the amount of accounting rules and regulations, and, most emphatically, the increase in the amount of technology used in all areas of the practice. Another interesting comment by several subjects was the expectation of further mergers among the Big 5 accounting firms[22].

4.2.1 Expanded Services

Expanding services and competition among the Big Five firms have changed. Several interviewees mentioned the fact that the accounting firms no longer identify themselves solely as accountants and auditors. In fact, due to identity and image

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[22] Originally the Big 8, merging of firms has reduced the number to six, then five firms. Following the events precipitated by the collapse of Enron, the demise of Andersen has brought the number of firms down to four.

issues, these terms are even avoided in promotional materials. Firms now compete as "business advisors" in a way that is much broader than the confines of financial statement audits, tax areas, and traditional accounting roles. This conforms to the goals identified in the AICPA's Vision Project (AICPA, 2001a). As one partner in a large firm notes:

> "Now we are doing everything from audit to IPO's to compensation and benefit consulting. We even consult companies on security issues. Accounting firms have really broadened the type of services that they are bringing to their clients."
>
> *Interviewee* 9

Another practitioner comments on the expansion of services his firm offers:

> "The major change is the evolving nature of the services provided by CPAs, both in public practice as well as CPAs working in industry, evolving from services that were based primarily on analyzing and reporting on historical results and providing services of a compliance nature particularly in the tax service areas to services that are more advisory in nature, more forward looking in nature and much broader in nature in terms of the competencies and skills that are needed in the marketplace."
>
> *Interviewee* 10

4.2.2 Commoditization of the Financial Statement Audit

Several practitioners defended the importance of the financial statement audit (AICPA, 1997), often questioned as losing relevancy. Factors such as independence, increased regulation, and litigation (i.e., Enron) have brought the audit function back to the forefront. Once considered a commodity, many firms now look at the audit as a "value added" service for clients:

> "I think the audit is now becoming less of a commodity and I think audit committees because of their focus on independence, because of the scrutiny in looking at fees. People have begun to recognize that the audit fees probably aren't where they should be and, as a result, maybe the accounting firms are not giving the audits the attention than they might have deserved in the past. … The audit committees are now looking at the audit fees and looking at it again less like a commodity and say, 'no, this is very important', the audit has to provide value."
>
> *Interviewee* 11

4.2.3 Decline in Customer Loyalty

Client loyalty has changed. Practitioners note that companies tended to remain very loyal to their audit firms. It was very rare, and considered a red flag, for a company to change from one auditor to another. One subject noted that this was the most significant change affecting his practice. The implication is that companies view the audit function as a non-value added service, and that it doesn't matter which firm performs the audit, the result will be the same.

> "The biggest change that I have seen is just in terms of our clients. When I started out, our clients were very loyal to us. We would do

their audit and their tax work, and they would never think of going to another firm, unless they were completely dissatisfied with the service they were getting. Within the past 5-7 years, that has changed. They are not loyal anymore. I think they are shopping for what they believe to be the best in that particular area. That is why they are going to the various accounting firms. It isn't just the lower price..... Sometimes it is just their perception of who is the leader in their particular area that causes them to go outside the firm."

Interviewee 9

4.2.4 Increased Regulation

Several practitioners commented on the increasing number of rules and regulations that have been created. This is a result of an increasingly more complex set of accounting principles (GAAP) coupled with increases in regulations by bodies such as the Securities and Exchange Commission and other agencies[23].

> "I think the biggest trend that I have seen is the fact that the rules and regulations are getting more and more complicated as time goes by. The proliferation of accounting literature is off the scale, especially the rules and regulations that we're dealing with. Not only from the accounting profession, the AICPA and the FASB, but also from the SEC standpoint."

Interviewee 5

Two more practitioners noted that these regulations have the tendency to change the role of the accountant/auditor to that of a policeman:

> "The first thing you look for is that your on guard for people that are pushing the envelope as far as the accounting goes, especially in the area of revenue recognition. The CPA profession has always been the policeman, but it is very difficult for those people, now more so than it

[23] It must be noted that these interviews were conducted prior to the implosion of Enron and the auditing firm of Arthur Andersen.

> has been in the past because people try to push the envelope in every way they can."
>
> *Interviewee* 14

Most recently we have seen several companies in a position of having to restate earnings results due to accounting irregularities. The complexity of business enterprises and the ever-increasing amount of rules and regulations have made preparation of financial reports and related disclosures much more complex for the auditors.

> "The biggest change I've seen that impacts us on a day-to-day basis is the new accounting rules and the literature and the interpretation of those rules that has come out. It is just overwhelming. The focus on enforcement by the SEC and their role has certainly changed. The whole area of accounting roles has caused us to be less like business people in terms of how we deal with our clients and more like policemen and policewomen in terms of 'no you can't do this, no you can't do that.' We need to be much more diligent in our research and education to make sure that we understand the rules, how they are applied, and the consequences if they are not applied properly."
>
> *Interviewee* 11

These comments about increasingly complex rules and regulations around accounting and financial reporting emphasize that there is still a very strong need for competency in the technical aspects of accountancy. Knowledge management and technology skills, global perspective, analytical and communication skills will not replace the need for practitioners to be experts in the accounting knowledge base.

4.2.5 Broader Array of Services

Most subjects noted that the increasing array of services now offered by accounting firms has, among other things, created new and more exciting types of work, which may have a tendency to attract better people into the accounting profession (AICPA, 2001a). Practitioners have experienced increased pressure to bring in additional sources of revenue to augment fees for traditional services:

> "The pressure to create more consulting-type services has expanded every professional's ability to get out of audit or tax if that is not what they find a career path in and stay with the firm. … They have been able to retain a lot more people by having a diversity of opportunities. There is a lot of pressure to bring in new revenue sources."
>
> *Interviewee* 4

4.2.6 Increased Skills Needed

As a result of these changes in the profession and the services now being offered by accounting firms, the skills necessary for success have changed (IMA, 1999). This is discussed later in this chapter, however, it is important to note here that interviewees see this as a very significant trend in the profession:

> "The skills people need now are much more on the communication side, because the audit process has changed. It is much more interview intensive. They are going to have to communicate with the client, get the information, and write it up. If they can't, the audit process falls apart at that point. Communication skills are just as important as technical skills. Ten years ago, technical came first. You

focused on that and then you made sure they had a minimum amount of communication skills."

Interviewee 4

4.3 Impact of Technology

Clearly the most significant change identified in the accounting profession among the subjects sampled, was the impact technology has had on the profession, as asserted in Chapter 2. Different practitioners described that impact from various perspectives, depending on their own interests and areas of expertise. One practitioner, formerly in audit and now working as a college recruiter, described technology's impact as follows:

> "We can get entry-level people really doing more challenging types of things from the get-go as opposed to when I came out 20 years ago, when before the advent of technology a lot of mundane, boring stuff that people had to do that technology now has eliminated much of, so they can hit the ground running and do some things that are really challenging for them as an accounting graduate."
>
> *Interviewee* 2

Another practitioner summed up the use of technology and its impact on the firms as follows:

> "When I first entered [the firm], we had just introduced what was then called a portable computer. That was big excitement. It comes in now where everyone has their mini-laptops and their Palm Pilots and then just comes to the office and synchronizes. You have multiple technology devices being used to talk to one another. Date books are going away. Old timers still carry around a hard copy date book, but

every one else has their Palm Pilots."

Interviewee 4

Two practitioners noted that technology has had a significant impact on the audit function. The first notes a drastic change:

> "From the accounting side there is a difference in the way that auditing is done now. Back in the days when I started with the firm and everything was very process-oriented, big extensive spreadsheets, 24-column pages with a lot of ticking and tying. [Today we have an] unintermittant use of technology through an analytic technology-based audit with more of a thought-through, top-down approach to serving clients. Before it was a lot of individual execution on specified areas."

Interviewee 15

While the second respondent views the audit process to be quite similar to the non-technology days. He notes that although technology has eliminated a lot of the manual labor involved in auditing, the need for higher level skills and analysis is now called for:

> "Basically an audit has not changed that much, but the way we execute it has changed. Technology has certainly reduced the manual labor involved in executing an audit, at the same time we always reduce the number of man hours, it has also increased the need for more sophisticated people in executing the audit; better analytical skills and the ability to use the technology."

Interviewee 14

A tax partner described to the researcher the impact technology has had on his tax practice. The ability to transfer documents via the Internet has increased productivity significantly and enabled accountants to deliver much better services to

clients. The area of use of technology to provide better services to clients is examined in the next line of questioning.

> "Probably the most dramatic change in the way we do business is via the Internet. The Internet has significantly changed. Starting in 1997 was probably the first time it became the norm to be able to ship legal documents over the Internet electronically and share information in that way. I would say today 2/3 is done over the Internet. That has a dramatic difference in the way we do business and do our job and share information with our clients. From a practice standpoint, from a business standpoint, we are much more efficient and productive today than we were 5-10 years ago. Now we are focused more on other ways to serve clients and help with their business tax issues and problems."
>
> *Interviewee 7*

4.3.1 Use of Technology for Client Services

The use of technology has permeated every aspect of an accounting or auditing practitioner's life today (AICPA, 1996). Whether in the area of audit software, tax research, client communication, audit team scheduling, or any other function, various computer applications have allowed firms to provide faster, better, more comprehensive service to their client base. A Big Five tax partner summed this up, as follows:

> "This laptop goes just about everywhere I go. It goes to clients. It goes to school and unfortunately, it goes home. I have attached a CD that I carry everywhere that has current tax codes, regulations and other IRS authoritative tax guides. It has most of the stuff you'd every really want to look for. As far as the programs we use: we use Lotus Notes for e-mail. Within Lotus Notes, we have some firm-wide databases that we manage, databases everywhere from doing

employee evaluations to employee staffing, to billing to collections to doing documenting our quality control procedures. We have tax databases, both for research, for policies, procedures, releases. We have databases for the teams that we are involved with. We keep a database that we log that tracks all our proposal activity. It tracks our contacts, our checklist, group administration, marketing activity, technical presentation, and proposals. Everybody that is part of the team has access to this database. We have four different databases of technical material to go through. I track all my notes from meetings on my Palm Pilot. I keep a memo for agendas, for meetings, for projects. I download various news service articles so I can read it if I am commuting or somewhere that I have a free minute."

Interviewee 7

The tools available to the practitioner are extensive. One of the issues of concern to this researcher is whether all members of the firm actually take advantage of all of these tools. When asked this question, the majority of the practitioners noted that there is a fair amount of inconsistency as to whether individuals really utilize all of the technological innovations designed to provide more and better service to their clients.

"We have an awful lot of tools that I'm not sure that everyone is fully functional on. But when they are used correctly, they do allow us to look at things that we were not able to in the past and to be able to analyze thousands of transactions or thousands of account balances at a time. We've moved towards a web-based approach that hopefully will allow us to look into the books and records and rely on that more and to hopefully become more of an advisor than just trying to get through and process a bunch of invoices.... We're probably not utilizing enough of the tools that we have on a regular basis."

Interviewee 5

The impact on the audit function is described in detail here:

> "Using audit software you can go on and just type in your risk assessments and have it pull up a selection of audit procedures that would address those areas. You select your procedure, have the program look at it, and say, 'based on the risk you assessed, the procedures you are doing don't match up.' That used to be all a manual judgment-oriented process....The computer program tells you that now. I think that just in the way we go out to a client to extract information from their files. We can now directly link up to their systems, not a mainframe anymore, not a big tape. You take your laptop. They give you a CD download and you can basically log in through a network and pull information that you need off their system. Using the client system has become much more easy and user friendly and [you do] not have to spend days figuring how to pull the information from a client. Everything is done through technology. Time differences in doing an audit overseas – now with e-mail, you can get on, send a message, go home, and log on your computer at home at 1 AM, if you need to check something."
>
> *Interviewee* 4

He further noted, "It's hard to imagine how we worked without it."

Another practitioner said that the most important impact of technology to be the way in which he communicates with clients. Telephone conversations, faxes, many face-to-face meetings, and mail have been replaced:

> "I would say e-mail is almost more prevalent than speaking on the phone in lots of cases. E-mail is probably the first means of communication to introduce somebody to a topic or work product. This is one huge change."
>
> *Interviewee* 6

Of course, this has created some problems. With the amount of information available on-line and through e-mail correspondence, it is often difficult to determine what is of vital importance and what has less relevancy (Dede, 1996).

> "Every staff person that comes in the door will get something like this [indicating laptop computer] that has a built in CD ROM. It has the latest software and chip speed and memory and everything else you need. If there are five people at a table, they can create an E-LAN and share information and documents amongst each other on the table without having to use disks and all that stuff. … The amount of information that you now get that is unsolicited both from clients and from third parties and from within the firm frankly because we are all connected to 77,000 people world-wide and if you get 25 e-mails a day, maybe five of them are important to you, but you have to read the other 20 to determine that they are not important to you. The amount of information that you receive because of this technology is too much and there is no filter. You are the filter."
>
> *Interviewee* 11

Another concern expressed by several practitioners, mostly at the senior manager and partner level, was that the use of technology would take away from individual judgment. Judgment in auditing is still viewed as vital (Tan et al., 1997). With all the tools available to expedite all of the various steps of the audit process, an auditor might merely follow the steps without actually thinking along the way about what risks are involved and other concerns. Here are various responses to confirm this concern:

> "For those engagements [small engagements] you can rely less on the audit process and more on instinct, because where are the risks? How do I take that instinct in that judgment that I have developed over the years and communicate that to my staff and my seniors, when they have their head in the computer. I have to do this checklist; I have to do that form. The technology is so complicated that they are focused on that and not looking at the big picture like I am. There is a kind of disconnect. You have the young people who are proficient at the tools, the software, the programs and the checklists, and you have the older generation or the people who kind of grew up and developed their instincts and judgments prior to this. How do you bridge that gap

between us and them?... I am afraid that if our people that are now younger people that are still being developed, they are not going to give out the judgment and the skills and expertise that we have. They are so focused on process."

Interviewee 11

One practitioner addresses his fear that using such technologies will diminish the possible challenges to continue to learn from experience:

> "The challenge for the firms is that we take some of those tasks away because of technology. We have to find ways to help educate or help these folks get up to speed so they do ask the right questions, so they
>
> do have a general sense of business and what that means. They have to continue to think. They have to continue to challenge."

Interviewee 12

In spite of the technological advances in the audit function, practitioners still see the importance of judgment in the process:

"We are continuously developing our audit approach to include technology but also to make sure that we are addressing risk areas and all of that.... We still really look at the big picture and try to use the professional judgment necessary to perform a good audit."

Interviewee 8

"The tools are helpful to process a lot more information that we never could have before, but you still need to use your individual judgment to assess those things or understand what the program is trying to tell you in the first place, rather than just read whatever the outputs are."

Interviewee 6

There certainly exists the fear that relying on technology in pace of judgment will lead to problems:

> "To the younger staff people, it's almost like a video game. And the thing that can't be replaced is the interaction between, the supervision of, the audit staff. They have to be guided, they have to be told, they have to be lectured as to what to look for just to remain inquisitive and not just to accept the answers. … The abilities to reason, to make sure that an answer that they get makes sense. That is going to be more difficult to accomplish with the use of computer work papers. You can sense that you are losing it very fast. …If we are not diligent, there will be slippage."
>
> *Interviewee* 14

And technology cannot replace the need for communication, both among auditors and also auditors with clients:

> "We get too dependent on or lazy [referring to reliance on technologies]. If we just let go of the human interaction or having conversations to discuss issues, I do think that things can be lost if you're just reading an e-mail from somebody or you're not getting face time with folks. I think an important thing to our firm is developing relationships and they can be developed and served well by responding to requests quickly and being able to do so from long distances electronically over the phone and that kind of thing. We really need to be careful that we don't lose sight of that and focus on just sharing information through the use of technology."
>
> *Interviewee* 6

Firms have increased training to deal with this problem. They have also attempted to incorporate steps within the audit software products that prompt auditors to ask questions, and help to identify areas of concern.

"I think probably from the audit perspective, there are two things that it has really helped us with. The first has been efficiency. What used to take months might now just take weeks. A second area is that some of our data interrogation tools have been able to help not only in the audit process, but also to help point clients in directions of places where they can make improvements in their controls, in some cases even save a client money."

Interviewee 8

Although practitioners clearly acknowledge the benefits of using computers in the audit process, concerns still exist:

> "I think there are pros and cons to having the audit process be structured and have a program to let you wade through it. It does build in efficiency if you can get to learn it and become efficient at it and effective at it. You need to understand how to tailor a checklist or what form to fill out for that client.... The audit programs being computerized can clearly add value to the clients and can add value to our lives, but can also hurt you if you find yourself in litigation."
>
> *Interviewee* 11

Certainly the move towards implementing extensive technological innovations was met with resistance by many. Practitioners who entered the profession before the onset of most of these technologies were resistant to change:

> "When we first began this move to technology roll out, I think a lot of the partners and the folks who have been around for a lot of years were against it, but I think now the majority of the folks understand that we need them to survive and that it is kind of a must."
>
> *Interviewee* 12

4.3.2 Use of Technology for Collaborative Work

Knowledge management theory (Nonaka et al., 1995) describes a process in which individuals within a knowledge organization use technological tools to facilitate the sharing of their knowledge with other members of the organization. These tools and their implementation are discussed in detail in a previous chapter. One of the important aims of this series of interviews is to ascertain the level of actual implementation of these theoretical models in professional service firms. Large global public accounting firms serve as a key example of the type of knowledge organization described in the literature (Empson, 1999). A series of questions was designed to illicit descriptions of the tools used, the pervasiveness of these applications in the organizations, and the attitudes of practitioners concerning knowledge management principles.

There were a wide range of responses as to the availability and level of usage of various knowledge management tools among the various practitioners interviewed and the firms they represent. Although it appears that all firms have embraced technology and knowledge management as a way of disseminating information to its members and allowing the sharing of knowledge, in actuality some rely on this more than others. One Big 5 partner described his firm's initiatives as follows:

> "We have something called the Center for Business Knowledge. We incent [i.e., motivate] people to share knowledge. So if you're researching or coming up with some research requirement or initiative that you've come across, the theory behind it is that we are going to ask you to submit whether it is five or ten submissions to the CBK.

Then if I am here in New York and someone is wherever in the world, I can go and search the CBK for 'derivatives' and come up with all kinds of information from all over the firm all around the world and point to a specific problem or issue that someone has dealt with and it gets them background. I do think that people are doing that fairly effectively.... You go the CBK route first and you search the database for information and if that is not good enough, you then call the technical person on call and you get the information."

Interviewee 12

Another respondent noted:

> "We have a kind of internal web site for sharing knowledge. It is a kind of bulletin board where we put our best practices on there and they often have contests..... Unfortunately, I think that a lot of our more special type of questions get handled over the phone. We use e-mail extensively, however if you have a very specific question, especially accounting wise, a lot of times we have to communicate with our national office or find out where another firm specialist is within the country. A lot of times that is not handled with technology as much as it possibly will be in the future. We often times e-mail memos that we have put together, but in the end it is handled over the phone a lot of times."
>
> *Interviewee* 8

It appears that the largest firms are continually increasing and improving their knowledge management initiatives:

> "I think that within even the Big 5 there is a lot of variance between where each firm is at.... I know that within the last couple of years, our firm has placed a new emphasis on both internal and external e-business and e-communications. They are continuously developing new web-based tools and are even starting to pilot some kind of web-based audit approaches."
>
> *Interviewee* 8

Much of the information sharing that takes place is still informal, often based more on existing networks of colleagues than utilizing knowledge management technological systems that firms have put in place. Several interviewees noted that not everyone in the firms embrace the new tools. The tendency of the older veterans is to rely on their existing networks. As one partner told me, "I usually rely first on what my people tell me." Other comments of note include:

> "Some of it is still kind of word-of-mouth. A partner knows a manager in an office because they have gone to a technical training class together or they actually taught that class and met the individual. A lot if it is database driven. … Now everything is stored in databases. A lot of it from a technology side, someone trying to get someone with an expertise. If I need someone with an expertise I can go to that website, see what the contact name is, call that individual and they typically would point to someone in their practice that meets what I need. I could e-mail an individual, but we try to make sure we have that contact name in there, so anybody can get the Intranet and go to that part o the service they are interested in, find a contact name and then either do an e-mail or telephone them."
>
> *Interviewee* 4

> "There are preexisting list of people with expertise in each office. I would say those are not used that frequently. I think the way it really happens is through relationships. We do have a lot of firm-wide meetings. We get to know the people from the other offices that do what we do. Based on the relationships that you develop through those initiatives and those seminars, you simply just know who to call. The longer you've been with the firm, the more relationships you have. If you have an issue with a particular company in Denver, I have three people I can call at San Jose. I have people that I know that I have done projects for here. I don't look at the list, I just know who to call."
>
> *Interviewee* 11

A few of the interviewees noted that although they are aware of some of their firm's resources for knowledge sharing, they are not fully aware of a lot of them and know that many in the firm also are in the same situation:

> "We do have some kind of information internally on some of our internal websites that by a kind of gross group, I mean industry, that would probably point us in the direction of some of the industry leaders within the firm. And also some technical experts. My guess is probably that there do exist some other sites in our internal information that could point us in the right direction of somebody at National office. I haven't used that. I think that probably a lot of times there is somebody in your own local office that has an idea of somebody you could call if you needed to move outside this office."
>
> *Interviewee* 8

> "There are several places to go and new places keep popping up. The firm has kind of a bulletin board sort of place to post information or new or that kind of thing to share information, but there are two or three official sites and I think there are probably several others that I am not aware of or that have better sharing of knowledge and better management of it. If we could centralize that process a little better."
>
> *Interviewee* 6

> "We have a directory which you can access through your computer and there is also a hard copy. I would tend to either talk to our sources in the office, maybe our international group. 'Who do you use in the UK who might have some knowledge in this area?' or I might go on-line and talk to somebody right in the UK office who could help me out in this area' ..... It is really informal now, but there may be a database that I just don't use because it is not in my area."
>
> *Interviewee* 9

The use of these resources is still sporadic and inconsistent:

"In practice, if I come across a situation where I need some assistance, I would go to a couple of different places. … We certainly have bulletin boards. Some people use them, some people don't. In my practice I would generally go to other avenues to try to find the resources that I need to use. I do one of two things. We can go grab someone and ask for information or a contact…. That kind of direct point communication works a lot better than a bulletin board. In order for a bulletin board to work effectively, you have to be monitoring it pretty closely. If this is kind of a general matter, that is of no rush or urgency, maybe the bulletin board works. As a matter of practice, most of the stuff we do has a sense of urgency to it…. I would say that in this particular practice it is hard to formalize something, because in today's business no two patterns are the same. It is a very complex environment. It is hard to put a simple formal structure."

