1998

Examining the Usefulness of Amerinet's Valusource 3.0 Software

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An Abstract Presented to the Faculty of the
Graduate School of Lindenwood University in Partial
Fulfillment of the Requirements for the Degree of Master of Science – Administration

1998

ABSTRACT

The main focus of this research is to provide AmeriNet, Inc., a group purchasing organization of medical and healthcare supplies, with a statistical and realistic perspective regarding user training requirements and effectiveness of their latest software release, ValuSource 3.0.

This electronic catalog was developed for AmeriNet members to provide contract pricing information. The software release took over a year to design and implemented most of the functionality required/requested by AmeriNet shareholders and members.

The purpose of the software is to give members access to up-to-date contract information such as pricing, contract terms, commitment levels, etc. ValuSource 3.0 is capable of providing the user with a large volume of information in many different formats, including the capability to export data to other software packages. Because of its functionality, however, the software could be perceived as somewhat confusing to use or not exactly user-friendly.

Based on this assumption, the main purpose of this study was to examine the effectiveness of ValuSource 3.0 to the average computer user. It is felt that users experiencing difficulty with the software would probably fail to utilize it to its fullest or not at all. The software was intended to replace current paper and microfiche catalog information. If users are unable to effectively utilize the electronic version, then they would not have access to vital contract and pricing data for purchasing needs. If members fail to purchase effectively from AmeriNet

contracted vendors, then the business itself could fail. It is vitally important that members access and utilize AmeriNet contracts effectively.

There were 38 respondents, or about 35% of the initial sample that returned the ValuSource 3.0 Survey. The survey was mailed out to healthcare personnel from AmeriNet facilities currently utilizing the software.

After studying the mean responses of these users, it became statistically clear that the majority of AmeriNet members are capable of utilizing the software with ease. Additional training availability could be provided to those members having difficulty, but the need is not clearly visible.

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1998

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Chapter I

INTRODUCTION

The purpose of this paper is to analyze the effectiveness and ease of use of the ValuSource 3.0 software package developed and distributed by AmeriNet, Inc. It is the intent to examine adult attitudes regarding the use of computers and software packages, the effect of these attitudes, the different types of learning styles, and the design of the ValuSource 3.0 instrument.