Interviewee 7

The most common form of communication has now become e-mail. It has surpassed telephone and in-person conversation, and other forms of writing. Most practitioners agreed with this trend.

"If there is a particular technical issue that the local office has experience with, whether it's industry specific or if it's a general GAAP issue, an e-mail goes out. Independence checks are done through e-mail now….When we are proposing a new client, an e-mail will go out and say we're proposing on a company in such and such an industry, if you have expertise and can use some of your clients for references, let me know. And, in fact, in the proposal area, many times we get those things we can e-mail them a proposal we have done in a particular industry, so instead of re-creating the wheel, they can take that and some people call it 'cut and paste' and use that as a base."

Interviewee 2

Newer members of the firms are more inclined to use these tools. This is probably the result of two factors. First, the newer members have not assembled the

network of contacts globally within the firm that a more senior practitioner would have. Second, the newer members are more familiar with the types of technologies involved, having experienced them for most of their lives.

> "The younger people in the firm go to the firm's Intranet and they will pull down the 'knowledge link', and they will go down and they will be able to drill down into the various areas. They don't have a network of contacts, and this is how they navigate through the firm. To some of the other people around here that are older, they will still use the networks [of contacts]."
>
> *Interviewee* 14

It is interested to see how each firm has taken advantage of knowledge management tools to assist in several functions. Auditors discuss how it has streamlined the audit process for the teams working on engagements.

> "What you see in some places is having teams of accountants or clients working together off a shared server or shared website where everybody shares information, documents, and files in real time fashion. I think that happens on occasion now, but that is going to become more prevalent."
>
> *Interviewee* 6

"I think one of the interesting things that they have done recently is on the firm's audit site, which has a lot of knowledge sharing. People can write in who have done a client presentation on whatever standard has just come out for clients in the energy industry, for example. Here it is and you can use that and utilize it for your own clients. I think that site itself has really stepped the knowledge sharing because now you're getting submissions not only from the top down, but from the bottom up, so that the engagement teams that have come out with some interesting things have a place to post them and get them off to other people within the firm."

Interviewee 5

A partner, whose function is to review workpapers and other documents prepared by the field auditor no longer needs to spend time wading through piles of paper documents:

> "We were getting CD's to review instead of big binders of work papers. But now they just e-mail me the sections that I need. So everything is electronic. We scan in documents and embed them into the files."
>
> *Interviewee* 14

Knowledge management technology enables members of firms to stay current with recent pronouncements, regulations, and internal company policies. Firms have utilized their Intranets for in-house training, thus eliminating much of the need for extended travel to centralized training sessions. This has become a great cost saving to firms.

> "In terms of research, we have everything loaded up on the computer. Everything I want is uploaded automatically. When I boot up in the morning, the latest versions get updated on a monthly or quarterly basis, so we don't even control it anymore. I have the latest SEC rules, I have the latest FASBs, I have all the assurance bulletins. Any professional literature that you can imagine is resident on my computer and continuously updated, maintained by the national office. There is a new SEC rule on independence and you have to go through a training program. We completed the training program electronically. We were all given a registered CD and we had about six weeks to get it done. We did it at our own pace. Took the test and everything, pressed a button, and it just got transmitted electronically. In this way, I have met my independence requirements."
>
> *Interviewee* 14

Of course, there are some who complain that these new tools really cause more problems than they solve. One major complaint shared by many respondents was the volume of e-mail that has to be sorted through daily (Dede, 1996). Another comment was that it cannot replace face-to-face or telephone contact.

> "The use of e-mail has gotten to be ridiculous, I mean I log on and I have twenty five e-mails every morning. The use of e-mail allows people to hide rather than [meet] face-to-face and the [system] becomes clogged. But what we are learning to do is to sort them and to put stuff into containers where they can be found."
>
> *Interviewee* 14

4.4 Practitioners' Perceptions of Future Trends

The interviewer pursued a line of questioning around practitioners' perceptions of how they envision the future of both the accounting profession and their individual firms. Interestingly, a wide array of issues were addressed by the group of practitioners. First responses included the increasing use of technology in the profession, increasing regulations and accounting rules, further consolidation of the current Big 5 firms, and increased pressure to develop new service areas.

4.4.1 Technological Innovation

Several responses dealt with the impact of technology on the future of the profession. This is described as not only ending much of the tedious work of

generating things like auditor work papers, but also creating significant challenges in the areas of auditability and controls.

> "As a staff and senior accountant, you have a lot more exposure to the client's systems, their software packages and understanding how they work and how to get information out of them than we did five years ago, where you just took a client's printout of whatever they handed over. You looked at a sheet of paper then. Now it's 'let's look at the system' and understand how you process information and at least theoretically understand the business better and how your process transactions from start to finish, and understand how the company is initiating a transaction. Who all the different players are that touch it and handle it, where there are maybe additional costs incurred. Hopefully we understand the controls around all of those processes and identify if there is going to be a breakdown somewhere. Either there is a mistake made or there is a loophole for some sort of fraudulent activity or something like that. …. We're working on developing tools where we have kind of consolidated and better organized all the firms' different interpretations or application of authoritative literature to each of our clients' individual situations and maybe some of the more unusual transactions that we might see, and we're trying to begin consolidating and organizing that information and automating it, and putting it out in a software package that our professionals can obviously use better and more efficiently, and our clients can have access to as well."
>
> *Interviewee* 6

4.4.2 The Accountant as Business Consultant

Subjects describe actual function of the accountant as changing. Whereas accountants traditionally served as preparers of reports, today, analyzer, decision maker, and advisor are now the dominant functions of accountants (Elliott, 1992). A more dynamic role is described:

"I suppose accounting, when I hear that work to me describes what is now done by technology as opposed to what is done by human beings. The work connotes recording transactions, summarizing transactions, and what we're doing today as CPAs goes way beyond that. Actually machines, the software, does the accounting and we interpret the information, the results, analyze it and use it to give advice or to help clients make decisions."

Interviewee 10

The advent of technology also implies that clients can generate information in-house which they previously hired outside accountants for. This has been an impetus for the professional firms to generate additional services.

"When I started in accounting there was a lot of pressure in terms of demand and value. By that I mean information that clients at one time would obtain from us as their outside accountants is no longer expensive for them to obtain themselves. Through their own investments in technology they can do much of what we did for them at one time. So there is an increasing need for us to provide services of a higher value which would be along the lines of what we say in our firm 'sharing our knowledge and wisdom' with the clients as opposed to compiling data and reporting results. We are working more to analyze data, interpret data, integrate knowledge from a variety of sources and working closely with clients as they develop plans. Our goal eventually is to work with them all the way through implementation and that's where I see it going, although, as I look at it today, many of us are still working in the area of providing advice and counsel and direction now as much working yet through implementation."

Interviewee 10

4.4.3 More Service Offerings

Several interviewees noted the change in the array of services offered by the firms, brought on by many factors. The "commoditization" of the financial statement audit is frequently cited as a major driver for adding additional services, especially consulting and broader assurance services. In spite of this, several cautioned that the financial statement audit, as well as other services traditionally provided by public accounting firms, is still an important product, and cannot be neglected.

> "We can't ignore those traditional assurance services, tax services, because that really is an entryway into the other services that we provide and frankly there is still big revenue, although they don't have the kind of growth rate as a consulting service."
>
> *Interviewee 2*

Another significant trend foreseen by some professionals is the melding of services traditionally associated with accounting firms and other financial services firms, such as banks, insurance companies, and financial planning firms. This includes those other professions undertaking services traditionally associated with public accounting firms, as well as public accounting firms incorporating much broader services into their range of offerings. This confirms the set of goals established by the CPA Vision Project (AICPA, 2001a).

> "There is a blurring of the lines between all of those different financial services, whether it be accounting services, assurance services, banking services, general financial planning services…. We are aligning ourselves with other financial service organizations to provide that one-stop shopping that our clients can take advantage of. … We just started an alliance program within the last two months of

signing up law firms, because we recognize that at some point the legal profession will realize they can't continue to operate on their own and will have to change their regulations to allow joint practices with CPA firms."

Interviewee 2

"I think over the next several years that the number of services that we add to the firm will be vast. In order to survive, in order to continue to grow, I think you have got to continue to reinvent yourself and that is what the firms have done a really good job at, reinventing themselves, changing with the marketplace, adding services that make sense."

Interviewee 12

4.4.4 Increased Regulation

Many predict that increased regulation and market pressure will affect the role of accounting within our economic society. As one practitioner put it,

"My fears are that the SEC will continue down their crusade and in a couple of years we will all just be deputized and put sheriff's badges on and work for Washington."

Interviewee 11

Some predict that the way in which the financial statement audit and the production of annual reports will change drastically due to technological innovations. There is increasing pressure for faster release of year end information, and clearly the technology is moving toward making that possible. Concerns, however, do exist.

"Frankly the financial statement audit is very much obsolete now, in the age of instant information and all that kind of stuff. Certainly the SEC and many lenders still require that kind of stuff, but what you are

migrating to is what I call a 'virtual audit', as information is produced, and not just financial information, we will go in there and provide assurance to that before it's disseminated to the general public instead of waiting and doing annual or quarterly reviews. A 'perpetual audit', in terms of our clients' use, to produce this information, marketing information, whatever, to provide that assurance as an outside third party and disseminate that to the financial markets and the other users of that kind of information.... I don't think a historical financial audit that comes out two months after year-end has any value any more. The fact is that all it does pretty much is confirm what all the analysts have been saying for the last two or three months."

Interviewee 2

4.4.5 More Mergers

A couple of practitioners in Big 5 firms alluded to the fact that there is certainly a possibility of more mergers among the firms. Once known as the Big 8, mergers of firms has reduced this number to six and, more recently with the merger of Coopers & Lybrand with Price Waterhouse, to five large accountancy firms. Of course none of the practitioners was willing to share any inside knowledge of current discussions or further insight into this prediction.

> "I think there will be more consolidation. Just because it seems like there is just a given pool of people, especially once you get up into the higher levels and each of the firms is basically poaching from other firms..... I would say possibly going down to three [from currently five]."

Interviewee 9

4.4.6 Image of Accountants

An area of concern with many of the practitioners is one which originally motivated this research. Although this is primarily anecdotal, the public perception of the accounting profession is very different that what accounting really is. Accountants are viewed as introverted number crunchers with limited people skills, or analytical skills for that matter. This misperception appears to be pervasive not just to the general public, but also importantly to young people considering their career options. Many firms, in addition to the professional bodies that support them, are attempting to address this issue with publicity campaigns geared to high school and college students [for example, AICPA, 2001 #430]. As one practitioner states:

> "Our firm has really placed an emphasis on changing the image and the name. While I've been here I think that my function's name changed probably no less than four times. There is a stigma of an audit and the auditors and they really have tried to teach us to consult. A lot of our training now that we have is like consultant skills. They want us to add value if we can."
>
> *Interviewee* 8

Another accountant, in frustration, described his role:

> "We're not introverts. We're not sitting there wearing green shades, and saying, 'please don't let the phone ring.' At the same time, we tend to like structure, rules, regulations, kind of framework parameters to work with. Gray areas are fine, but I think we are the type of people who like to come to conclusions. Whereas in a marketing firm or some of these other more creative situations, it is a little different. Or on Wall Street it is a little bit more cutthroat."
>
> *Interviewee 7*

Alternatively, as another interviewee describes what she does on a day-to-day basis:

> "I can go weeks without doing any kind of mathematical analysis. I can spend 100% of my entire week on administrative matters. To some extent I think there is a misconception on what accountants on a daily basis do."
>
> *Interviewee 7*

This is clearly much different type of work that what is typically thought of when "accountant" is mentioned in public. As a matter of fact, the higher up one goes on the ladder, from staff to senior, to manager, to partner, the amount of time devoted to actual traditional accounting functions diminishes significantly.

> "If you think about the way an accounting firm is organized, once you get to the manager level, your role changes. You become more of a business entrepreneur, administrator, client service coordinator, than a number cruncher. It changes dramatically."
>
> *Interviewee 7*

Of concern to many in the field is the prospect that image problems combined with other factors are detracting good students from choosing to study accounting. Several practitioners identify the new 150-hour rule (AICPA, 2001b), now adopted by most state boards of accountancy, for allowing graduates to qualify for the Uniform CPA Exam as a needless barrier to entry. Most of those interviewed felt that the additional academic requirement does little to better qualify entrants to the profession, while creating a significant discouragement to anyone considering the study of accounting. Because of image problems, competition by fields considered more exciting (such as information technology), and additional educational

requirements, many worry about the quality of those now entering the profession. As one interviewee stated:

> "I don't think the best and the brightest have been coming into the profession in the last ten years. It is just tougher and tougher to find people that are the best and brightest. If we don't have good people in this business, we will die a slow death as a profession. Eventually people will lose confidence in our abilities to perform as CPAs and to do what people think we do. I think we've lost a little on that, a little bit of our reputation."
>
> *Interviewee* 14

Yet many are optimistic that, despite barriers to entry into the profession, the firms will be able to attract, select, and hire qualified applicants.

> "I see the accounting profession struggling. We still have a significant number of barriers to entry that prohibit people from, or deter people from, majoring in accounting. I think the next few years will be interesting, but I don't think it will make up nearly as much as firms would hope that they would. I think the accounting profession used to have an image problem. I think the accounting profession has to better utilize the skills that students are coming to the firms with, rather than asking the students to fit into an old fashioned model."
>
> *Interviewee* 15

The AICPA has recently announced a $25 million initiative to reach out to high school students. The goal of this program is to educate young people about the dynamic changes taking place in the accounting profession and to encourage them to consider studying accounting. Most accounting that is taught at the high school level is really bookkeeping. Because of that and the perpetuation of stereotypes about

accountants, students either are not considering the study of accounting or are choosing the field when it is not appropriate for them.

> "Even at the high school level, the bookkeeping that they call accounting will turn a lot of people off. I think if we really want to make a dent on the profession, and make some changes, we as professionals need to really get together and go in and help those 'bookkeeping' folks understand what is going on and help them get hip so people then see accounting as a viable option."
>
> *Interviewee* 12

Finally, one respondent appears to have summarized the various comments on changes in the accounting profession and within the firms, as follows:

> "increased specialization…an environment of increased regulatory concerns…an emphasis on profitability…trying to communicate, finding better ways to communicate value to the clients. We've been looking very closely at the tax compliance to see how we can streamline that process."
>
> *Interviewee* 13

4.5 Preparedness of Recent Recruits

A line of questioning was followed to determine if senior accounting professionals believe that recently hired staff are well prepared for their jobs. The subjects were asked to share their views on any strengths or weaknesses that were perceived in entry-level accountants. There has been much discussion among educators on various deficiencies in accounting curricula, including oral and written communication skills, analytical skills, and technological competencies (Albrecht et

al., 2000). The AICPA (AICPA, 2000a) has noted that, although emphasis on technical competencies in accounting is adequate in accounting programs, a myriad of other competencies are needed for success in the profession today. Answers were in a diverse range, with many similar conclusions and some differences.

The following subsections highlight some of the key comments concerning recent entrants to the accountancy profession's strengths and weaknesses. These comments illustrate the fact that these recent graduates are indeed very competent in an array of computer and technology skills. In confirmation of various calls for additional proficiencies (AICPA 2000; and others), respondents identify several key weaknesses in competencies. These include proficiency in oral and written communication, the ability to work well in teams, and broad understanding of overall the business environment and strategies.

4.5.1 Technological Proficiency

Concerning technological competencies, most of those surveyed felt that today's graduates have a more than adequate foundation in technology. Many noted that recent graduates are much more adept at technology and computers that their senior counterparts. As one person noted, "In terms of technological competencies, they're off the charts. I think they're better than most of us in grasping and understanding it." Another subject viewed the reasons for this as:

> "In terms of technology, these are kids who have grown up their whole lives with technology and that's a very positive point. They come in and they're not afraid of technology and they know how to use it very effectively and efficiently and that's very positive."
>
> *Interviewee* 2

Another noted:

> "Most of our kids today come to us far more proficient in technology skills than we ever were. They grew up with the Internet always being in existence. This is a tool that they can use, where the Internet is a new tool to me, where it did not exist along the way or when I was in school, nor did it for the first 5-6 years. I think the kids that we are seeing are prepared."
>
> *Interviewee* 11

4.5.2 Analytical Skills

As noted in the literature (AICPA, 1996, 2000a), today's accounting students lack the ability to analyze information. With the changes in the profession, primarily as a result of technological innovations, accountants have been freed from the tedium of most bookkeeping functions by computers. As a result, more time and expertise is devoted to interpreting and analyzing information, rather than preparing of that information. Although recent accounting graduates seem to be strong in technology, they appear to be lacking in analytical skills, as noted, "I think strategic thinking is something that students don't typically come to us with. In terms of technological proficiency, I think the students come today with everything and more." Or as one practitioner says:

"What I see in the young people coming out of school is a good knowledge of accounting principles, auditing standards primarily, reasonably good technology skills in terms of being able to use technology. They are lacking in the ability to interpret information, to analyze information, to integrate knowledge from a variety of business disciplines and to use that knowledge to help companies/clients to look to the future. In a nutshell, the skills are still very good in accounting, assurance, and technology. Where they are not so well trained are in the ability to interpret data, to analyze information, to use information to make decisions. Communications as well, both written and oral presentation skills, are not what I would like for them to be."

Interviewee 10

"Practical business training in business skills" is what several practitioners noted is lacking in today's graduates. Taking that one step further, one practitioner noted another deficiency:

"They have a good foundational knowledge, but there are two deficiencies that I still see. They still don't have the broad business knowledge that comes with experience. I understand it's kind of a catch-22 situation. But I have noticed in the last decade a definite decline in the work ethic in accounting majors."

Interviewee 2

The same accountant further observed:

"Things aren't just black and white in the real world. It takes being out there to understand that. They come out and when things aren't black and white, they get all flustered, and at times they have a tough time dealing with those situations."

Interviewee 2

4.5.3 Communication Skills

The next area of concern about recent accounting graduates, echoed by many of those surveyed, was lack of proficient oral and written communication skills. As one practitioner lamented about writing skills:

> "I think that the one thing where they are lacking is in the communication skills. I think that area I see the most is writing skills. I think their ability to read something, interpret it, and write about it and summarize the contract and arrangement is very poor."
>
> *Interviewee* 11

Another accountant commented on recent recruits' writing deficiencies in addition to expressing concern about their general business knowledge:

> "The area you will hear the most complaining about is on the written communication skills. They come out very accounting literate, but they don't come out with good writing skills and good communication in terms of feeling comfortable going out to a client and interviewing them right out of school. They are very uncomfortable talking about a typical business topic. If it is accounting, they can talk about it, but if they go in and talk to the finance director about how they do their treasury function and how they go into a public offering. They don't feel comfortable about that. They may have had only one finance class. The curriculum is really pushing towards accounting and not giving students a couple of finance, marketing, human resource classes. Part of risk assessment is talking to a marketing director because advertising is a huge component of a client we do and they really need to understand how the advertising is rolled out and how they basically manage that process. Most of them don't know how advertising works. They come out great accountants, but the new auditing process that has migrated so it is very interview driven and understanding business."
>
> *Interviewee* 4

One practitioner noted that accounting majors' writing skills are so poor that much of the writing is delegated to those who graduated with law degrees.

> "We see a problem with communication skills. The people that do the bulk of the writing here are people that have come through and gotten their law degrees. The accounting undergraduates end up doing just number crunching, and so they don't really get much of a chance to develop those skills. And so they stay the same or get worse probably in time."
>
> *Interviewee* 13

Auditing, even more so than other areas of the profession, relies on interviewing clients to collect information and ascertain risk areas. As a result, both oral communication skills and the ability to develop a rapport with clients are essential. In addition, teamwork is a key component of the audit. The ability to work well with an audit team in the field is essential.

> "I think from an auditor's perspective, the most important thing to me is being able to develop relationships and interact with people and being able to think on your feet and not necessarily knowing everything when you come out with your diploma. You can talk to people and relate with people and work with people, that is probably the most important thing."
>
> *Interviewee* 6

> "I don't think that they can teach in school exactly what we do, unless they actually do a simulation of it. It is very much 'on the job' training. I am continuing to see people come with a good technical background. I think that one of the things that I look for is 'people skills'. I don't think that the skills have gone down over the years. It is just that we learn so much once we start here. The people that come out now have grown up with computers."
>
> *Interviewee* 8

A small number of practitioners have accepted the fact that recent graduates cannot be expected to have a real-world perspective. That, they note, comes with experience and on-the-job training. The large accounting firms invest a large amount on in-house training, especially during the first few years in practice. Two practitioners made the following observations:

> "I would say most of the undergrad new hires fresh out of college are prepared in the sense that , hey here is a project that I want you to work on, go. No, they wouldn't know the first thing to do. Here's an analysis I want done. I want you to use these particular applications. Do they have the background, the attitude, the mindset, the confidence to figure out how to get it done? I would say more often 'yes' than 'no'. Your first year of learning is huge. All firms spend $50,000 per year training their people for the first three, four, or five years in the organization. That is a lot of training. I think 99% of what I do on a day in, day out basis I learned being in the firm, not in college."
>
> *Interviewee* 7

> "We spend a lot of money educating our people. I think we expect them to come in with a theory behind the accounting and what's going on, but at the end of the day, how we do or deliver our services and our approaches, we have to teach them, and we'll continue to probably spend a fair amount of money doing that."
>
> *Interviewee* 12

Moreover, lastly, some practitioners are quite tolerant of new hires, assuming that most will be able to accumulate the skills necessary to progress in the profession. One subject was quite optimistic about this:

> "Certain schools seem to pump out auditors and certain schools seem to pump out accountants.... On the whole, the students are much more technologically savvy than they were before. To come out and expect

them to understand all of the intricacies of general ledger is probably a little far fetched. I think on the whole the people I have seen are probably better off in a lot of respects that when we started."

Interviewee 5

4.6 Suggestions for Changes in Accounting Curriculum

Since most of the practitioners interviewed had criticisms of the competencies of recent accounting graduates, they were then asked to make any suggestions on how to revise existing undergraduate accounting program curricula. Most of those interviewed were quite familiar with these curricula, both from their own educational experience and from their involvement with recruiting and training. Further, many of practitioners interviewed were no more than ten years out of college. One senior manager, out of college for nine years noted:

> "To me accounting is still being taught almost the same way it was when I learned it, and the world has changed tremendously and we have not been teaching, we're not teaching it, any different. That's a mistake. You still have to know cost accounting, sure you do, but how you approach auditing, discussion of business ethics, what really is management skills, how you can audit. We should be auditing management, it's ability to manage, because that has an important effect on the financial statements, just as much as compliance with any specific accounting and auditing pronouncements. … The focus needs to change if we are truly going to be recognized as the value professionals, that will hold business out to what they are supposed to do, and that is to report back with their financial information."

Interviewee 14

Some commented on the format in which the accounting courses are taught. Perceptions are that accounting courses are still delivered in the traditional lecture style, taught exclusively from textbooks. In fact, today's courses do involve interactive and group learning exercises, in addition to traditional lecture-type delivery. However, practitioners probably assume courses are still being taught they way they were when they were students.

> "I think in part they could make the curriculum a little bit more exciting. People tend to stay away from accounting because they have this image as being these dry, stuffy, boring people and don't want to have any part of that. Make it more like an MBA curriculum. There are a lot of group projects. A lot of it is tied to what is happening in the world today and the classes really make you think. It is not just opening your book and studying your journal entries."
>
> *Interviewee* 9

> "The delivery is what is important, and the debits and the credits are really less important these days, beyond the application, is what's important. The understanding of an environment in which debits and credits are affected is important."
>
> *Interviewee* 15

> "Accounting education as I understand it is principally taught from textbooks, and to get textbooks changed to include the developmental competencies and skills entry level people need today in the real world of public accounting is a long evolutionary process. Not just to get the textbook changed, but to get the educators to adopt those changing methodologies."
>
> *Interviewee* 10

4.6.1 Case Study Approach

Recommendations are for teaching methods such as group work and case study analysis:

> "I think the schools that do more case study approach, those students are a little better at it, because they are used to looking at real life examples. They happen to think more business oriented. The schools that are still on the traditional accounting curriculum take a little more time to really develop, but some never do. A case study really helps pull that out early. If they look at a case and can't analyze it, they probably won't be good at the auditing profession."
>
> *Interviewee* 4

> "I think the case study approach at least in some of the classes helps because it fosters them to work in teams, which is a big part of our practice, working with groups."
>
> *Interviewee* 4

4.6.2 More Audit Training

Several auditors noted that traditional accounting curriculum for undergraduates generally contains only one auditing course. With the importance of auditing and the increasing array of products within the realm of assurance services, it was suggested that more emphasis be placed on it. In fact, many accounting programs are devoting at least two courses in auditing and assurance services. As one practitioner noted, "I think there is probably not enough time devoted to auditing."

And finally, several subjects noted that although technical competency in accounting is important, today's profession calls for many additional competencies. Some, such as analytical skills and oral and written communication skills have been noted. One practitioner expressed it more broadly:

> "There should be more emphasis on not just accounting classes, but on other stuff as well. How well spoken are you, how well read are you, how well can you communicate your thoughts effectively, efficiently. How worldly are you? That is very important. You can sit there and crunch numbers as well as anybody else, but in the end, you've got to be able to go out and communicate to your client what is important for them, and you've got to be able to tell people why they should use your services, so we talk about the big picture in that regard."
>
> *Interviewee* 13

4.7 Comments Regarding the Cognitive Style Study

Upon completion of the series of semi-structured questions outlined in the previous sections, the researcher summarized the general research question described in the next chapter. Namely, this research examines whether there is a relationship between cognitive style and technological proficiency in a group of undergraduate accounting majors. Further, an empirical study is conducted to see if accounting majors typically fit into any distinct cognitive/learning style[24]. The practitioners interviewed were asked for their comments on the findings of this research. Since the

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[24] Results of research presented in the next chapter shows that a large number of students sampled scored high in the cognitive style known as Concrete Sequential. Further, these students scored lower in technological proficiency than those who were non-Concrete Sequential. Implications for this finding are discussed later in the study.

great majority of the practitioners in the interviews noted that they were highly satisfied with the level of technological proficiency in the students entering the profession, the focus of their comments was on the fact that a large number of the students in the researcher's study scored high in the Concrete Sequential style.

> "I don't think that people who are methodical and don't interact well with others will do well in the new firm. The emphasis is very much on selling yourself on a daily basis to your clients. If you can't interact in this profession. We have seen it from simple things such as language barriers, when one comes from another country, they are not going to survive in this profession. One of the main reasons I went into this profession was because there was a set of laws that was out there. When you go into your introductory accounting courses, those first few courses when you start talking about debits by the door and credits by the window. It is very methodical. There is a language and a rule. It is basically like learning a language from the beginning. That is one of the things that drew me in. Now, I have gone beyond that. When I'm sitting down with people on the phone and talking about their issues and trying to fully understand not only what the facts are, but what the client wants and what the engagement thinks and ultimately what the right answer is. I tend to think if we were truly drawing those kinds of people [concrete sequentials], that we need to rethink our recruiting. If that is the pool that we are pulling from, we definitely need to make sure that we are pulling from that 25% that aren't the plotter and move along. It is very clear that we need to be seen as advisors and we need to help build our business in whatever way possible."
>
> *Interviewee* 5

"I think accountants tend to be very structured people. Those people [very organized, numbers only people] are not going to succeed if they can't learn to think outside the box and especially team work. There is

just no room for people who don't want to be a team player. …You have to be customer oriented, a team player. You have to be creative."

Interviewee 9

Practitioners attribute the phenomenon of such a large number of a single cognitive style entering the profession as one of stereotypes and image. "We try to see ourselves as business experts, yet a lot of the world tries to kind of compress us as tax guys or auditors." Some responses about public perceptions of the accounting profession include:

"They still think our profession is all technically driven. It's not. It's a communications profession, it's a relationship profession and more and more it's a profession where you have to be able to think outside the box. It's a perception they have of what an accountant is, maybe that's why the stereotype has continued for so many years."

Interviewee 2

"I think that a lot of people that fit the image of what an accountant would be also fit several other types of professions. Maybe that would be better engineers and maybe we need to be pulling from a different group that can keep up with where the profession is going."

Interviewee 9

"I have found the experience to be a lot less about numbers and a lot more about writing and communicating and relationships and that kind of thing. I probably was attracted to the profession personally for the numbers because I am a numbers kind of person, but I've found the experience to be much different than that."

Interviewee 6

"I honestly thought when I went into accounting that I was going to be doing journal entries to accounts and monthly closing. That's what I took in high school. That was bookkeeping, but it was called

accounting, and that was what I thought I was going to be doing when I graduated, up to my senior year. I still have some of those characteristics. I still actually like number crunching. At the same time I think my experiences have made me a more outgoing person and more easy to work with team person, a more analytical person. I think sometimes those traits can be developed if you have the right environment and the right training."

Interviewee 8

Several interesting points about stereotypes and cognitive style were observed. In describing the skills and processing styles necessary for success in the profession, on practitioner mentioned that on the scale of creativity, accountants probably fall somewhere in the middle. Certain careers call for people much more outgoing and creative than accounting,

> "Maybe you are less creative than a true salesperson, but nevertheless, you are out there, thinking out of the box, you are going to seminars and functions. You are meeting people. You are outgoing and spontaneous. I think most of us on the audit side in our technology practice fit into the mode that I just described and don't fit into your 75% box [broadly concrete sequential]. I think maybe people are self selecting."

Interviewee 11

Many in the accounting field can relate to the fact that the actual day-to-day work is very different from what they were told it would be, or what they expected it to be. As one senior manager noted, "What is [my] typical day like? I have no typical day." Obviously, this is one of the reasons for the relatively low retention rate in the big accounting firms. Many are disillusioned and leave after only a few years in the firm. One partner stated, "The class I started with, there were probably

twenty five of us. I think there are maybe two of us that are left in public accounting." Another practitioner observed:

> "We have many new hires that said it was not what they thought it was going to be and they are basing it either on an audit class they had or the recruiters that came in and talked to them about the profession and probably glorified it a bit. So there is a disconnect between what a student expects and what they actually wind up doing, at least the first couple of years."
>
> *Interviewee* 4

It could be noted that there probably still is a role for the traditional stereotypical accountant/bookkeeper. Unfortunately, this individual will be relegated to a relatively low level function, with little opportunity for career growth or satisfaction.

> "I think there are still many of those typical accountants. You'll see that most of the Big 5 tend to steer away from those people. I think that students that come in or begin to familiarize themselves with the Big 5 are almost shocked at what they see in terms of what the firms are and what the people are like."
>
> *Interviewee* 3

Practitioners note that entry-level positions often call for individuals who fit the profile of a Concrete Sequential. However, as one advances in the profession, more skills are called for that involve creativity, communication skills, analytical skills, and the like.

> "When I started, my first assignments were to summarize disbursements and put numbers in little boxes on green paper and prepare journal entries and make sure things balanced. What I do

today is to serve as primary business advisor to entrepreneurial companies."

Interviewee 10

A concern expressed is that the increased use of technology may have a negative impact in one way. Especially in the auditing area, judgment plays a key role. It is feared by some that increased reliance on computers will foster an atmosphere where practitioners will rely too heavily on the results generated by the hardware and software and tend to rely less on tacit knowledge, judgment, and a critical view. Although this was expressed by several practitioners, it is clearly stated here:

"The students are very good at using technology, they can be creative with it. But the bad part is it can turn them into robots that don't understand what they are doing, and it takes away reality a little bit, what is real and what is not real. Sometimes I think they all think it's a game."

Interviewee 14

With all the negative stereotypes, declining enrollments, perceived lowering of the level of competencies of individuals choosing accounting as a major, there are also positive aspects of choosing accounting as a course of study and profession. Virtually all of the subjects interviewed were very satisfied with their choice of accounting as a career. They experienced extreme job satisfaction and pride in their work. They were optimistic about the future of the profession and its ability to

overcome the obstacles in front of it. They were also positive about trends within their firms. One practitioner summarized this quite eloquently:

> "I still see a major in accounting as being one in which a person can get into the guts of a business or organization and really learn what it takes for that business to be successful, what the case success factors are, what really drives it, using today's terminology, what the key performance measures are, and to play a role in an organization or in advising organizations as to how they might change to be more successful."
>
> *Interviewee* 10

4.8 Summary of Interviews

Fifteen accounting practitioners from United States offices of primarily Big Five accountancy and second tier firms submitted to approximately one-hour semi-structured interviews conducted either in person or over the telephone. Table 4-2 summarizes the composition of the interview subjects. Interviews were audio taped and later transcribed. Subjects were asked a series of questions in topic areas around knowledge management practices in their firms, use of technology within the firm and with client services, perceptions of changes in the profession (past, present, and future), and preparedness of recent recruits to the firms. A summary and highlights of responses are presented in Table 4-1.

The purpose of the interviews was to determine whether practices described in academic literature concerning knowledge management (see Chapter 2) and its related technologies are being embraced within the firms. Further, these interviews

serve to motivate the second part of this research project, namely to determine whether practitioners have an awareness of changes in practice driven by technological innovation and whether current accounting program graduates entering the profession are well prepared and well suited for the profession.

The second part of this research focuses on two particular aspects of the findings of the interviews – cognitive style fit and technological proficiency. Further, since the majority of the interviewees (representative of U. S. accounting practitioners) hail from a background which includes an accounting degree, and since a large number of entrants into public accounting firms have an accounting educational background, subjects of the second part of this research are undergraduate accounting majors.

Table 4-1 – Summary and Highlights of Practitioner Responses

Area of questioning	Highlights of responses
Changes in the profession	• Technological innovation • Wider variety of services offered by accounting firms • Increased competition for audit fees • Less customer loyalty • Broader array of skills needed by accountants • Redefinition from accountants and auditors to "business advisors" and consultants • Commoditization of the financial statement audit • Increase in number of rules and regulations in accounting
Changes in the firm	• Mergers of large global firms • Technological innovations
Technology for delivery of client services	• Most modern available • Large variation in technological usage within the firm • Majority of communication is now e-mail • Fear that technology will replace judgment
Technology for knowledge Sharing	• All Big 5 firms have huge initiatives in this area • Many interviewees weren't aware of all the resources available within the firm • Many still rely on old network of contacts • Newer firm members use tools more than veterans – new members lack contacts and veterans less familiar with technologies • Drastic streamlining of audit process
Comments about future of the profession	• More technological innovation • Shift from preparer to analyzer, decision maker, advisor • More service offerings • Melding with other financial services • More firm mergers • Increased regulation • Faster production of year-end reports • Accountants will need broader skills and areas of expertise • Concern about declining enrollments in accounting programs
Preparedness of recent Graduates	• Impressive technological competencies • Need for broader business training • Need for better oral and written communication skills • Need to be able to work more in teams
Suggestions for accounting Curriculum change	• More case study approach • Less lecture/text book format • More auditing training • Concern about the new 150-hour requirement for the CPA exam

Table 4-2 – Profile of Interview Subjects

Date of Interview	Interviewee #	Rank	# of Years	Type of Firm
8/11/2001	1	Senior Manager	20	Regional
8/11/2001	2	Partner	20	Large National
8/14/2001	3	Recruiter/Partner	25	Large National
8/15/2001	4	Recruiter/Partner	19	Big 5
8/23/2001	5	Manager	7	Big 5
8/23/2001	6	Manager	7	Big 5
8/28/2001	7	Partner	10	Big 5
8/30/2001	8	Manager	6	Big 5
8/31/2001	9	Partner	14	Big 5
8/31/2001	10	Partner	28	Regional
9/5/2001	11	Partner	11	Big 5
9/6/2001	12	Recruiter/Partner	11	Big 5
9/10/2001	13	Partner	11	Big 5
9/25/2001	14	Partner	30	Large National
9/25/2001	15	Recruiter/Partner	16	Big 5

5 – ANALYSIS OF FINDINGS: COGNITIVE STYLE AND TECHNOLOGICAL PROFICIENCY

Chapter 5 – ANALYSIS OF FINDINGS: COGNITIVE STYLE AND TECHNOLOGICAL PROFICIENCY

5.1 Introduction

This chapter presents the results of the empirical field work. A self-designed technology questionnaire and a cognitive styles assessment test (The Gregorc Style Delineator) were administered to a sample of undergraduate accounting majors at four northeastern United States universities. Details of the instrument selection and design and other methodological issues are presented in Chapter 3.

5.2 Technological Proficiency, Attitude, and Anxiety

Students' scores were generated for computer anxiety, computer attitudes, and computer proficiency. Computer anxiety scores, out of a possible 75 points, averaged 29.61 (SD=8.69), with a range of scores between 15 and 73. A higher score indicates a higher level of anxiety (Table 5-2 and Figure 5-6). Scores of attitudes toward computers averaged 43.89 (SD=4.52), with a range of scores between 32 and 50 (out of a possible 50 points) (Table 5-2 and Figure 5-5). This indicates a very positive attitude toward computers.

Proficiency questions were divided into three levels – basic (level 1), intermediate (level 2), and advanced (level 3) (as described in chapter 3). As illustrated in Table 5-1, out of a possible 25 points, the level 1 proficiency was self-

reported as an average of 18.08 (SD=3.66) (Figure 5-2). Level 2 proficiency was 16.03 (SD=4.53) (Figure 5-3), and level 3 proficiency (database management, network applications, etc.) was an average of 11.61 points (SD=5.09) (Figure 5-4) (out of a possible 25 points each). Overall self-reported computer proficiency averaged 45.71 (out of a possible 75 points) (SD=11.82) (Table 5-1 and Figure 5-1). Appendix D shows an analysis, question by question, of the respondents' scores on the Technology Questionnaire.

Table 5-1 - Computer Proficiency Scores

ITPROF	N	Minimum	Maximum	Mean	Std. Deviation
Level 1 Computer Proficiency	132	9	25	18.08	3.66
Level 2 Computer Proficiency	132	5	25	16.03	4.53
Level 3 Computer Proficiency	132	5	25	11.61	5.09
Overall Computer Proficiency	132	19	75	45.71	11.82

Table 5-2 - Computer Attitude and Anxiety Scores

	N	Minimum	Maximum	Mean	Std. Deviation
Attitude	132	32	50	44.12	4.49
Anxiety	132	15	73	29.58	8.67

Figure 5-1 – Overall Computer Proficiency Scores

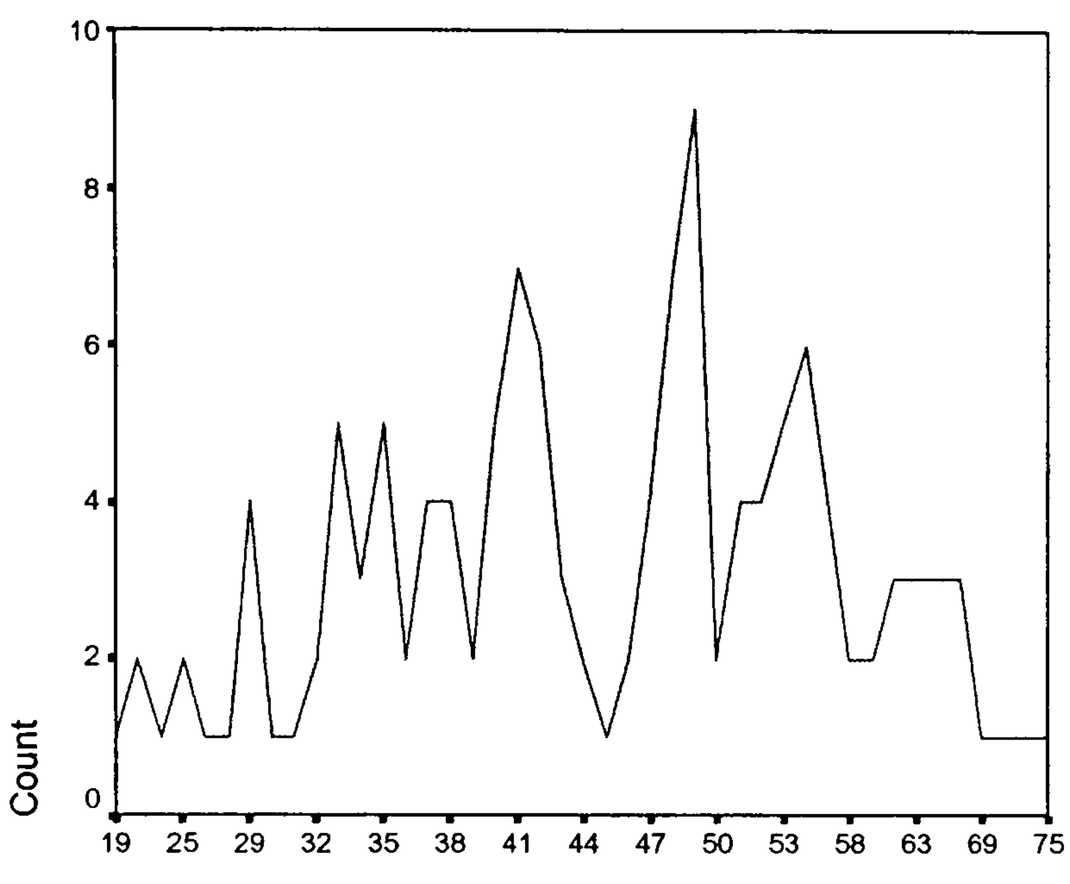


Figure 5-2 - Computer Proficiency Scores – Level 1

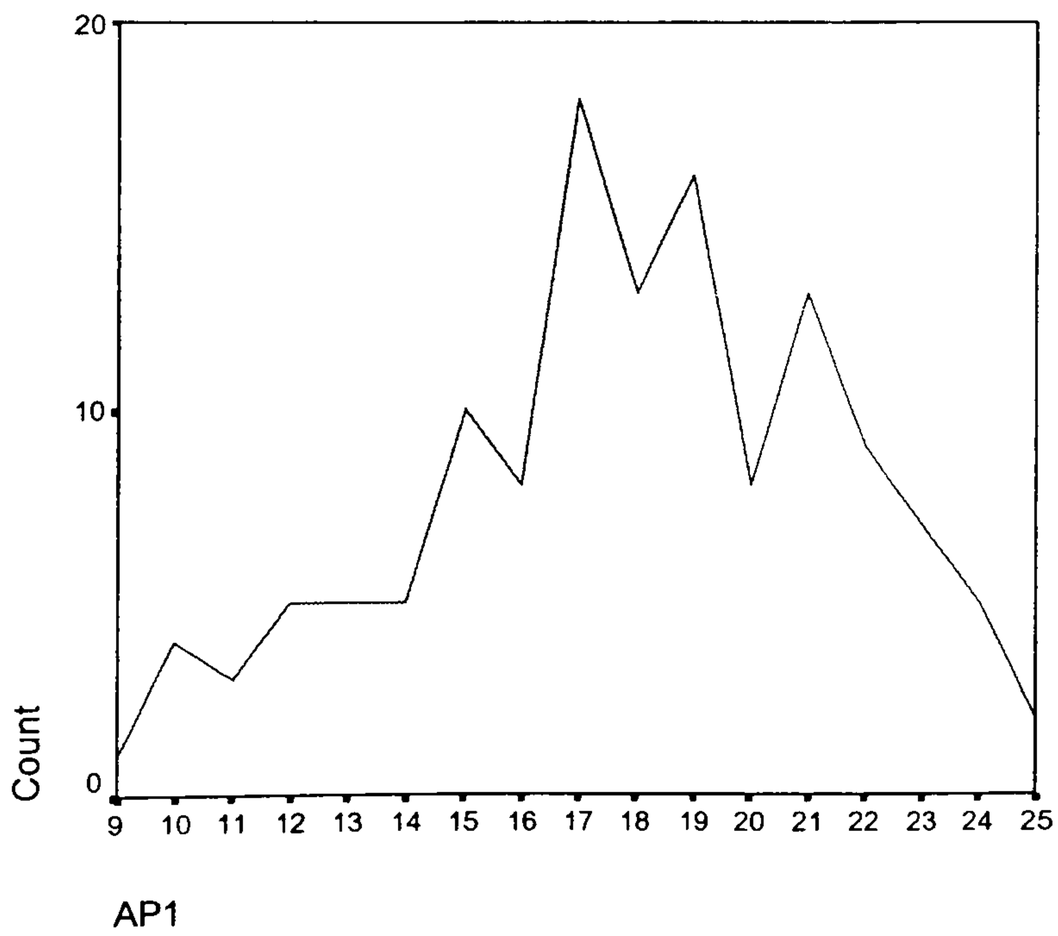


Figure 5-3 - Computer Proficiency Scores – Level 2

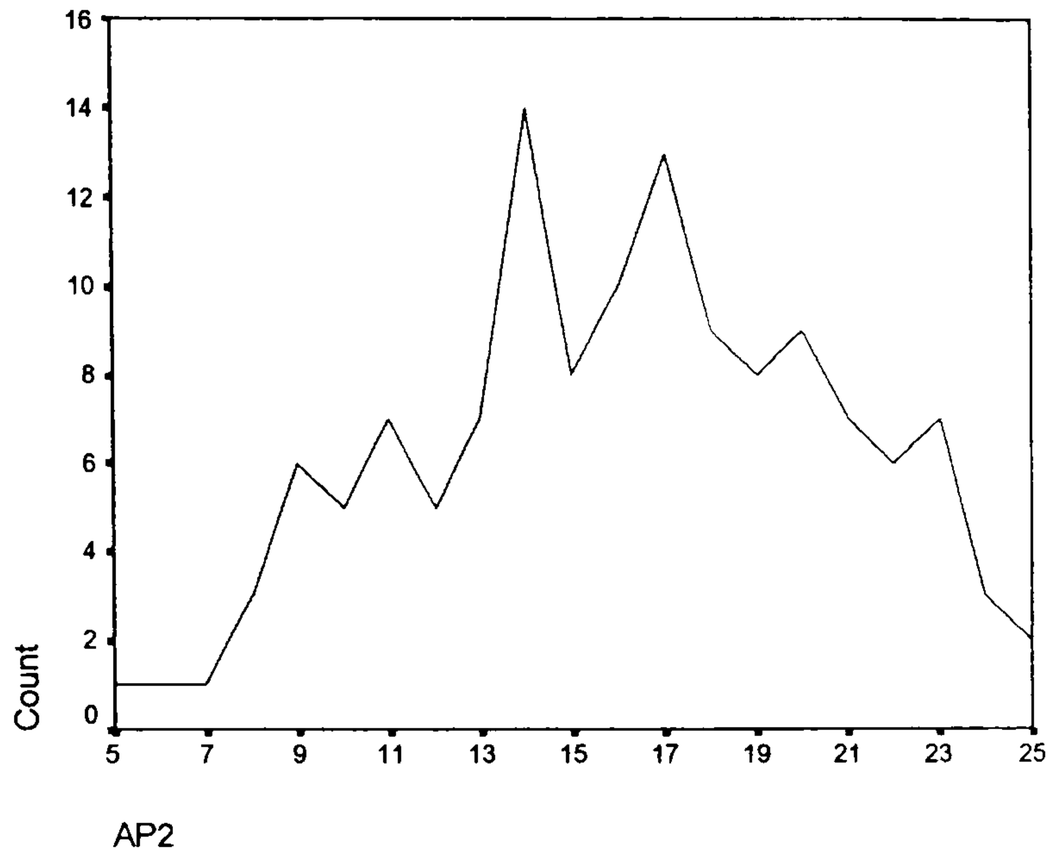


Figure 5-4 - Computer Proficiency Scores – Level 3

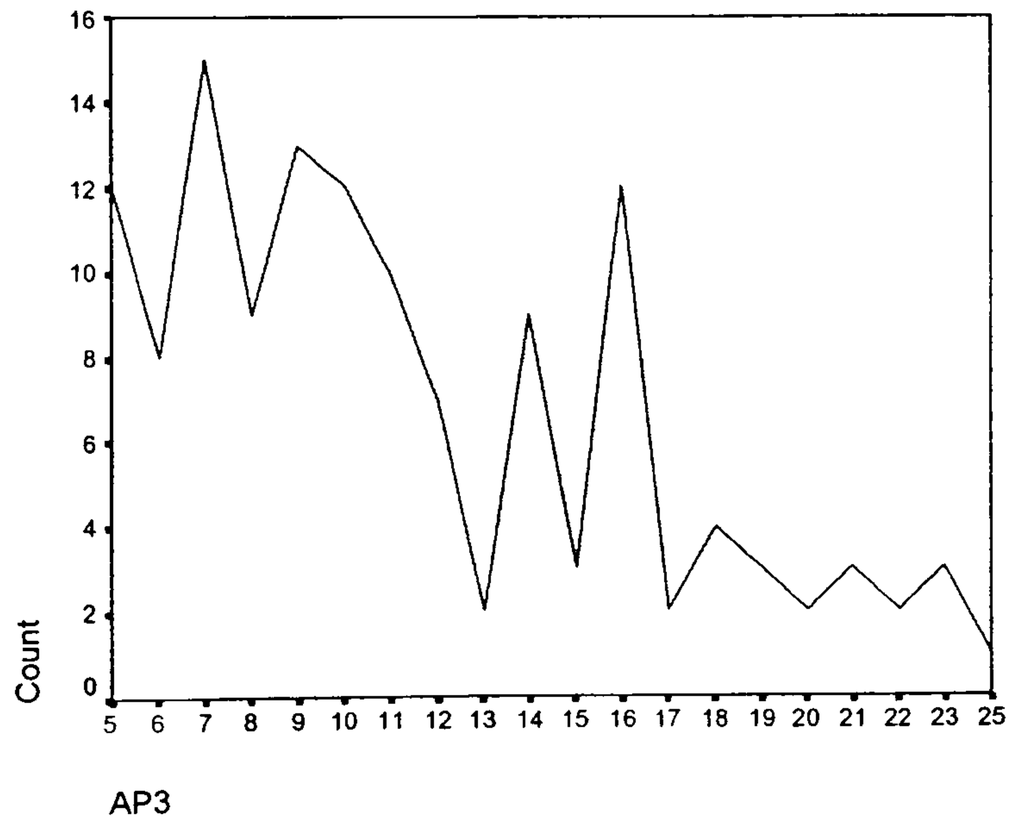


Figure 5-5 - Computer Attitude Scores

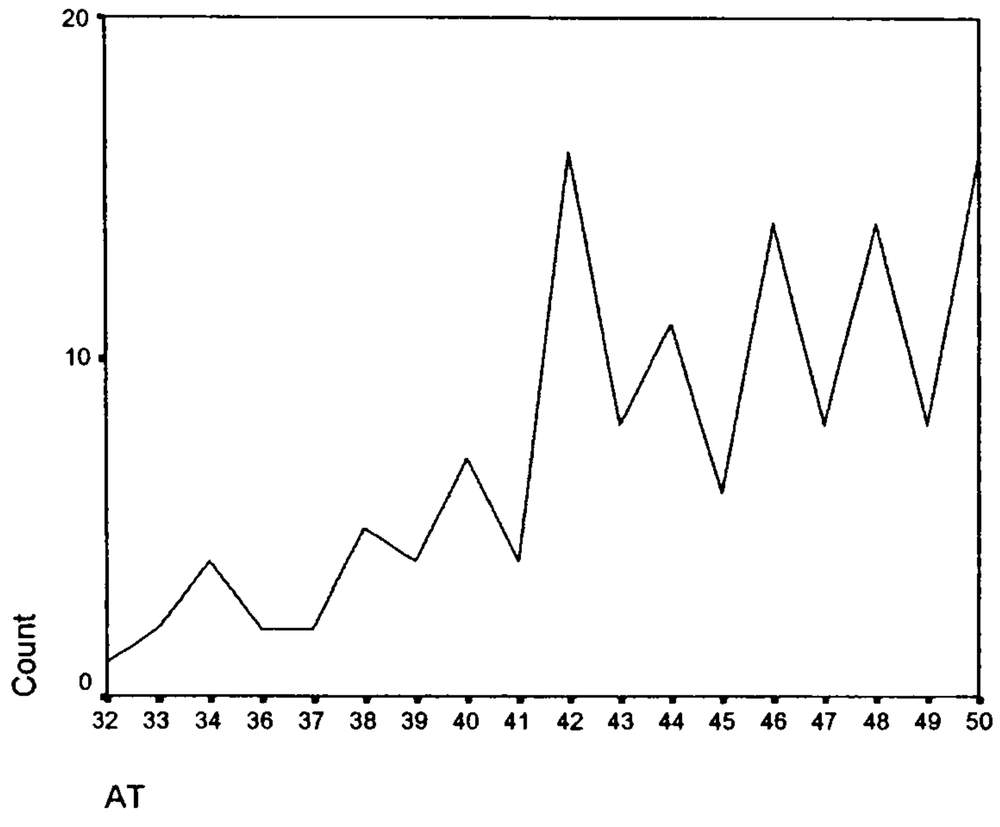
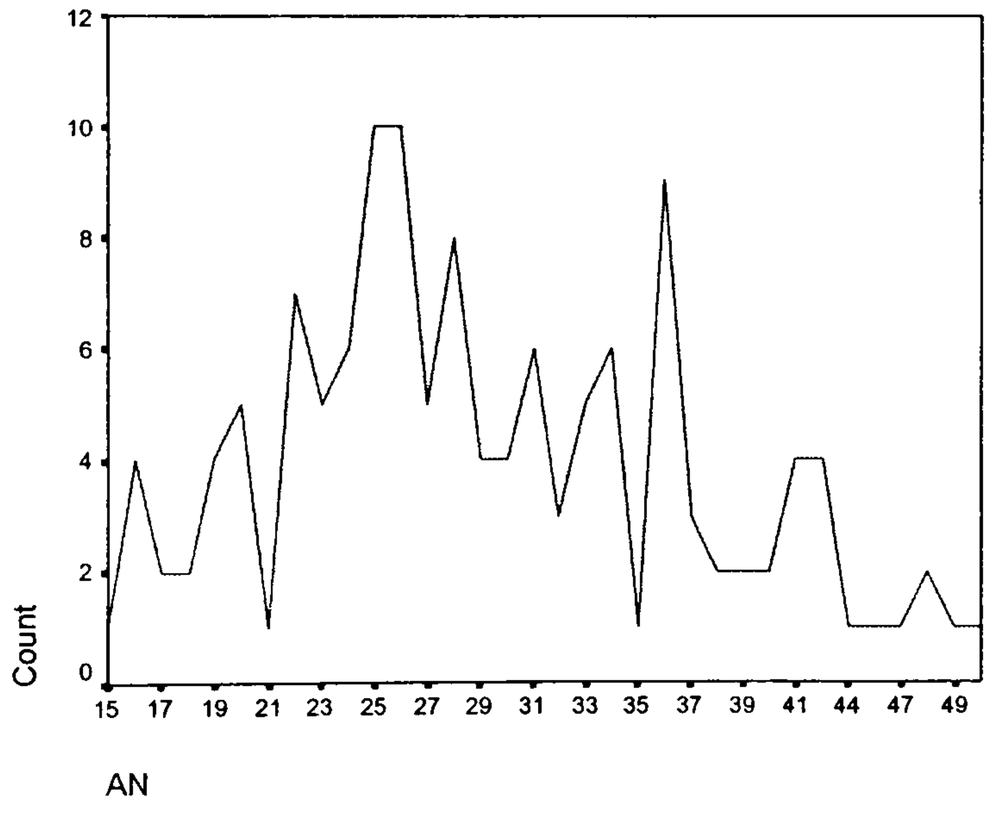


Figure 5-6 - Computer Anxiety Scores



5.3 Cognitive Style

With a possible score of 4 to 40 in each of the four mediation channels, the Gregorc Style Delineator divides the scores in each area into: strong orientation as

27-40, moderate orientation as 16-26, and low orientation as below 16. Gregorc asserts that roughly 90% of individuals have a natural predisposition toward one or two of these channels and that channels serve to mediate how the individuals learn and act upon their environment (Gregorc, 1982). The remaining 10% of individuals either have strong orientation in more than two areas or equally balanced scores in all four areas.

Research studies have further shown that approximately 37% of the general population is Concrete Sequential, 34% is Abstract Random, 19% is Concrete Random, and only 10% is Abstract Sequential (Seidel and England 1999). Correlations between the ratings and the attributes were: 0.85 for Concrete Sequential, 0.72 for Abstract Sequential, 0.82 for Abstract Random, and 0.86 for Concrete Random ($n=100$, $p<0.001$) (Gregorc, 1984).

In contrast to Gregorc's findings about the general population, although 24.24% of the accounting majors in the study scored high in Concrete Sequential alone, 46.21% of the students scored high in Concrete Sequential and had high scores in other mediation channels as well. Of these, 30.3% scored high in both Concrete Sequential and Abstract Sequential (Table 5-3). The average score in the Concrete Sequential channel was 28.61 (SD=5.10), while the average score in each of the other three mediation channels was below the threshold for "high score" of 27 (out of a possible 40 points) (Table 5-4 and Figures 5-7 through 5-10).

In contrast to the general population, only 7.58% of the students were Abstract Sequentials, 2.27% Abstract Random, and 3.03% Concrete Random. While only 40.15% of the accounting students scored high in only one mediation channel, only 3.79% scored high in more than two channels (in contrast to Gregorc's findings of 10% of the general population). Only four students (4.55%) scored below 27 on each of the four mediation channels.

Table 5-3 - Distribution of Mediation Channels

Mediation Channel	N	Percent	Group Percent	
CS	32	24.24	24.24	CS only
CS & AS	40	7.58		
CS & AR	10	4.55		
CS & AS & AR	3	3.79		
CS & CR	4	30.30	46.21	CS & other
AS	10	7.58		
AR	6	2.27		
CR	5	3.03		
AS & AR	3	3.03		
AS & CR	9	2.27		
AR & CR	6	6.82		
None	4	4.55	29.55	Non-CS
TOTAL	132	100.00	100.00	

The mean score of the subjects (Table 5-4) was 28.64 (SD=5.00) for Concrete Sequential, 26.05 (SD=3.62) Abstract Sequential, 22.65 (SD=4.43), and 22.66 (SD=4.79) Concrete Random. Figures 5-7 through 5-10 show graphically the range of scores in each of the four separate mediation channels.

Table 5-4 - Scores on The Gregorc Styles Delineator

Mediation Channel	N	Minimum	Maximum	Mean	Std. Deviation
Concrete Sequential	132	14	37	28.64	5.00
Abstract Sequential	132	16	34	26.05	3.62
Abstract Random	132	11	36	22.65	4.43
Concrete Random	132	13	37	22.66	4.79

Figure 5-7 - Concrete Sequential Scores

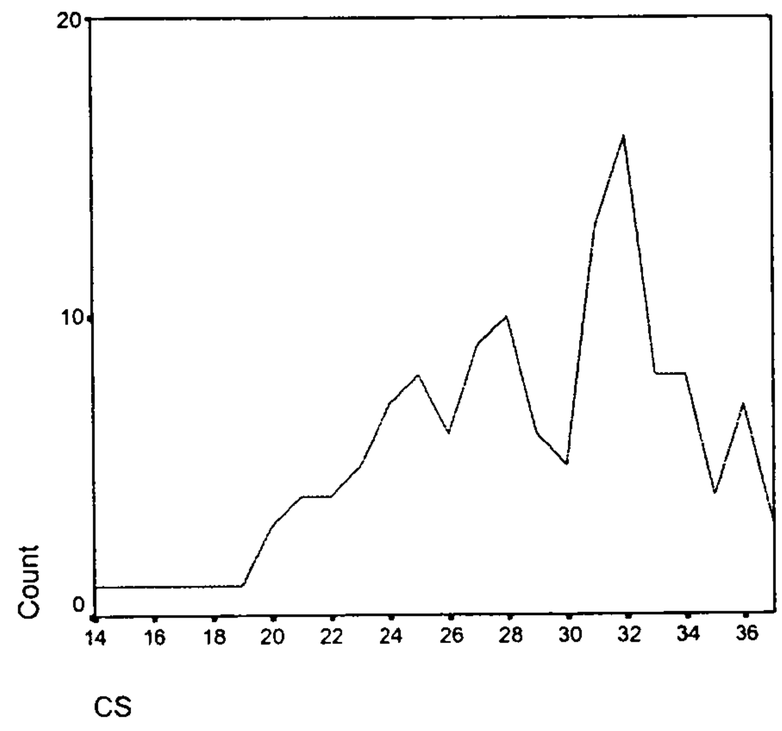


Figure 5-8 - Abstract Sequential Scores

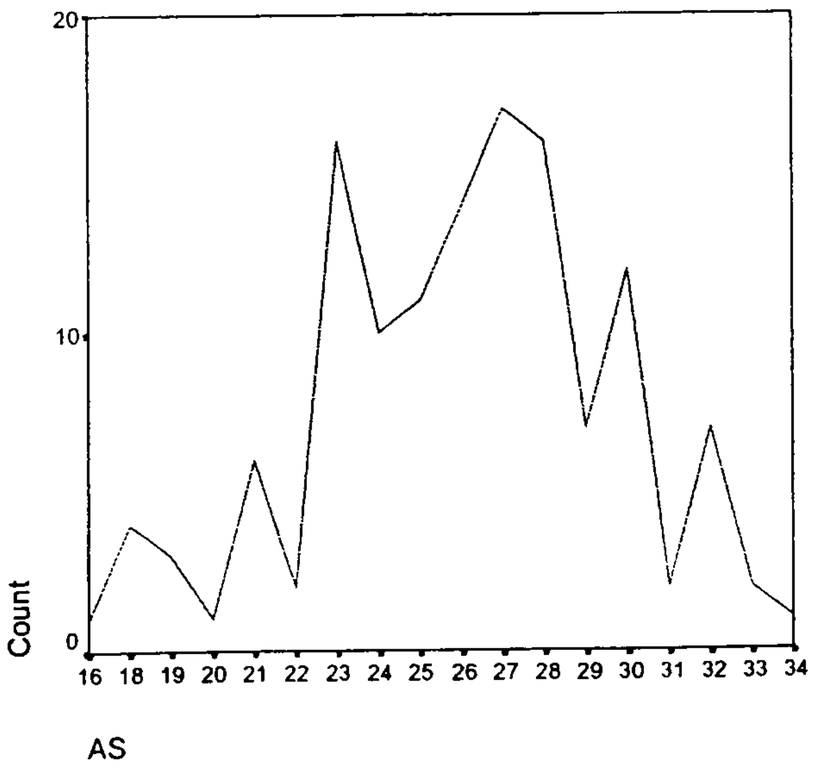


Figure 5-9 - Abstract Random Scores

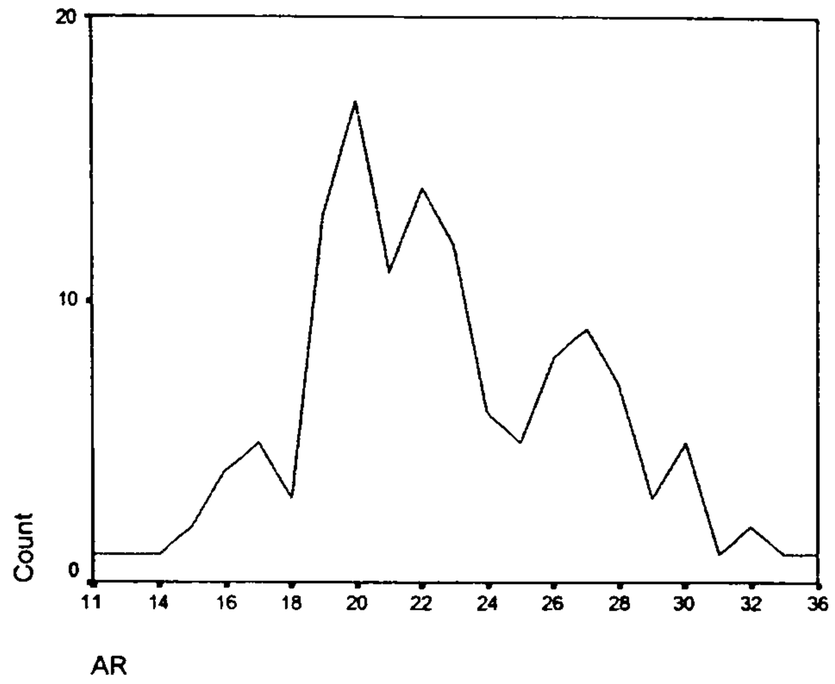
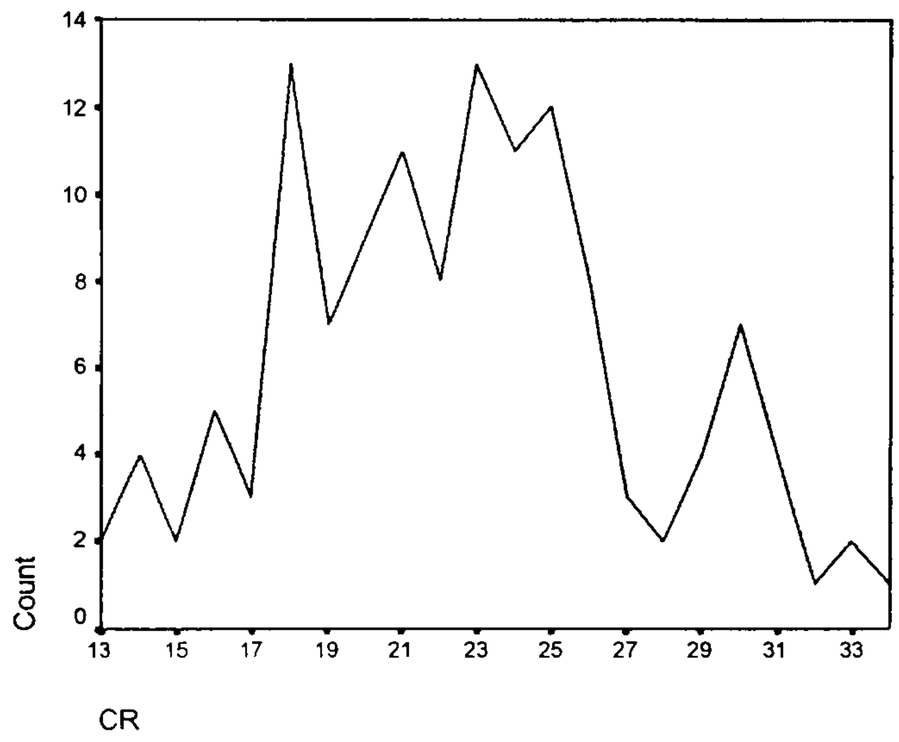


Figure 5-10 - Concrete Random Scores



5.4 Research Questions

The first analysis looked at the primary research question of the quantitative study (RQ_1): Is there a relationship between cognitive style and computer proficiency in a sample of accounting undergraduate students? For this analysis, cognitive style scores were coded as 0=not Concrete Sequential, 1=Concrete Sequential only, 2=

Concrete Sequential and at least one other cognitive style[25]. Gregorc's assessment of 27+ was used as the criterion for each score (Gregorc, 1982). Results of one-way ANOVA indicate that there is a moderately significant (sig.=.059) relationship between Concrete Sequentialness and computer proficiency, where non-Concrete Sequentials scored higher than either pure Concrete Sequentials or mixed Concrete Sequentials (Table 5-5).

Further tests were conducted on pairs of cognitive style scores (0's vs. 1's, 0's vs. 2's, 1's vs. 2's) which indicate that non-Concrete Sequentials scored higher on the computer proficiency test than both Concrete Sequentials and mixed Concrete Sequentials. Non-Concrete Sequentials received a mean score of 49.21 (SD=11.73) (out of a possible 75 points), compared to Pure Concrete Sequential mean score of 43.21 (SD=11.69) and Mixed Concrete Sequential mean score of 44.21 (SD=11.57). This indicated a between-groups significance of 0.059. Between-group significance between Pure Concrete Sequentials and Non-Concrete Sequentials was even lower (0.047). The significance between Non-Concrete Sequentials and Mixed Concrete Sequentials was 0.037, showing that Concrete Sequentials did, in fact, score measurably lower on computer proficiency than Non-Concrete Seqentials.

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[25] As previously noted, there were too few students with high scores in any of the other three mediation channels for any significant statistical analysis.

Table 5-5 – Computer Proficiency and Cognitive Style

Mediation Channel	N	Mean Score on Computer Proficiency	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	43	49.21	11.73	1.79	45.60	52.82	24	71
1	32	43.69	11.69	2.07	39.47	47.90	23	75
2	57	44.21	11.57	1.53	41.14	47.28	19	67
Total	132	45.71	11.82	1.03	43.68	47.75	19	75

0=non-Concrete Sequential
1=Concrete Sequential only
2=Concrete Sequential and one or more other styles

Further tests were conducted to determine any relationship between computer proficiency scores and gender, age, and GPA (see RQ_2) yielded no significant results. Males scored an average of 46.63 while females averaged 45.08 (sig.=.275). Results on gender and computer attitudes and anxiety showed no significant differences, contrary to much of the literature cited in Chapter 2. Mean scores on both attitude toward computers and computer anxiety were virtually identical for males and females.

Relationships between computer proficiency scores and age did yield some interesting results (Table 5-6). Between-groups significance was quite remarkable (0.007), with students age 26-30 (13.6% of the sample) scoring 50.83 (out of possible 75 points) with students age 16-20[26] (16.7% of the sample) scoring 47.05. In

[26] It is unlikely that any of the participants were as young as 16, however ages of 19 through 20 are quite probable for Juniors and Seniors.

contrast, students age 31-35 scored lowest on computer proficiency, with a mean score of 32.86[27].

Table 5-6- Relationship between Computer Proficiency Scores and Age

Age	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
16-20	22	47.05	11.33	2.42	42.02	52.07	23	69
21-25	76	44.76	11.06	1.27	42.23	47.29	23	75
26-30	18	50.83	12.19	2.87	44.77	56.90	19	67
31-35	7	32.86	9.08	3.43	24.46	41.26	24	49
36+	9	50.22	13.59	4.53	39.78	60.67	33	71
Total	132	45.71	11.82	1.03	43.68	47.75	19	75

Analysis of computer proficiency between the four universities used in the survey yielded non-significant results (Table 5-7). University #2 yielded the lowest results (41.76 out of 75) while university #1 yielded the highest results (mean score of 46.49 out of 75). It can be noted that university #3 clearly has the most sophisticated technological resources on its campus, requires all students to purchase a laptop computer, emphasizes technology in all its classes, and yet students at universities #1 and #4 had mean scores slightly higher than University #3.

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[27] The author is unable to explain the inconsistency in mean computer proficiency score for this age

Table 5-7- Relationship between Computer Proficiency Scores and School

University	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	57	46.49	11.80	1.56	43.36	49.62	23	75
2	15	41.73	13.66	3.53	34.17	49.30	19	70
3	30	45.93	11.47	2.09	41.65	50.22	26	75
4	30	46.00	11.43	2.09	41.73	50.27	24	71
Total	132	45.71	11.82	1.03	43.68	47.75	19	75

Multivariate regression analysis of the sample (Tables 5-8 and 5-9), using Computer Proficiency as the dependent variable, and the other measures (anxiety (RQ_3), attitude (RQ_2), concrete sequentialness, gender, age, and GPA) as the independent variables, showed mixed results. Because the amount of concrete sequentialness within the sample was high (over 70% of the sample scored 27 or over on this mediation channel), any correlation between overall cognitive style and computer proficiency was inconclusive. As described previously, the non-Concrete Sequential subjects scored higher in computer proficiency than the high or mixed Concrete Sequentials.

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group.

Interestingly, however, the relationship between proficiency, anxiety, and gender showed that female students had higher scores in proficiency and lower computer anxiety. This is inconsistent with previous research (see Chapter 2).

Table 5-8 – Correlations

		Proficiency	Concrete Sequential	Attitude	Anxiety	GENDER	AGE	GPA
Proficiency	Pearson Correlation	1.000	-.039	.340	-.327	.106	-.056	-.104
	Sig. (2-tailed)	.	.656	.000	.000	.232	.530	.252
	N	131	131	131	131	128	130	123
Concrete Sequential	Pearson Correlation	-.039	1.000	-.193	.091	.013	-.064	.081
	Sig. (2-tailed)	.656	.	.027	.300	.885	.466	.376
	N	131	131	131	131	128	130	123
Attitude	Pearson Correlation	.340	-.193	1.000	-.627	.023	.064	.119
	Sig. (2-tailed)	.000	.027	.	.000	.793	.469	.189
	N	131	131	131	131	128	130	123
Anxiety	Pearson Correlation	-.327	.091	-.627	1.000	.111	-.025	-.123
	Sig. (2-tailed)	.000	.300	.000	.	.211	.775	.174
	N	131	131	131	131	128	130	123
GENDER	Pearson Correlation	.106	.013	.023	.111	1.000	-.032	.197
	Sig. (2-tailed)	.232	.885	.793	.211	.	.722	.030
	N	128	128	128	128	128	127	121
AGE	Pearson Correlation	-.056	-.064	.064	-.025	-.032	1.000	.016
	Sig. (2-tailed)	.530	.466	.469	.775	.722	.	.859
	N	130	130	130	130	127	130	122
GPA	Pearson Correlation	-.104	.081	.119	-.123	.197	.016	1.000
	Sig. (2-tailed)	.252	.376	.189	.174	.030	.859	.
	N	123	123	123	123	121	122	123

** Correlation is significant at the 0.01 level (2-tailed).
Correlation is significant at the 0.05 level (2-tailed).

Table 5-9 – Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	43.769	17.029		2.570	.011
CSONLY	-1.706	1.159	-.123	-1.472	.144
AT	.524	.277	.198	1.891	.061
AN	-.367	.145	-.270	-2.528	.013
GENDER	-1.162	2.018	-.048	-.576	.566
AGE	.705	1.009	.058	.699	.486
GPA	-2.759	2.338	-.098	-1.180	.240

a Dependent Variable: Computer Proficiency

5.5 Summary of Analysis of Findings

Undergraduate accounting majors at four northeastern United States universities were administered a self-designed technology questionnaire and a cognitive styles assessment test. Scores in three levels of technological proficiency, in addition to attitudes towards computers and computer anxiety were examined. The Gregorc Style Delineator, a cognitive styles assessment instrument, measured students' ranges of cognitive style. Relationships between cognitive style and technology attributes were examined. Further, relationships to various demographic measures (age, gender, GPA, and others) were analyzed.

Significant findings include the relationship to technological proficiency and other computer measures, attitude and anxiety. These are consistent with prior literature (see Chapter 2). The relationship between computer attributes and gender are insignificant, inconsistent with prior literature. The accounting majors in the

sample show distinct similarity in cognitive style. Contrary to results in the general population, a large number of the students (over 70%) score high in the Concrete Sequential median. In the general population approximately 37% are Concrete Sequential (Seidel et al., 1999).

The results further indicate that those who score higher in the Concrete Sequential median score lower in technological proficiency, while those who score higher in other mediation channels (Abstract Sequential, Concrete Random, Abstract Random, or none) score higher in technological proficiency. Chapter 6 continues with a discussion of the findings of both this quantitative research and the qualitative research presented in Chapter 4 which motivated the study described in this chapter, and the implications of this study on accounting education and the accountancy profession in general.

6 - DISCUSSION OF FINDINGS AND IMPLICATIONS FOR ACCOUNTING EDUCATION AND THE PROFESSION

Chapter 6 - DISCUSSION OF FINDINGS AND IMPLICATIONS FOR ACCOUNTING EDUCATION AND THE PROFESSION

6.1 Introduction

This work focuses on several aspects of changes taking place in the accounting profession. The transformation in the largest of accountancy firms – The Big Five - is especially of interest. These firms are examples of the highest level of knowledge organization, offering expertise to clients as their primary marketable service. Particularly, this study examines how the firms employ technology to facilitate the transfer of knowledge. This study explores the attributes necessary for a successful career in accountancy and whether current accounting students (those preparing to enter the field) have the appropriate skills, competencies, and cognitive style.

To examine these issues, two phases of research have been conducted. A pluralistic research methodological approach has been employed. The first part of the research, qualitative in methodology, is a series of interviews with practitioners. The second, more empirical in nature, follows the responses of the interview subjects by the administration of two research instruments to a group of undergraduate accounting majors in U. S. universities. Both are important in determining if the

changes discussed in accounting literature (AICPA, 2000a; Elliott, 1992; Elliott, 2000; and others) are in fact taking place. Further, this study examines whether recent entrants into the profession are qualified for the demands being placed on today's accountants. Although these demands have been depicted as quite broad in nature, this study focuses more on the students' abilities involving the technologies necessary to implement successful knowledge management systems in large professional services firms, specifically the biggest of the global accountancy firms.

6.2 Practitioner Interviews

Fifteen practitioners are interviewed (see Chapter 4). The primary purpose of the interviews is to determine whether the tools discussed in various authoritative sources (Zack and Serino, 1996; Waler et al., 1994; and others) are being adopted to empower firms in the strategies of knowledge management. The interviews further serve to validate the impact of changes being witnessed in the firms and discuss how adequately prepared recent accounting graduates are for careers.

Results of the interviews provide rich material to support the questions examined in this research. Accounting practitioners describe several transformative aspects of the profession, including the pressure to develop new products and services, pressures on the financial statement audit function, increased regulation, and the changes in the skills required of accountants. They describe massive changes due

to technological innovation, both as a communication and knowledge-sharing platform, and also as a facilitator of more and faster services to clients.

When asked to discuss their perceptions of the future of the profession, responses were quite varied, supporting various authoritative sources calling for change (Albrecht and Sack, 2000, for example). Topics mentioned included increased reliance on technology, further expansion into broader business consulting areas, increased regulation, the possibility of more mergers of the large firms, and a change in the perception of the accountant by the general public.

One of the key research questions at the heart of this research involves technological proficiency of today's accounting students. Interestingly, most of the practitioners interviewed commented that recent entrants to the profession actually exhibit strong computer skills and training, far more than senior members of the firms. It appears that resistance to adoption of knowledge management technologies occurs more with veteran firm members than with those who have grown up in the age of computers. This phenomenon is noted also by Zuboff (Zuboff, 1988) and Turkle (Turkle, 1995).

The various calls for change in accounting education note that today's students need stronger proficiencies in the areas of oral and written communication, analytical skills, and the ability to view the global business environment (IMA 1994, for example). The practitioners interviewed strongly confirmed that these are areas of weakness in today's accounting graduates.

The interview process provides strong anecdotal evidence for the key research questions explored in this study. Thus an empirical examination was conducted to validate some of the assertions of the practitioners interviewed. Specifically, how well suited and prepared are undergraduate accounting majors for careers at global accountancy firms? The areas of concentration for this research are technological proficiency and cognitive style. The next section describes the rationale and findings of the empirical study.

6.3 Student Surveys

The data collected from a sample of 132 undergraduate accounting students at four major northeastern United States universities yields various results. The subjects were given a self-designed technology questionnaire and a cognitive-style assessment test. This part of the study's primary motivation is to determine cognitive style characteristics and to see if a relationship exists between cognitive style and information technology proficiency among accounting students. This relationship has significance, since accounting students continue for the foreseeable future be the main source of practitioners entering the accountancy profession, and since accounting firms are an important example of knowledge-based organizations (Empson, 1999). Technology is an essential component for the transfer of knowledge among the members of a knowledge organization, where transfer of knowledge is the key to the creation of products and services that are the primary resource of the firm.

Various researchers have noted that cognitive style helps determine the ability of individuals to function within the knowledge organization (Geisert and Dunn 1991, for example).

Further, cognitive style has been shown to be a key determinant in one's ability to utilize technological innovation to achieve the goals of the knowledge-based firm (Zack et al., 1996). The relationship between cognitive style and technological proficiency has long been known (see discussion in Chapter 2). Since technological proficiency is key to the efficient management of knowledge resources, accounting professionals are called on to exhibit expertise in an ever-changing array of technological tools, applications, platforms, and systems.

Results of this study indicate that the accounting students are not representative of the general population in their cognitive style. Confirming previous research, the students in the study scored quite high in one specific range, and quite low in other ranges. Using the Gregorc Style Delineator measurement terminology, over 70% of the subjects were either exclusively Concrete Sequential or Concrete Sequential with high scores in one or more of the other three mediation channels. Attributes associated with this mediation channel include practical, thorough, well-organized, preferring stable, quiet, structured environments. On the surface, this would tend to describe attributes essential for the traditional role of the accountant within an organization. Today's knowledge management organization, designed to operate within the cycle of knowledge creation and codification (Nonaka et al.,

1995), strongly technology-based, requires members to have attributes differing from those traditionally associated with accountants; i.e., more creative, abstract thinking, able to solve problems in unstructured settings, able to work in teams and communicate effectively, and the like.

This study further examines relationships between computer proficiency and other key attributes. These include computer anxiety and attitude toward computers, gender, age, grade point average (GPA), amount of previous computer training, and membership in Beta Alpha Psi (the accounting honors fraternity). Prior researchers see chapter 2) have both observed this and described the significance of these relationships.

The main research question of the empirical study is: is there a relationship between cognitive style and computer proficiency in a group of accounting students. The results of this study show that the students scoring high in the Concrete Sequential cognitive style range scored lower in computer proficiency than those whose cognitive style is one of the other three cognitive styles measured by the Gregorc Style Delineator. This is of significant interest since the majority of the students surveyed scored primarily as Concrete Sequentials (or "mixed Concrete Sequentials"). This implies that a large number of accounting majors have a lower propensity to computer proficiency. In light of the interviewees' confirmation of the importance of technology as a tool and platform for the management of knowledge,

accountancy professionals as knowledge workers must be able to demonstrate proficiency with a broad range of technological tools.

Various studies have observed that females tend to have higher anxiety and lower proficiency with technology. Many reasons have been given for this phenomenon. There were 54 males and 78 females participating in this study. The accounting profession in general is almost evenly divided between men and women, and women are entering the profession in increasing numbers (Flynn et al., 1997). Results of this study show almost identical scores in computer proficiency, anxiety, and attitude toward computers in males and females.

Although an examination of grade point average (GPA) did not yield significant results, it was observed that students with slightly lower GPA's scored slightly higher in computer proficiency. The mean GPA of the 125 subjects who responded to this question was 3.235 (SD=.425) out of a possible 4.0. Various researchers have observed this phenomenon and have attributed several implications to this, including different learning styles and that poorer performing students benefit more than high achieving students from computerized teaching enhancements.

Other attributes surveyed, including major and minor areas of study, number of previous computer courses taken, and membership in Beta Alpha Psi, did not show measurable results in students' proficiency with technology. As discussed in the next chapter, this may be due to several limitations of the scope of this study.

The key contributions of this study are, in fact, in the findings about the inherent cognitive style of accounting students (based on this sample) and in the relationship between cognitive style and technology proficiency. First, accounting students tend to score very high in one specific channel of cognitive style (Concrete Sequential). Second, there is a relatively significant inverse relationship between the levels of proficiency with technology of the students in that style versus those with other styles. Both points have major implications for the future of the accountancy profession. As the profession adopts more of the persona of the knowledge-based organization, the ability for accountants to demonstrate a breadth of knowledge and to be able to quantify and communicate that knowledge both throughout the organization and to clients is essential. That requires individuals with cognitive styles compatible to knowledge workers, certainly not merely concrete thinkers. That further requires individuals who possess strong technological competencies, compatible with utilization of various knowledge management technology tools.

6.4 Implications for Accounting Education

With the changes brought about within the business environment due to globalization, technological innovation, and many other factors, the future of accounting education has been challenged. In the United States various bodies have been observing and analyzing several changes in the quality and quantity of accounting students enrolled in university-level programs. For more than a decade,

both academic institutions and professional organizations have been calling for a fundamental change in accounting education. The Bedford Committee (AAA et al., 1986) and other reports called for a comprehensive information systems approach to management education, rather than focusing strictly within department and course structures. Elliott (Elliott, 1991) urged accounting educators to teach students how to learn rather than what to learn, thus producing workers who could function within the knowledge organization.

The Institute of Management Accountants (IMA, 1994) described accountants as strategic business partners who need to acquire "knowledge, skills, and abilities" in understanding business. In a later publication (IMA, 1999), the Institute notes that most schools are moving very slowly in accommodating the rapid changes in practice. LeRouge (LeRouge, 2000) further identifies innovations in technology as shifting the role of financial professionals more toward the areas of strategic planning and analysis.

The American Institute of Certified Accountants lists three ways that accounting education could be revised to improve the professional abilities of accounting students, ensuring success in the profession (AICPA, 1996). First, is developing decision modeling, risk analysis, problem solving, and decision making. Second, students need to learn to evaluate both internal and external business environments and how their interactions determine success or failure of businesses. Third, four broad business competencies are critical: strategic/critical thinking,

industry/service perspective, international/global perspective, and resource management.

Public accounting firms today expect incoming accounting graduates to have both a general knowledge of accounting information systems and a set of specific skills related to information technology (Stone et al., 1996). This includes the ability to use generally accepted micro-computer tools, such as spreadsheets and word processing software, but also experience with various applications software, such as accounting packages and database management systems. This observation is not confined to public accounting. Stone et al. further note that financial executives in the corporate sector also find accounting graduates to be weak in information systems design areas. These tools and applications form the basis for knowledge management platforms – decisions support systems (DSS), computer supported collaborative workware (CSCW), and the like.

The most recent major study (Albrecht et al., 2000), sponsored by the American Accounting Association, the American Institute of Certified Public Accountants, the Institute of Management Accountants, and several global accountancy firms, portrays a rather dismal picture.

Among the findings of this research:

- The number and quality of students electing to major in accounting is decreasing rapidly.
- Both practicing accountants and accounting educators would not major in accounting if pursuing their education again.

- Accounting leaders and practicing accountants state that accounting education, as currently structured, is outdated and needs to be modified significantly.

The study further identifies three major developments that have occurred that have changed dramatically the business environment which accounting graduates enter. The first driver is technology. The ability of hardware and software to prepare and disseminate information has reduced and in many cases eliminated the traditional accounting function. The second major development has been globalization. Faster methods of transportation, combined with instantaneous information, have allowed the world to become one giant marketplace. The third driver identified in the study is the concentration of financial power held by certain market investors, especially mutual and pension funds. Large institutional investors, with huge resources in capital, information acquisition, and analysis capabilities, have shortened the period in which success is measured.

These three major developments have increased the pace of the business world, shorted product life cycles, required faster, more accurate decision making by management, and have led to the emergence of the modern knowledge-based organization. This knowledge organization model has fostered new products, new industries, new markets, and the emergence of new types of professional service organizations.

These organizations operate in an increasingly complex business world, full of risk and uncertainty. There have been increases in regulatory oversight. In

addition, there has been an increased emphasis within businesses on customer satisfaction as a measurement for success. This new business model includes a restructuring of traditional reward systems, increasing rewards for services that help leverage technology and globalization and that assist in strategic decision making.

Important to accountants, accounting educators, and those studying accounting today are the rapid changes in financial reporting. Predictions of totally paperless, virtually real-time reporting over the Internet using XBRL (Extensible Business Reporting Language), the Internet financial reporting language, have become accepted as mainstream ideas. This development is changing the role of the accountant and auditor, as well as firms' relationships with financial markets and major market players, including mutual and pension funds.

These observed trends in the business environment have greatly influenced students' choices of college study. In the knowledge management organization, competing in a global economy, the perceived importance of the traditional accounting role has been diminished. Albrecht and Sack (Albrecht et al., 2000) report that students view the accounting role as that of scorekeeper, a function that can easily be replaced by technology. Students further realize the competitive pressure and lack of value added by services such as financial statement audits and tax compliance work have diminished compensation in those areas. Salaries of accounting graduates have not kept pace with increases in salaries in other majors, especially information technology, finance, and consulting.

The observations of Albrecht and Sack (Albrecht et al., 2000) have not gone unnoticed by accounting educators, accounting professional organizations, or accounting firms (especially the Big Five). Universities have seen a decrease in accounting major enrollments over the last ten years. They have further observed a decrease in the quality of those selecting accounting as a major.

Walker and Ainsworth (Walker & Ainsworth, 2001) suggest the implementation of a process-centered curriculum for accounting and business education. This would consist of six different cross-disciplinary modules examining business organization and strategy, customer service, human resources, conversion and service activities, capital resources, and performance measurement. These modules would cover all areas now covered in core accounting courses and general business courses in a four-year undergraduate program. Their study includes detailed descriptions of the content of each of these six modules and suggestions to educational institutions on the implementation of this approach.

6.5 Redesigning Accounting Curricula

The largest of accountancy firms are in the process of transforming themselves into broad-based consulting firms, trying no longer to be identified as accounting/auditing/tax professionals. The interviews in the first part of this research

support the claim that today's accounting graduates lack much of the training necessary to succeed in their newly reconfigured knowledge organizations. This includes sufficient knowledge of technology, ability to communicate and operate in groups, and ability to convert tacit to explicit knowledge to add value to firms and their clients.

Accounting programs in today's universities need to be revised. They need to provide the skills needed in the fast-paced business world, which relies heavily on technology to provide what the students are now being training to do. Although the AACSB (the main accrediting authority) has primarily left choices of accounting curriculum to individual schools to decide, it is clear that major changes need to take place to attract more qualified students to the accounting major. Then these students need to be educated in the areas that the business environment deem essential. Accountancy firms need to portray the accountant as someone whose tasks within an organization are important, interesting, rewarding, diverse, and challenging.

6.6 Implications for Accounting Certification

Professional organizations have observed a decline in perceived status of professional certifications, such as the CPA credential. The realization that accounting professionals need more expertise than is able to be taught in a traditional undergraduate accounting program, have led to several key initiatives. One of these is the "150-hour rule". This rule, which has been adopted by most state boards of

accountancy, requires that anyone wishing to sit for the Uniform CPA Examination must have 150 credit hours of education, which translates to one year beyond a traditional undergraduate degree. For most applicants, this is the equivalent of a master's level degree. Further initiatives implemented by the AICPA include specialized certifications, the exploration of an entirely new credential (AICPA, 2000b), and an initiative to computerize the CPA exam by November 2004 (details provided in the next section).

Recently the American Institute of Certified Accountants (AICPA) has begun to recognize changes in business organizations and the demand for a new set of skills to be developed and marketed by and to its membership. Accountants need to be recognized for more than their ability to record, classify, summarize and report financial information, as well as provide assurance services. They need to be facilitators for organizational change, skilled in performance measurement systems, entrepreneurial in nature, globally aware, and grounded in the techniques of knowledge management (Reeb & Cameron, 2000). The AICPA has been conducting various experimentation and market research into the creation of an entirely new credential (separate from the Certified Public Accountant). The proposed credential is intended to serve several purposes:

- Best meet the needs of a diverse profession
- Claim a highly active, lucrative, and currently unclaimed marketplace
- Preserve and protect the integrity and services of the CPA
- Create a credential that can adapt swiftly to global market demand and change

- Allow its holders to move and provide services seamlessly across international borders.

Drawing upon the theory of knowledge management, the AICPA identifies accountants' new mission as "enablers of people and organizations allowing them to harness knowledge from the information value chain". This chain begins with business events that create raw data. That data must then be organized into information that is useful. Information is then analyzed, synthesized, and managed so that it can be transformed into knowledge, which is the foundation of sound strategic decision making. Accountants have always seen their role as one of transforming data into useable information. This new model integrates that and carries it to the next level – knowledge creation.

The core services identified that will be provided by carriers of this new credential include: assurance and information integrity, management consulting and performance measurement, technology services, financial planning, and international services. The ultimate goal of the visionaries of this new credential is that it becomes a global credential. Efforts are currently underway to acquire international partners among other certification agencies who would also provide their members with this new credential[28]. Efforts are further underway to develop a name for this new credential and create significant brand awareness[29].

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[28] An allegiance was developed with the ICAEW in 1999, later abandoned by them.
[29] The proposed name for the credential, "Cognitor", was adopted briefly but not ratified by AICPA membership.

Robert Elliott, former chairman of the AICPA, has worked hard to develop and promote a new vision for the accounting profession. Mr. Elliott sees the accounting and information technology areas converging to better create and use information and knowledge (Elliott, 2000). The challenge for accountants is to be at the forefront of this convergence by transforming the profession. The profession needs to reinvigorate its service offerings.

6.6.1 Changes in the Uniform CPA Examination

The CPA credential was primarily intended to protect the interests of non-managing owners (stockholders) through the audit and attest function. The CPA was trained and licensed based on demonstration of the ability to perform a technical craft – accounting and auditing. Today's accountants are qualified to do much more than that, and in fact do provide many more services than the traditional financial statement audit. Creating awareness among the public of the expertise held by accountants in vast areas of technology and knowledge management is the key vision of the AICPA (Elliott, 2000). A new definition for accounting could be "the information infrastructure necessary for an organization to achieve its objectives".

Along with redefining the role of the accountant within the global, technologically sophisticated organization is the examination of the traditional entrance requirements to the profession. In the United States, professional certification is a major objective of entry-level accountants. Options for certification

include the Certified Public Accountant (CPA), Certified Management Accountant (CMA), Certified Financial Manager (CFM), Certified Fraud Examiner (CFE), Certified Internal Auditor (CIA), and a few others. Clearly, the CPA credential is considered the most valued.

In order to qualify for the CPA credential, one must be licensed by a state board of accountancy. Licensing requirements vary from state to state, however they all require successful completion of the Uniform CPA Exam, some sort of experience requirement (from 0 to 3 years), educational requirements, and a thorough background check. The Uniform CPA Exam is administered nationally twice yearly. It consists of four parts, administered over two days (16 hours total). Pass rates are around 40-50% semiannually. The content and delivery of the exam have changed little to accommodate the changes in the accounting profession. The exam is primarily focused on the technical aspects of financial accounting practice and theory, auditing, taxation, ethics, and business law.

Recently the AICPA has begun to explore computerization of the exam, so that applicants may sit for the exam when they want and receive grades virtually instantly. This would entail moving more towards a multiple-choice format for the exam, and moving away from essays and complex problem sets, which need to be graded manually. With the call for increased emphasis on analytical skills and written communication skills, this has been questioned. The most recent information provided by the Content Oversight Task Force (COTF) and the Computerization

Implementation Committee (CIC) of the AICPA projects the implementation date for the new CPA exam format and delivery of January 2004 (AICPA, 2001b).

In further recognition of the broadening of the scope of knowledge required of the CPA, the AICPA recently presented a preliminary study identifying proposed changes to the content of the CPA examination (AICPA, 2001b). An increased focus will be placed on the areas of regulation and "business environments and concepts". This last section is designed to cover knowledge of the general business environment and business concepts that candidates should know in order to understand underlying business motivation and the related accounting implications of business transactions and the skills needed to apply that information to the broader knowledge base for business decision making. This appears to be recognition of the broader role required of accountants within the knowledge-based organization.

As previously mentioned, another recent change is the "150 hour rule". This requires that in order to sit for the Uniform CPA Exam, one needs 150 hours of college-level credits, in a mix of accounting, business, and other disciplines. This is the equivalent of an additional year of study beyond the bachelor degree level, and for most applicants this equates to a master's degree. Educational institutions around the country are developing 5-year bachelor/master programs to accommodate this change. The rule must be adopted on a state-by-state basis, and, as of 2000, has been adopted by 47 out of 50 state boards of accountancy. The rationale for the rule is that

the body of knowledge needed for today's accountant is more than can be acquired in four years of college study.

6.7 Summary

A series of semi-structured interviews with accounting practitioners form the basis for exploration of the key research questions at the heart of this study. Practitioners discuss changes in the profession and in their firms. They further elaborate on the impact technology has made on the practice, both as a tool for more effective communication and transfer of knowledge within the firms, and also in its ability to allow the firm to provide more and faster services to clients. Practitioners give their predictions of the direction of the accountancy profession and how the perceived changes will affect the set of competencies requisite for a successful accounting career. Going further, they discuss the preparedness of recent entrants to the profession, elaborating on technological proficiencies, communication skills, analytical skills, and other attributes. The comments of the interviewees support the hypothesis that due to knowledge management innovations and the related technologies employed, a different type of person may be more suited to a career in a large accountancy firm that what has been typically assumed. These interviews support the second part of this study.

The administration of a cognitive styles assessment tool (the Gregorc Style Delineator) and a self-designed technology questionnaire (Appendix C) to a group of undergraduate accounting majors provided interesting insights into the make-up of that population. The sample scored markedly high in one specific style, Concrete Sequential. Individuals with this style tend to be practical, thorough, well-organized, preferring stable, quiet, structured environments. These are attributes descriptive of someone in the traditional role of accountant/bookkeeper. In today's knowledge firm, these traits may not be enough. Further, there is a relationship between cognitive style and technological proficiency in the students sampled. Those who scored higher on the Concrete Sequential median (the majority of the sample) tended to score lower in technological proficiency, indicating an inverse relationship.

This indicates that those exhibiting the characteristics of traditional accountants may be weaker in technological competencies and other areas than individuals demonstrating characteristics more appropriate for success in a knowledge organization. In this type of organization, of which today's professional accountancy firm is an example, individuals need to demonstrate a much broader set of skills and perhaps different cognitive style. Knowledge workers must demonstrate strong oral and written communication skills, the ability to think analytically and abstractly, and the ability to share knowledge through an assortment of technological tools and platforms. Those who fit the profile of the traditional

accountant/bookkeeper may be ill suited for the role that today's accountant within a knowledge organization is expected to play.

Implications for both accounting education and accounting certification requirements are significant. Although there have been various calls for changes in accounting education to keep pace with changes in the profession (both in the United States and in other countries), very little has changed in the last couple of decades. Only recently have the certification bodies, such as the AICPA, begun to address these issues.

With the internal and external pressures on the accounting profession to provide relevance to today's organizations, it is imperative that the profession address these concerns. Attracting appropriate individuals into the profession, educating them in the skills and competencies deemed necessary for today's and future demands, and creating certification standards appropriate for allowing entry of the most qualified into the accounting profession is vital for survival.

7 – CONCLUSIONS, LIMITATIONS, AND IMPLICATIONS FOR FURTHER RESEARCH

Chapter 7 – CONCLUSIONS, LIMITATIONS, AND IMPLICATIONS FOR FURTHER RESEARCH

7.1 Introduction

The purpose of this research project is to examine changes taking place in the accountancy profession and changes in the role of the accountant within organizations. The largest global accountancy firms are gradually redefining themselves from the traditional role of auditor and accountant to that of a much broader strategic business consultant. Accounting firms can be seen as large professional service firms utilizing the tools and techniques of the modern knowledge management organization (Empson, 1999). This study further investigates whether current undergraduate accounting students, those preparing for careers in these firms, are prepared for this new dimension within the profession.

As a result of the changes in the profession and in the accounting firms, new skills and traits are being called for in those who enter the field of accounting. Today's accountant fills a much broader role than just that of recording, summarizing, reporting, auditing, and analyzing financial information for firms. Performance measures are much broader than just the traditional financial benchmarks of the past (Kaplan 1996; and others). Technology has eliminated much of the need for traditional accounting functions (Kies et al., 1998). Technology has further provided a vast array of tools to assist in providing faster and higher quality

information, as well as a means to share and codify knowledge within global firms. Further, the transfer of learning, key to conversion of information into knowledge, focuses on the actions and roles of persons, and different dominant style traits allow all members of a firm to participate in the process of sharing knowledge, which adds value to the firm and its clients. (Wenger et al., 2002)

This research project employs a pluralistic methodological approach – both qualitative and quantitative. In the qualitative phase, a series of semi-structured interviews with accounting practitioners, primarily in large global accountancy firms, is conducted. These accountants are asked to discuss their perceptions of changes taking place in the profession and in their firms. They further comment on the role of knowledge management and technology in the firms, preparedness of new entrants to the firms, and their views on accounting education.

The responses from this qualitative section provide insight into how firms perceive changes in the profession and predictions for the future of accountancy. These interviews further illustrate just how pervasive technology and knowledge management techniques are within the firms and in our society in general. Interviewees identify strengths and weaknesses in the training and skills of entry-level accountants, primarily accounting majors at United States universities, and make suggestions for addressing deficiencies through curriculum changes. They further validate the fact that the skill set and perhaps cognitive style of today's

accounting professional is quite different that what is traditionally associated with accountants.

The second phase of this research is an empirical examination of both the cognitive style and self-perceived technological proficiency in a group of accounting students at the undergraduate level in the United States. The study further explores whether a relationship exists between cognitive style and technological proficiency. This is motivated largely on the results of the practitioner interviews. Practitioners note the importance of different skills and abilities necessary for success in the accountancy profession from what was necessary in the past. Students are given a cognitive styles assessment test and asked to complete a self-designed technology questionnaire. Computer proficiency, anxiety, and attitude are also measured. Further, demographic information is also obtained, including age, gender, grade point average (GPA), number of computer-related courses taken, and membership in Beta Alpha Psi (the accounting honors fraternity). Relationships of these attributes have been identified in prior literature. Further, certain cognitive style and technological attributes have been identified as crucial for success as a knowledge worker (Nonaka et al., 1995), and, importantly, are mentioned as keys to success by the practitioners interviewed.

Results of this quantitative examination yield many interesting insights into the make-up of today's undergraduate accounting majors. First, a significant proportion of the subjects fit into a specific cognitive style. The attributes of this

style match those that would be typical of a traditional accountant (Gul et al., 1992, for example), whose strengths were in processing information sequentially in an orderly and precise manner. This type of individual prefers work under specific instructions, is product oriented, needs highly structured environments in which to function, dislikes chaos or change, and cannot deal well with individuals who think differently than he or she does (Gregorc, 1982). These characteristics do not fit well with today's knowledge worker in a multi-disciplinary, team-based environment of the modern organizational structure (Grant, 1997). The results of this part of the research further show that the subjects who fit within the cognitive style described here had measurably lower scores in computer proficiency than the students who had different cognitive styles, as hypothesized. Since technology is a key to the codification and transfer of knowledge (Zack et al., 1996), individuals in knowledge organizations, including accounting firms, need to have a very strong ability to utilize technology and develop a thorough appreciation for knowledge management tools (decision support systems and the like) in order to develop intangible assets that add value to firms and their customers.

Analysis of data collected in this study indicates that gender, age, number of computer courses taken, and membership in Beta Alpha Psi had very little relationship to proficiency with computers. Interestingly, however, students with lower GPA's scored moderately higher in computer proficiency than students with high GPA's. It must be noted that the range of GPA's among the students was not

large, most upper level accounting majors tend to be hard working, excellent students preparing primarily for careers in public accountancy. Previous research has shown that lower performing students tend to rely on computers as a learning tool, and, therefore, may have more reliance on them to help them succeed academically.

7.2 Limitations of the Study

There are several limitations to this research that must be noted. First, the interviews were conducted with fifteen accounting professionals with between six and thirty years of experience in large accounting firms. Responses of these practitioners, although consistent in many areas, were quite broad in range. There were agreements in many areas and a divergence of opinions in others. It is quite possible that the views and insights of these subjects are not entirely representative of the profession in general. Further, the practitioners were all based in United States offices of global accountancy practices. It cannot be assumed that international counterparts would share all views. In some areas the responses validate prior research (Albrecht and Sack 2000; and others), and in some areas responses area quite divergent.

The empirical section of this study (Chapter 4) is based on a sample of 170 accounting students at four different institutions. The data were collected during scheduled classes, with the author present to administer the surveys. Of the 170

possible subjects, 38 surveys were not used due to failure of subjects to follow instructions on either the cognitive styles assessment test or the technology questionnaire. This appears to be consistent with other researchers' experience. The final sample of 132 accounting majors, although statistically valid in the analysis of cognitive style and technological proficiency, may have been too small to determine other relationships. As a result, this study found little relationship between either cognitive style or technological proficiency to gender, age, GPA, or other demographic attributes. It is possible that a larger sample would have yielded better results in these areas. Further, the cognitive styles instrument and technology questionnaire were administered to the target group only. It is possible that some sort of control group (i.e., non-accounting students, liberal arts students) would have provided further insight into the primary research questions. Although there is sufficient evidence from prior literature (see Chapter 2) concerning cognitive style and technological proficiency, the focus on knowledge management in this study made it different from most past studies.

Another limitation is due to the bias of results on cognitive style. As noted, although approximately one quarter of the students scored as Concrete Sequential, over 70% scored as Concrete Sequentials mixed with one or more other styles. Only 30% of the students fit into any of the other three mediation channels. This is highly different from the general population. As a result of this bias and the fact that the non-Concrete Sequential students were so few, it was not possible to measure

relationships between the remaining three cognitive styles and technological proficiency. Analysis was based on classifying cognitive styles as either Concrete Sequential, mixed Concrete Sequential, or other cognitive style (i.e., non-Concrete Sequential). It must be noted, however, that based on this method of analysis, the various statistical results were moderately significant, and the sample size was sufficient for validity.

Yet another limitation of this study is the selection of the cognitive style instrument. The Gregorc Style Delineator was selected as the cognitive style test for this study. The Gregorc Style Delineator is a well-validated test, used for measures of both cognitive style and learning style applications. It classifies subjects into four distinct styles. It ignores personality and other measures of style. Most cognitive style research in accounting, social sciences, and other business studies uses the well-recognized Myers-Briggs Type Indicator (MBTI). This instrument consists of 86 questions and measure cognitive style, personality traits, and other attributes. Other popular instruments are described in chapter 2.

The choice of the Gregorc Style Delineator was for several important reasons[30]. First, it is very simple to administer and score. The test takes approximately 3-5 minutes to administer. Since the survey was taken during class time, it was essential to design a study that would not be inconvenient to administer.

Thus obtaining instructors agreeable to allow the study to be taken during class time was maximized. In addition, it is the intention of this researcher to continue to examine cognitive style attributes in accounting practitioners, both in the United States and globally, as follow-ups to this exploratory study (see for example, Shaw and Pant 2003). In order to be able to obtain research subjects from within accountancy practices, the ability to gather research data in as little time as possible is vital.

Second, as previously noted, at least two of the Big 5 firms are already familiar with the Gregorc Style Delineator, which is used internally in several diverse applications. Third, this study was designed to look at cognitive style alone, without examining personality attributes, as the MBTI does. In addition, the author is familiar with this test from prior research and teaching applications. Consultation and support from the test's author, Dr. Anthony Gregorc, aided in the development of this research project.

Although the results of this research clearly indicate that accounting students fit into a distinct range of cognitive styles characteristics, this may not imply that their future is doomed as practitioners in a knowledge organization. There is evidence that, although cognitive style does not change over time, individuals are able to adapt to the needs of differing tasks by developing learning strategies and different ways of approaching problem solving. Further, accountancy firms,

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[30] It is important here to emphasize that there is sufficient research (cited in chapter 2) to ascertain the

especially outside of the United States environment, routinely hire from a range of educational backgrounds, accounting being only one.

7.3 Implications for Further Research

The areas of knowledge management, technology, and cognitive style lend themselves to many different areas of study in the accounting profession and accounting education. With changes in organizational structure and dynamics due to information technology, utilization of knowledge within organizations, changes in professional services organizations, and the role of the accountant in organizations, there are many opportunities for further research.

This study focuses only on undergraduate accounting students. There are other avenues to entry into the field of accounting. With the expansion of the domain of accounting into information technology, consulting, general management, and other areas, a degree in accounting is not the only way to gain the technical training to work in the field. The Big Five and other firms routinely hire non-accounting majors and train them in technical aspects of accounting and auditing. Finance and information systems majors also acquire a background in accounting. Therefore, this limited study could be expanded to examine not only accounting majors, but also other students who might consider entering the field of accounting. It is quite likely

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high validity of the instrument

that the skewing of cognitive style observed in the accounting majors would be less evident in a wider population sample.

It would further be interesting to compare both results in cognitive style and technological areas, proficiency, anxiety, and attitude, in other populations with results obtained in the accounting students in the study. With today's emphasis on technology in education and, in fact, in everyday life, results could prove interesting. Similarly, in today's fast-paced, highly media-centric society, cognitive style factors may have shifted from the initial validation of the Gregorc Style Delineator in the late 1970's. Perhaps the general population has shifted towards a different combination of styles than observed previously.

Comparing results of this study of accounting students to various levels of practitioners could prove interesting. It is possible that Concrete Sequentials (the majority of the accounting students) do not remain in the accounting field, or do not achieve job satisfaction in accounting. This raises the question as to whether part of the typical attrition that public accountancy firms experience is due to mismatched cognitive style. In addition, research suggests that at different levels of management within the accounting profession, different traits are called for. Stratification of "style-centric" types may be observed in different positions in the field (i.e., managers and partners versus auditors and cost accountants).

However, preliminary research (Shaw et al., 2003) indicates that accountants at all levels of professional practice within public accountancy (and among various

specialties) have cognitive style ranges consistent with this examination of accounting students. Indications of this research suggest that perhaps a socialization and adaptation takes place, allowing Concrete Sequential individuals to develop complimentary traits consistent with those necessary to succeed in a knowledge-based environment. Further, it is possible that in a team-based environment, individuals with diverse or complimentary styles balance each other in a positive, synergistic fashion. This is an exploratory study and more examination is necessary in this area.

The area of knowledge management and its application in organizations is quite broad. It would be of interest to focus on specific knowledge management applications, such as computer supported collaborative work, executive support systems, enterprise-wide resource planning, or expert systems, and measure the impact of technology and cognitive style on those applications. Since the literature on knowledge management is quite divided over what appropriate cognitive style is needed to succeed in cycling tacit to explicit knowledge, perhaps within those specific applications, distinct cognitive styles could be observed.

7.4 Summary

The accountancy profession is rapidly changing to satisfy the needs of organizations and society in this new "Knowledge Age". Skills and traits necessary for success in the profession in the past may no longer be appropriate. Today's

accounting professionals exemplify knowledge workers, bringing vast resources of tacit knowledge acquired by years of education and experience into firms which capitalize on this knowledge through codifying and sharing it with other firm members and clients as explicit knowledge.

The purpose of this research project is to examine the changes in the accountancy profession caused by knowledge management and its related technologies. Practitioners in global accountancy practices are interviewed to determine the extent of this change on their firms, the industry, and them personally. Insights into the preparedness of recent entrants to the profession are elicited (undergraduate accounting majors). Then, undergraduate accounting majors are administered a cognitive styles assessment instrument and a technology questionnaire to ascertain inherent cognitive style and the relationship between it and technological proficiency. Results indicate a strong bias towards on particular cognitive style and a relationship between students' cognitive styles and their technological proficiency.

There are many implications for the future of the accountancy profession. The image of the accounting profession appears to be based on an antiquated model. As a result, students perhaps choose accounting as an area of study believing that they are suited for the profession based on impressions from the past. Further, an examination of accounting education and the various calls for change indicate that our education model needs to change to keep pace with changes in the profession.

Standards for professional certification must be updated to make sure that those with the appropriate skills are admitted to the profession.

BIBLIOGRAPHY

BIBLIOGRAPHY

AAA, A. A. A., & Committee on the Future Structure, C., and Scope of Accounting Education. 1986. Future accounting education: Preparing for the expanding profession. ***Issues in Accounting Education***, Vol. 1: 168-195.

AICPA. 1996. Information Technology Competencies in the Accounting Profession.

AICPA. 1997. ***Report of the Special Committee on Assurance Services***.

AICPA. 2000a. AICPA Core Competency Framework for Entry into the Accounting Profession: AICPA.

AICPA. 2000b. The Cognitor Concept: Turning Knowledge into Value.

AICPA. 2001a. Vision Statement. New York.

AICPA, 2001b. Proposed structure and content specifications for the Uniform CPA Examination: 1-34.

Alavi, M., & Leidner, D. E. 2001. Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues. ***MIS Quarterly***, 25(1): 107-134.

Albrecht, W. S., & Sack, R. J. 2000. ***Accounting Education: Charting the Course through a Perilous Future***: American Accounting Association.

Appleton, E. L. 1997. How to survive ERP. ***Datamation***, Vol. 43(No. 3): 50-55.

Argyris, C. 1991. Teaching smart people how to learn. ***Harvard Business Review***.

Argyris, C., & Schon, D. A. 1989. Participatory action research and action science compared : a commentary, ***American Behavioral Scientist.***, Vol. 21(No. 5): 612-624.

Atkins, H., Moore, D., Sharpe, S., & Hobbs, D. 2001. Learning style theory and computer mediated communication. ***World Conference on Educational Multimedia, Hypermedia, and Telecommunications (EDMEDIA)***, 2001(1).

Atkinson, S. 1998. Cognitive style in the context of design and technology project work. ***Educational Psychology***, Vol. 18(Issue 2): 183-195.

Auyeung, P., & Sanders, J. 1996. A cross cultural study of the learning style of accounting students. ***Accounting and Finance***, Vol. 36: 261-274.

Ayersman, D. J., & Reed, W. M. 1995/1996. Effects of learning styles, programming, and gender on computer anxiety. ***Journal of Research on Computing in Education***, 28(2): 148-161.

Bandura, A. 1977. Self - efficacy : toward a unifying theory of behavioural change. ***Psychological Review***, Vol. 84: 191-215.

Betz, N. E., & Schifano, R. S. 2000. Evaluation of an intervention to increase self-efficacy and interest of college women. ***Journal of Vocational Behavior***, Vol. 56(No. 1): 35-52.

Bokoras, M. A., Goldstein, M. B., & Sweeney, M. M. 1992. Common factors in five measures of cognitive style. ***Current Psychology: Research & Reviews***, Vol. 11(No. 2): 99-109.

Bookman, H. 1989. Testing for the best programmer. ***Datamation***, Vol. 35(No. 7): 83-86.

Booth, P. 1993. Personality biases of accounting students: Some implications for learning style preferences. ***Accounting and Finance***, 33(2): 109(112).

Boreham, B. W., & Watts, J. D. 1998. Personality type in undergraduate education and physics students. ***Journal of Psychological Type***, Vol. 44: 26-31.

Brown, J. S. 1991. Research that reinvents the corporation. ***Harvard Business Review***.

Burns, J. 1994. Accounting Education for the 21st Century: The global challenges. ***AAA & Int'l Assoc. for Accounting Education and Res. Oxford***.

Busch, T. 1996. Gender, group composition, cooperation, and self-efficacy in computer studies. ***Journal of Educational Computing Research***, 15(2): 125-135.

Butler, K. A. 1984. Learning and Teaching Style.

Campbell, N. J. 1992. Enrollment in computer courses by college students: computer proficiency, attitudes, and attributes. ***Journal of Research on Computing in Education***, Vol. 25(No. 1): 61-72.

Chan, M. M. K. 1995. The moderating effects of cognitive style and recency effects on the auditors' belief revision process. ***Managerial Auditing Journal***, Vol. 10(No. 9): 22-28.

Christensen, C. 1997. ***The Innovator's Dilemma : When New Technologies Cause Great Firms to Fail***. Boston, Massachusetts: Harvard Business School Press.

Cooper, R., & Kaplan, R. S. 1998. The promise - and the peril - of integrated cost systems. ***Harvard Business Review***, Vol. 76(No. 4): 109-121.

Dambrot, F. H., Watkins-Malek, M. A., Silling, S. M., & Marshall, J. 1985. Correlates of sex differences in attitudes toward and involvement with computers. ***Journal of Vocational Behavior***, Vol. 27: 71-86.

Davis, G. B., & Monroe, M. C. 1987. The problem of information requirements for computer applications. ***Accounting Horizons***, Vol. 1(Issue 4): 105-110.

Debrecency, R. 1998. Accounting information in a networked world - resource discovery, processing, and analysis. Working Paper.

Dede, C. 1996. Emerging Technologies and Distance Learning. ***The American Journal of Distance Education***.

Denzin, N. K., & Lincoln, Y. S. 2000. ***Handbook of Qualitative Research***.: 633-672.

Drucker, P. F. 1988. The coming of the new organization. ***Harvard Business Review***.

Drucker, P. F. 1993. Toward a knowledge-based society. ***The Post-Capitalist World***, current(No. 350): 4-10.

Drummond, R. J., & Stoddard, A. H. 1992. Learning style and personality type. ***Perceptual and Motor Skills***, Issue 75.

Duff, A. 1997. Validating the learning styles questionnaire and inventory of learning processes in accounting: a research note. ***Accounting Education***, 6(3): 263-272.

Duffy, J. 2000. The KM technology infrastructure. ***Information Management Journal***, 34(2): 62-68.

Duffy, J. 2001. The tools and technologies needed for knowledge management. ***Information Management Journal***, 25(1): 64-68.

Dull, R. B., & Tegarden, D. P. 1999. A comparison of three visual representations of complex multidimensional accounting information. ***Journal of Information Systems***, 13(2): 117-132.

Dunk, A. S. 1989. Management Accounting Lag. ***ABACUS***, Vol. 25(No. 2).

Dunk, A. S., & Roohani, S. J. 1997. A Framework Analysis of the relation Between Information Technology and Performance : The Influence of Operational Change Factors and Organizational Culture, ***Advances in Accounting Information Systems***., Vol. 5.

Ellen, P. S., Bearden, W. I., & Sharma, S. 1991. Resistance to technological innovations: an examination of the role of self-efficacy and performance satisfaction. ***Journal of the Academy of Marketing Science***, 19: 297-307.

Elliott, R. K. 1991. Accounting education and research at the crossroad. ***Issues in Accounting Education***, Vol. 6(Issue 1): 1-8.

Elliott, R. K. 1992. The third wave breaks on the shores of accounting. ***Accounting Horizons***: 61-85.

Elliott, R. K. 2000. Who are we as a profession - and what must we become? ***Journal of Accountancy***, 189(2): 81-86.

Empson, L. 1999. Knowledge management : in search of the philosophers' stone. ***Business Strategy Review***, Vol. 10(No. 2): 67-71.

Evans, G. E., & Simkin, M. G. 1989. What best predicts computer proficiency? ***Communications in the ACM***, Vol. 32(No. 11): 1322-1328.

Fisher, D. G., & Ott, R. L. 1996. A study of the relationship between accounting students' moral reasoning and cognitive styles. ***Research on Accounting Ethics***, Vol. 2: 51-71.

Fisher, R. 1995. Senior managers and executive information systems examining linkages among individual characteristics, attitudes, computer use, and intentions. ***Psychological Reports***, Vol 77: 1171-1184.

Flick, U. 1998. ***An Introduction to Qualitative Research***. London: Sage Publishing.

Flynn, P. M., Leeth, J. D., & Levy, E. S. 1997. The accounting profession in transition. ***The CPA Journal***.

Foxall, G. R. 1986. Managerial orientations of adaptors and innovators. ***Journal of Managerial Psychology***, Vol. 2(Issue 2).

Foxall, G. R., & Bhate, S. 1991. Extend of computer use: relationships with a adaptive-innovative cognitive style and personal involvement in computing. ***Perceptual and Motor Skills***, Vol. 72(No. 1): 195-202.

Francis, L. J. 1993. Measuring attitude toward computers among undergraduate college students : the affective domain, ***Computers in Education.***, Vol. 20(No. 3): 251-255.

Geary, W. T., & Rooney, C. J. 1993. Designing accounting education to achieve balanced intellectual development. ***Issues in Accounting Education***: 60-70.

Geisert, G., & Dunn, R. 1991. Computers and learning styles. ***Principal***.

Gilroy, D. F., & Desai, H. B. 1986. Computer anxiety : Sex, race and age. ***International Journal of Man-Machine Studies***, Vol. 25: 11-719.

Glunk, U., & Wilderom, C. P. M. 1998. Predictors of organizational performance in small and medium-sized professional service firms. ***Technology Management***, 16(1/2/3): 23-36.

Goldsworthy, A. 1996. IT knowledge: what do graduates need? ***Australian Accountant***, Vol. 66(No. 9): 24-28.

Grant, R. M. 1996. Toward a knowledge-based theory of the firm. ***Strategic Management Journal***, Vol. 17: 109-122.

Grant, R. M. 1997. The knowledge-based view of the firm: implications for management practice. ***Long Range Planning***, Vol. 30(No. 3): 450-454.

Gregor, S., & Benbasat, I. 1999. Explanations from intelligent systems: theoretical foundations and implications for practice. ***MIS Quarterly***, 23(4): 497-531.

Gregorc, A. F. 1979. Learning/teaching styles: potent forces behind them. ***Educational Leadership***: 234-237.

Gregorc, A. F. 1982. An Adult's Guide to Style. ***Educational Leadership***.

Gregorc, A. F. 1984. Gregorc Style Delineator: Development, Technical and Administrative Manual. ***Columbia***.

Grey, C. 1998. On being a professional in a "big six" firm. ***Accounting, Organizations and Society***, 23(5/6): 569-587.

Gul, F., Huang, & Subramaniam, N. 1992. Cognitive style as a factor in accounting students' perceptions of career-choice factors. ***Psychological Reports***, Vol. 71: 1275-1281.

Gul, F. A. 1986. Adaption-innovation as a factor in Australian accounting undergraduates' subject interests and career choices. ***Journal of Accounting Education***, Vol. 4(No. 1).

Gul, F. A. 1987. Field dependence cognitive style as a moderating factor in subjects' perceptions of auditor independence. ***Accounting and Finance***, Vol. 27(No. 1): 37-48.

Gummesson, E. 2000. ***Qualitative Methods in Management Research*** (2nd ed.). Thousand Oaks, CA: Sage Publishing.

Hanno, D. M., & Turner, R. M. 1996. The changing face of accounting education. ***Massachusetts CPA Review***, Vol. 70(No. 1): 8-12.

Harasym, P. 1996. Relationship between Myers-Briggs Type Indicator and Gregorc Style Delineator. ***Perceptual and Motor Skills***, Vol. 82: 1203-1210.

Harris, D. B. 1995. Creating a knowledge centric information technology environment. ***Unpublished paper***.

Harrison, A. W., & Rainer Jr., R. K. 1992. An examination of the factor structures and concurrent validities for the computer attitude scale, the computer anxiety rating scale, and the computer self-efficacy scale. ***Educational and Psychological Measurement***, Vol. 52: 735-745.

Harrison, A. W., & Rainer Jr., R. K. 1997. Testing the self-efficacy - performance linkage of social - cognitive theory. ***Journal of Social Psychology***, 137(1): 79-88.

Hawker, A., & Crane, J. 1993. Information technology and the culture gap. ***Management Accounting***, Vol. 71(No. 1): 38-42.

Heinssen Jr., Robert, K., Glass, C. R., & Knight, L. A. 1987. Assessing computer anxiety: development and validation of the computer anxiety rating scale. ***Computers in Human Behavior***, Vol. 3: 49-59.

Henry, P. 1989. Relationship between academic achievement and measuring career interest: examination of Holland's theory. ***Psychological Reports***, Vol. 64: 35-40.

Herndon, S. L., & Kreps, G. L. 1993. ***Qualitative Research: Applications in Organizational Communication***. Cresskill, New Jersey: Hampton Press, Inc.

Hildebrand, C. 1996. A little of that human touch. ***CIO Magazine***.

Hill, R., Bullard, T., Capper, P., Lawes, K., & Wilson, K. 1998. Learning about learning organisations: case studies of skill formation in five New Zealand organisations. ***The Learning Organization***, 5(4): 184-192.

Honey, P., & Mumford, A. 1992. ***The Manual of Learning Styles*** (3rd ed.). Maidenhead: Peter Honey.

Huber, G. P. 1992. Response to Rao, et al: how to deal with cognitive style. ***MIS Quarterly***, 16(2): 153-155.

IFAC. 1996. ***Information technology in the accounting curriculum***. New York, NY: International Federation of Accountants.

Ijiri, Y. 1989. Momentum accounting and triple-entry bookkeeping: Exploring the dynamic structure of accounting measurements. ***Studies in Accounting Research #31***.

IMA. 1994. ***What corporate America wants in entry-level accountants***. Montvale, NJ: IMA.

IMA. 1999. ***Counting more, counting less: Transformations in the management accounting profession***. Montvale, NJ: Institute of Management Accountants.

Johnson, H. 1992. ***Relevance Regained: From Top-Down Control to Bottom- Up Empowerment***. The Free Press.

Jones, W. P. 1994. Computer use and cognitive style. ***Journal of Research on Computing in Education***, Vol. 26(No. 4): 514-523.

Joniak, A. J., & Isaksen, S. G. 1988. The gregorc style delineator: internal consistency and its relationship to kirton's adaptive-innovative distinction. ***Educational and Psychological Measurement***: 1043-1049.

Jordan, J., & Jones, P. 1997. Assessing your company's knowledge management style. ***Long Range Planning***, Vol. 30(No. 3): 392-398.

Junnarkar, B., & Brown, C. V. 1997. Re-assessing the enabling role of information technology in KM. ***Journal of Knowledge Management***, 1(2): 142-148.

Kaplan, R. S., Norton, David P. 1996. Using the balanced scorecard as a strategic management system. ***Harvard Business Review***: 75-85.

Kennedy, J., & Peecher, M. 1997. Judging auditors' technical knowledge. ***Journal of Accounting Research***, 35(2): 279-293.

Kies, J. K., Williges, R. C., & Rosson, M. B. 1998. Coordinating computer-supported cooperative work: a review of research issues and strategies. ***Journal of the American Society for Information Science***, Vol. 49(No. 9): 776-791.

Kocharekar, R. 2001. K-Commerce: Knowledge-based commerce architecture with convergence of e-commerce and knowledge management. ***Information Systems Management***, 18(2): 30-37.

Kolb, D. 1976. Learning Style Inventory. ***McBer and Company***.

Landry, J., Raymond, M., Rogers, R. L., & Harrell, H. W. 1996. Computer Usage and Psychological Type Characteristics in Accounting Students. ***Journal of Accounting and Computers***, Vol. 12.

Laribee, S. F. 1994. The psychological types of college accounting students. ***Journal of Psychological Type***, 28: 37-42.

Leadbeater, C. 1998. Who will own the knowledge economy? ***Political Quarterly***, 69(4): 375-386.

Lee, T. A., Bishop, A., & Parker, R. H. 1996. ***Accounting History from the Renaissance to the Present.***

Leonard, D., & Sensiper, S. 1998. The role of tacit knowledge in group innovation. ***California Management Review***, Vol. 40(No. 3): 112-132.

Leonard, D., & Straus, S. 1997. Putting your company's whole brain to work. ***Harvard Business Review***.

LeRouge, C. 2000. 21st century technology issues. ***Strategic Finance***: 55-60.

Lotus. 2001. Lotus and IBM knowledge management products: An introduction to Lotus and IBM technologies: 1-18: Lotus Development Corporation.

Loyd, B. H., & Gressard, C. 1984. Reliability and factorial validity of computer attitude scales. ***Educational and Psychological measurement***, Vol. 44: 501-505.

Madhavan, R., & Grover, R. 1998. From embedded knowledge to embodied knowledge: new product development as knowledge management. ***Journal of Marketing***, 62(4): 1-13.

Marriott, N., & Marriott, P. 2000. Professional accountants and the development of a management accounting service for the small firm: barriers and possibilities. ***Management Accounting Research***, 11: 475-492.

McInerney, V., Marsh, H. W., & McInerney, D. M. 1999. The designing of the computer anxiety and learning measure (CALM): validation of scores on a multidimensional measure of anxiety and cognitions relating to adult learning of computing skills using structural equation modeling. ***Educational and Psychological Measurement***, 59(3): 451-470.

McKenney, J. L. 1995. ***Waves of Change: Evolution through Information Technology***.

Mills, T. Y. 1997. An examination of the relationship between accountants' scores on field independence and use of and attitude toward computers. ***Perceptual and Motor Skills***, Vol. 84: 715-720.

Morgan, G. J. 1997. Communication skills required by accounting graduates: practitioner and academic perceptions. ***Accounting Education***, 6(2): 93-117.

Murphy, C. A., Coover, D., & Owen, S. V. 1989. Development and validation of the computer self-efficacy scale. ***Educational and Psychological Measurement***, Vol. 49: 893-899.

Murphy, H. J., Kelleher, W. E., Doucette, P. A., & Yo, J. D. 1998. Test-retest reliability and construct validity of the cognitive style index for business undergraduates. ***Psychological Reports***, Vol. 82: 595-600.

Myers, I. B., & McCaulley, M. H. 1985. Manual: A Guide to the Development and Use of the Myers-Briggs Type Indicator. ***Consulting Psychologists Press***.

Newman, V. 1997. Redefining knowledge management to deliver competitive advantage. ***Journal of Knowledge Management***, 1(2): 123-128.

Nickell, G. S., & Pinto, J. N. 1986. The computer attitude scale. ***Computers in Human Behavior***, Vol. 2: 301-306.

Nonaka, I. 1991. The knowledge-creating company. ***Harvard Business Review***.

Nonaka, I., & Takeuchi, H. 1995. ***The Knowledge-Creating Company***. New York: Oxford University Press.

O'Brien, T. P. 1990. Construct validation of the Gregorc style delineator: an application of LISREL 7. ***Educational and Psychological Measurement***, Vol. 30.

O'Brien, T. P. 1994. Cognitive learning styles and academic achievement in secondary education. ***Journal of Research and Development in Education***, Vol. 28(No. 1): 11-12Walker, Kenton B., Eric L. Denna.

Odom, M., & Pourjali, H. 1994. Effects of personality and expert system instruction on knowledge development in managerial accounting. ***Perceptual and Motor Skills***, Vol. 79: 267-272.

Oswick, C., & Barber, P. 1998. Personality type and performance in an introductory level accounting course: a research note. ***Accounting Education***, 7(3): 249-254.

Polanyi, M. 1996. ***The Tacit Dimension***. London: Rutledge & Kegan.

Popovich, P. M., Hyde, K. R., Zakrajske, T. D., & Blumer, C. 1985. The development of the Attitudes Toward Computer Usage Scale. ***Educational and Psychological Measurement***, Vol. 45: 261-269.

Quinn, J. B. 1992. ***Intelligent Enterprise: A Knowledge and Service Based Paradigm for Industry***.

Quintas, P., Lefrere, P., & Jones, G. 1997. Knowledge management: a strategic agenda. ***Long Range Planning***, Vol. 30(No. 3): 385-391.

Qureshi, S., & Hoppel, C. 1995. Profiling computer predispositions. ***Journal of Professional Services Marketing***, Vol. 12(No. 1): 73-79.

Radecki, C., & Jaccard, J. 1995. Perceptions of knowledge, actual knowledge, and information search behavior. ***Journal of Experimental Social Psychology***, 31: 107-138.

Rasch, R. H., & Harrell, A. 1990. The impact of personal characteristics on the turnover behavior of accounting professionals. ***Auditing: A Journal of Practice & Theory***, Vol. 9(No. 2): 90-102.

Rastogi, P. N. 2000. Knowledge management and intellectual capital - the new virtuous reality of competitiveness. ***Human Systems Management***, 19(1): 39-49.

Reeb, W. L., & Cameron, M. 2000. ***Adding value to the profession: the proposed global credential***.

Reich, R. B. 1991. ***The Work of Nations***. New York: Alfred A. Knopf.

Richards, T., & Gaston, K. 1995. A re-examination of personal and group estimates of the Kirton Adaption-Innovation scores. ***Psychological Reports***, Vol. 77: 491-498.

Riding, R., & Cheema, I. 1991. Cognitive Styles - an overview and integration. ***Educational Psychology***, Vol. 11(Nos. 3 and 4).

Romney, M. B., & Steinbart, P. J. 2003. ***Accounting Information Systems*** (9th ed.). Upper Saddle River, New Jersey: Prentice Hall.

Rosen, L., & Maguire, P. 1990. Myths and realities of computerphobia: a meta-analysis. ***Anxiety Research***, Vol. 3: 175-191.

Seidel, L. E., & England, E. M. 1999. Gregorc's cognitive styles: college students' preferences for teaching methods and testing techniques. ***Perceptual and Motor Skills***, Vol. 88: 859-875.

Sewall, T. 1986. ***The Measurement of Learning Style: A Critique of Four Assessment Tools.***

Shashaani, L. 1997. Gender differences in computer attitudes and use among college students. ***Journal of Educational Computing Research***, Vol. 16(No. 1): 37-61.

Shaw, L. 2002. The Relationship of Accounting Majors' Cognitive Style and Technological Proficiency: Are Students Prepared to Enter an Increasingly Knowledge-Based Profession? ***Working paper***.

Shaw, L., & Pant, L. 2003. An Assessment of Public Accountants' Cognitive Style: Socialization through Attrition or Adaptation. ***Working paper***.

Simonson, M. R., Maurer, M., Montag-Torardi, M., & Whitaker, M. 1987. Development of a standardized test of computer literacy and a computer anxiety index. ***Journal of Educational Computing Research***, Vol. 3(No. 2): 231 -247.

Soroko, M. P. 1988. Student learning styles - a teaching consideration in the principles of accounting courses. ***Journal of Education fro Business***.

Stewart, K. L., & Felicetti, L. A. 1992. Learning styles of marketing majors. ***Educational Research Quarterly***, Vol. 15(No. 2): 15-23.

Stone, D. V., Arunachalam, V., & Chandler, J. S. 1996. An Empirical Investigation of Knowledge, Skill, Self-Efficacy and Computer Anxiety in Accounting Education. ***Issues in Accounting Education***, Vol. 11(No. 2).

Summers, S. 1998. The relationship between cognitive problem-solving style, stress, and outcomes in public accounting: consulting versus audit. ***Working paper***.

Tan, H.-T., & Libby, R. 1997. Tacit managerial versus technical knowledge as determinants of audit expertise in the field. ***Journal of Accounting Research***, Vol. 35(No. 1): 97-113.

Taylor, J. 1993. The networked firm, IT and Accounting.,: Chapter 21.

Tseng, H.-M., Tiplady, B., Macleod, H. A., & Wright, P. 1998. Computer anxiety: a comparison of pen-based digital assistants, conventional computer and paper assessment of mood and performance. ***British Journal of Psychology***, 89: 599-610.

Tucker, P., & Warr, P. 1996. Intelligence, elementary cognitive components, and cognitive styles as predictors of complex task performance. ***Pergamon***, Vol. 21(No. 1): 91-102.

Turkle, S. 1995. ***Life on the Screen: Identity in the Age of the Internet***. New York: Touchstone.

Vasarhelyi, M. A. 1977. Man-machine planning systems: a cognitive style examination of interactive decision making. ***Journal of Accounting Research***, 15(1): 138-153.

Wagman, M. 1983. A factor analytic study of the psychological implications of the computer for the individual and society. ***Behavior Research Methods and Instrumentation***, Vol. 15: 413-419.

Waler, R., Schweitzer, J., Volksen, G., & Weber, M. 1994. CSCW Tools: Concepts and Architectures. ***IEEE***, Vol. 27(No. 5): 28-36.

Walker, K. B., & Ainsworth, P. L. 2001. Developing a process approach in the business core curriculum. ***Issues in Accounting Education***, Vol. 16(No. 2): 41-66.

Wallman, S. M. H. 1997. The future of accounting and financial reporting, part IV: "access" accounting. ***Accounting Horizons***, Vol. 11(No. 2).

Walters, J. E., & Necessary, J. R. 1996. An attitudinal comparison toward computers between underclassmen and graduating seniors. ***Education***, Vol. 11(No. 4): 623-632.

Wenger, E. (Ed.). 1998. ***Communities of Practice: Learning, Meaning, and Identity***. Cambridge: Cambridge University Press.

Wenger, E. 2000. ***Communities of Practice: Learning, Meaning, and Identity***. Cambridge: Cambridge University Press.

Wenger, E., McDermott, R., & Snyder, W. M. 2002. ***Cultivating Communities of Practice: A Guide to Managing Knowledge***. Boston: Harvard Business School Press.

Williams, B. 1991. IT and Accounting - The Impact of Information Technology.

Witkins, H. A., Oltman, P. K., Taskin, E., & Karp, S. A. 1971. ***Embedded Figures Test***. Palo Alto, CA: Consulting Psychological Press, Inc.

Wolk, C., & Cates, T. A. 1994. Problem-solving styles of accounting students: are expectations of innovation reasonable. ***Journal of Accounting Education***, Vol. 12(No. 4): 269-281.

Wood, F., Ford, N., Miller, D., Sobczyk, G., & Duff, R. 1996. Information skills, searching behavior and cognitive styles for student-centered learning: a computer-assisted approach. ***Journal of Information Science***, Vol. 2(No. 2): 79-82.

Yin, R. K. 1994. ***Case Study Research: Design and Methods*** (2nd ed.). London: Sage Publishing.

Young, B. J. 2000. Gender differences in student attitudes toward computers. ***Journal of Research on Computing in Education***, 33(2): 204-216.

Zack, M. H. 1999. Managing codified knowledge. ***Sloan Management Review***, 40(4): 45-58.

Zack, M. H., & Serino, M. 1996. Knowledge management and collaboration technologies, ***White Paper***. Lotus Institute.

Zakrajsek, T., Waters, L. K., Popovich, P. M., Hyde, Craft, S., & Hampton, W. 1990. Convergent validity of scales measuring computer-related attitudes. ***Educational and Psychological Measurement***, Vol. 50: 343-349.

Zuboff, S. 1988. ***In the Age of the Smart Machine: The Future of Work and Power***: Basic Books.

APPENDICES

APPENDIX A – Interview Request

As part of my Ph.D. research, entitled, **Responding to Changes in Global Accountancy Practice: Knowledge Management, Information Technology, and Cognitive Style**, I am seeking accounting practitioners who have had experience in global public accounting firms and can articulate a perspective on the evolution of the accounting industry.

These individuals will be asked a series of questions in an informal technique known as the "semi-structured interview". The respondent is free to speak in his or her own words regarding to content of the questions, allowing the interviewer to adapt the interview to capitalize on the special knowledge, experience, or insights of the respondent.

These one-on-one interviews may be conducted in person or over the telephone. The approximate length of the interview will be 30 minutes. I would like to conduct interviews while in Atlanta for the Beta Alpha Psi and American Accounting Association Annual Meetings, August 9-15. (An alternative would be to schedule a telephone interview later in August or early September.)

Names of the interviewees and their firms will remain confidential. In addition, I will be willing to share the results of my research with all respondents.

If you would like to participate in this project, please e-mail me and I will follow up when I return from a vacation in early August. Thank you for your consideration.

APPENDIX B - Semi-Structured Interview Questions

Disclosures:

- These questions will be used as part of doctoral dissertation dealing with KM, IT, Global Accounting Firms
- Your name and firm name will remain confidential
- I am willing to share results with your firm

1. Describe your position in your firm.
   - Senior, partner, etc.
   - Audit, tax, consulting, etc.

2. How long have you been practicing accountancy?
   - Always in Big 5?
   - Other experience?

3. What is your educational background?
   - Accounting Degree or other?
   - When graduated and from where?

4. In your years with the firm, what changes have you seen taking place in the accounting profession?
   - Trends in profession – more technology, competitiveness, consolidation of firms, pressure to develop new lines of business, etc.
   - Has there been an increase in technology beyond automated accounting applications?
   - Changes in types of clients, types of services offered, client needs, etc.
   - Changes in firm organizational structure?

5. How has technology allowed you to provide more and better services to your clients?
   - How long have you worked with computers?
   - How important is this to you in what you do on a day-to-day basis?
   - Describe which applications you utilize?

6. How has technology allowed you to work collaboratively with others within your firm?
   - Globally, do you really utilize resources of the entire firm?
   - What are the tools used (Lotus Notes, proprietary network, etc.)
   - What types of training and support are offered?
   - Has this type of technology really added value to the firm and its clients?

7. Can you envision any trends taking place or future direction of your firm or the profession?
   - Auditing vs. other services
   - Consulting in technology areas
   - Competition with consultancy firms
   - Computerized information systems, E-commerce, ERP
   - Additional certifications (XYZ, etc.) and specializations

8. How well is recently-hired staff faring in the firm?
   - Skills needed?
   - Able to work in teams
   - Transfer of educational training to workplace
   - Technological competencies

9. Are they well prepared for their positions?
   - Technical proficiency in accounting
   - Adequate computer and technology skills and training
   - Understanding of evolving direction of accounting profession and firm
   - Ability to fit in to corporate culture and mission of the firm

10. There has been much discussion lately about accounting education, curricula, and the like not keeping up with changes that are taking place in the profession. Do you have any comments on this?

11. Are you satisfied with your professional choices?

12. How do you maintain and update your skills to remain current?

APPENDIX C - Technology Questionnaire

Dear Participant:

Thank you for agreeing to participate in this research study. The aim of this study is to determine how accounting students' attitudes and perceptions about computers and technology relate to their cognitive learning styles. You will be completing a brief questionnaire and a cognitive styles assessment instrument (The Gregorc Style Delineator).

First, wait for the administrator to read the directions for the cognitive styles test before proceeding to complete it (it should take about 3-5 minutes). Then, proceed to complete the attached questionnaire.

All data will be kept in a secure place, inaccessible to others. Confidentiality and anonymity will be assured through the assigning of a number to each participant.

Thank your for your participation.

Lew Shaw

Please indicate your level of agreement with the following statements, where 1=Strongly Disagree and 5=Strongly Agree:

Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree
1	2	3	4	5

1. I feel at ease when I am around computers.
   1 2 3 4 5

2. Knowing how to use a computer is important in today's world.
   1 2 3 4 5

3. Computers can help me learn.
   1 2 3 4 5

4. The challenge of solving problems with computers appeals to me.
   1 2 3 4 5

5. I think that working with computers would be enjoyable and stimulating.
   1 2 3 4 5

6. Learning about the different uses of computers is interesting.
   1 2 3 4 5

7. I enjoy learning about how computers are used in our daily lives.
   1 2 3 4 5

8. I am curious about computers.
   1 2 3 4 5

9. I believe that proficiency in technology is essential for someone in my field.
   1 2 3 4 5

10. I feel that computers have changed the accounting profession.
    1 2 3 4 5

11. I feel insecure about my ability to interpret a computer printout.
    1 2 3 4 5

12. I look forward to using a computer on my job.
    1 2 3 4 5

13. I do not think I would be able to learn a computer programming language.
    1 2 3 4 5

14. I am confident that I can learn computer skills.
    1 2 3 4 5

15. I am afraid that if I begin to use computers, I will become dependent upon them and lose some of my reasoning skills.
    1 2 3 4 5

16. I feel that I will be able to keep up with the advances happening in the computer field.
    1 2 3 4 5

17. I dislike working with machines that are smarter than I am.
    1 2 3 4 5

18. I feel apprehensive about using computers.
    1 2 3 4 5

19. I have difficulty in understanding the technical aspects of computers.
    1 2 3 4 5

20. It scares me to think that I could cause the computer to destroy a large amount of information by hitting the wrong key.
    1 2 3 4 5

21. I hesitate to use a computer for fear of making mistakes that I cannot correct.
    1 2 3 4 5

22. If given the opportunity, I would like to learn about and use computers.
    1 2 3 4 5

23. I have avoided computers because they are unfamiliar and somewhat intimidating to me.
    1 2 3 4 5

24. I feel computers are necessary tools in both educational and work settings.
    1 2 3 4 5

25. When I enter the accounting profession, I expect to use computers frequently.
    1 2 3 4 5

Please indicate your level of computer skills, where 1= Not at all and 5= Highly Proficient:

Not at all	Somewhat Familiar	Somewhat Proficient	Very Proficient	Highly Proficient
1	2	3	4	5

26. Getting help for problems in the computer system.
    1 2 3 4 5

27. Accessing on-line information from the World Wide Web.
    1 2 3 4 5

28. Creating a spreadsheet that involves calculations.
    1 2 3 4 5

29. Explaining why an application will or will not run on a given computer.
    1 2 3 4 5

30. Electronically locating topically relevant information within the campus library.
    1 2 3 4 5

31. Using a popular accounting software application (i.e. QuickBooks, Peachtree, etc.).
    1 2 3 4 5

32. Describing the function of computer hardware.
    1 2 3 4 5

33. Learning advanced skills within a specific computer application.
    1 2 3 4 5

34. Using a spreadsheet to analyze numerical data.
    1 2 3 4 5

35. Using database software (i.e. Access) to construct error-free databases.
    1 2 3 4 5

36. Using database software to create customized input screens for data entry.
    1 2 3 4 5

37. Using database software to create queries to look at the data in a database from different perspectives.
    1 2 3 4 5

38. Writing customized applications in a higher-level language of a database processing software package.
    1 2 3 4 5

39. Learning to use an Enterprise Resource Planning application (i.e., SAP).
    1 2 3 4 5

40. Transferring data between databases of different formats.
    1 2 3 4 5

University/College: _____

Major:
_____Accounting
_____Finance
_____Information Systems
_____Other _____

Minor: _____

Current Grade Level:
_____Freshman
_____Sophomore
_____Junior
_____Senior
_____Graduate Student

Gender: _____Male _____Female

Age: _____16-20
_____21-25
_____26-30
_____31-35
36+
_____

Grade Point Average (GPA): _____

Computer Related Courses taken:
_____Computer Literacy
_____Accounting Information Systems
_____any other systems course
_____any computer programming course
_____any Web design course
_____any database management course
_____any electronic commerce course
_____Other _____
_____Other _____

Are you a member of Beta Alpha Psi? _____Yes _____No

APPENDIX D - Technology Questionnaire Results

Computer Attitude (Questions 1-10)
From Strongly Disgree (1) to Strongly Agree (5)

1. I feel at ease when I am around computers.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	2	4	16	52	57	4.21
Percent	1.5	3.1	12.2	39.7	43.5	.88

2. Knowing how to use a computer is important in today's world.

	1	2	3	4	5	Mean/Std. Dev.
Frequency				6	125	4.95
Percent				4.6	95.4	.21

3. Computers can help me learn.

	1	2	3	4	5	Mean/Std. Dev.
Frequency			4	41	86	4.63
Percent			3.1	31.3	65.6	.55

4. The challenge of solving problems with computers appeals to me.

	1	2	3	4	5	Mean/Std. Dev.
Frequency		10	17	60	44	4.05
Percent		7.6	13	45.8	33.6	.88

5. I think that working with computers would be enjoyable and stimulating.

	1	2	3	4	5	Mean/Std. Dev.
Frequency		3	25	49	54	4.18
Percent		2.3	19.1	37.4	41.2	.82

6. Learning about the different uses of computers is interesting.

	1	2	3	4	5	Mean/Std. Dev.
Frequency		3	11	54	63	4.35
Percent		2.3	8.4	41.2	48.1	.73

7. I enjoy learning about how computers are used in our daily lives.

	1	2	3	4	5	Mean/Std. Dev.
Frequency		5	17	57	52	4.19
Percent		3.8	13	43.5	39.7	.8

8. I am curious about computers.

	1	2	3	4	5	Mean/Std. Dev.
Frequency		6	19	54	52	4.16
Percent		4.6	14.5	41.2	39.7	.84

9. I believe that proficiency in technology is essential for someone in my field.

	1	2	3	4	5	Mean/Std. Dev.
Frequency		1	10	34	86	4.56
Percent		.8	7.6	26	65.6	.67

10. I feel that computers have changed the accounting profession.

	1	2	3	4	5	Mean/Std. Dev.
Frequency		2	8	32	89	4.59
Percent		1.5	6.1	24.4	67.9	.68

Computer Anxiety (Questions 11-25)
From Strongly Disagree (1) to Strongly Agree (5)

11. I feel insecure about my ability to interpret a computer printout.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	32	33	33	22	11	2.6
Percent	24.4	25.2	25.2	16.8	8.4	1.26

12. I look forward to using a computer on my job.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	60	57	10	2	1	1.67
Percent	45.8	43.5	7.6	1.5	.8	.75

13. I do not think I would be able to learn a computer programming language.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	45	37	26	18	5	2.24
Percent	34.4	28.2	19.8	13.7	3.8	1.18

14. I am confident that I can learn computer skills.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	84	42	5			1.4
Percent	64.1	32.1	3.8			.58

15. I am afraid that if I begin to use computers, I will become dependent upon them and lose some of my reasoning skills.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	35	26	35	29	6	2.58
Percent	26.7	19.8	26.7	22.1	4.6	1.23

16. I feel that I will be able to keep up with the advances happening in the computer field.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	34	68	24	5		2.0
Percent	26	51.9	18.3	3.8		.77

17. I dislike working with machines that are smarter than I am.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	67	35	23	4	2	1.98
Percent	51.1	26.7	17.6	3.1	1.6	2.79

18. I feel apprehensive about using computers.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	51	23	33	19	5	2.27
Percent	38.9	17.6	25.2	14.5	3.8	1.23

19. I have difficulty in understanding the technical aspects of computers.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	23	40	28	34	6	2.69
Percent	17.6	30.5	21.4	26	4.6	1.17

20. It scares me to think that I could cause the computer to destroy a large amount of information by hitting the wrong key.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	27	24	27	35	18	2.95
Percent	20.6	18.3	20.6	26.7	13.7	1.35

21. I hesitate to use a computer for fear of making mistakes that I cannot correct.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	62	33	24	9	3	1.92
Percent	47.3	25.2	18.3	6.9	2.3	1.07

22. If given the opportunity, I would like to learn about and use computers.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	78	43	7	2	1	1.49
Percent	59.5	32.8	5.3	1.6	.8	.71

23. I have avoided computers because they are unfamiliar and somewhat intimidating to me.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	90	23	12	5	1	1.5
Percent	68.7	17.6	9.2	3.8	.8	.87

24. I feel computers are necessary tools in both educational and work settings.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	96	29	5	1		1.32
Percent	73.3	22.1	3.8	.8		.59

25. When I enter the accounting profession, I expect to use computers frequently.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	99	27	4	1		1.3
Percent	75.6	20.6	3.1	.8		.6

Computer Proficiency (Questions 26-40)
From Not at All (1) to Highly Proficient (5)

Level One Proficiency (Questions 16-30)

26. Getting help for problems in the computer system.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	3	20	45	39	24	3.45
Percent	2.3	15.3	34.4	29.8	18.4	1.03

27. Accessing on-line information from the World Wide Web.

	1	2	3	4	5	Mean/Std. Dev.
Frequency		8	13	53	57	4.21
Percent		6.1	9.9	40.5	43.5	.86

28. Creating a spreadsheet that involves calculations.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	3	4	21	44	59	4.15
Percent	2.3	3.1	16	33.6	45.1	.96

29. Explaining why an application will or will not run on a given computer.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	22	37	46	18	8	2.62
Percent	16.8	28.2	35.1	13.7	6.1	1.09

30. Electronically locating topically relevant information within the campus library.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	7	19	35	44	26	3.46
Percent	5.3	14.5	26.7	33.6	19.8	1.12

Level Two Proficiency (Questions 31-35)

31. Using a popular accounting software application (i.e. QuickBooks, Peachtree, etc.).

	1	2	3	4	5	Mean/Std. Dev.
Frequency	20	13	52	25	21	3.11
Percent	15.3	9.9	39.7	19.1	16	1.24

32. Describing the function of computer hardware.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	18	36	39	20	18	2.88
Percent	13.7	27.5	29.8	15.3	13.7	1.23

33. Learning advanced skills within a specific computer application.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	15	20	37	35	24	3.25
Percent	11.5	15.3	28.2	26.7	18.3	1.25

34. Using a spreadsheet to analyze numerical data.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	2	9	28	47	45	3.95
Percent	1.5	6.9	21.4	35.9	34.4	.99

35. Using database software (i.e. Access) to construct error-free databases.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	24	31	38	29	9	2.76
Percent	18.3	23.7	29	22.1	6.9	1.19

Level Three Proficiency (Questions 36-40)

36. Using database software to create customized input screens for data entry.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	29	31	35	27	9	2.66
Percent	22.1	23.7	26.7	20.6	6.9	1.23

37. Using database software to create queries to look at the data in a database from different perspectives.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	26	31	38	26	10	2.72
Percent	19.8	23.7	29	19.8	7.6	1.21

38. Writing customized applications in a higher-level language of a database processing software package.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	79	18	14	17	3	1.83
Percent	60.3	13.7	10.7	13	2.3	1.19

39. Learning to use an Enterprise Resource Planning application (i.e., SAP).

	1	2	3	4	5	Mean/Std. Dev.
Frequency	79	19	20	8	5	2.11
Percent	60.3	14.5	15.3	6.1	3.9	4.1

40. Transferring data between databases of different formats.

	1	2	3	4	5	Mean/Std. Dev.
Frequency	41	38	23	19	10	2.38
Percent	31.3	29	17.6	14.5	7.6	1.27

APPENDIX E - Guidelines for Administration of the Gregorc Style Delineator

(from Gregorc 1984)

1) Ask participants to refrain from beginning until told to do so.

2) Be certain that everyone who should have an instrument possesses one.

3) Provide a pencil for those who do not have one.

4) Read each direction to the group (do not assume that each individual will read and/or follow directions alone).

5) Stress that each individual is to use the **SELF** as a reference point.

6) Emphasize ranking order as **4-3-2-1** (occasionally individuals use **1-2-3-4**, or some other iteration).

7) Emphasize the need to react quickly to the words in the matrix.

8) Do not define any words in the matrix for participants.
(the Gregorc Style Delineator requires the individual to actively connect the words with personal thoughts and feelings. The words are meant to prompt the individual to bring to life something that the SELF sees/hears/experiences. It is not necessary that the individual know the definition of each word.)

9) It is not necessary for individuals to score the instrument (the researcher will complete this task).

10) Have the group open the Gregorc Style Delineator at the same time.

11) Keep the group to the three-minute time limit for completing the matrix.

12) Reiterate that there are no "right or wrong" choices from the words.

APPENDIX F – Directions for the Gregorc Style Delineator

Before starting with the word matrix below, carefully read all seven of the following instructions and suggestions:

1. **Reference Point**. You must assess the relative value of the words in each group using your SELF as a reference point; that is, who you are deep down, NOT who you are at home, at work, at school or who you would like to be or feel you ought to be. THE REAL YOU MUST BE THE REFERENCE POINT.
2. **Words**. The words used in the Gregorc Style Delineator matrix are not parallel in construction nor are they all adjectives or all nouns. This was done on purpose. Just react to the words as they are presented.
3. **Rank**. Rank in order the ten sets of four words. Put a "4" in the box below the word in each set which is the best and most powerful descriptor of your SELF. Give a "3" to the word which is the next most like you, a "2" to the next and a "1" to the word which is the least descriptive of your SELF. Each word in a set must have a ranking of 4, 3, 2, or 1. No two words in a set can have the same rank.

1=**MOST** descriptive of you
1=**LEAST** descriptive of you

4. **React**. To rank the words in a set, react to your first impression. There are no "right" or "wrong" answers. The real, deep-down you is best revealed through a first impression. Go with it. Analyzing each group will obscure the qualities of SELF sought by the Delineator.
5. **Proceed**. Continue to rank all ten vertical columns of words, one set at a time.
6. **Time.** Recommended time for word ranking: 3 minutes.
7. **Start**. Turn the page and start now.

Note: The author of the Gregorc Style Delineator, Dr. Anthony Gregorc, will not allow the reproduction of the instrument in any form. Permission has been granted to present the Directions only.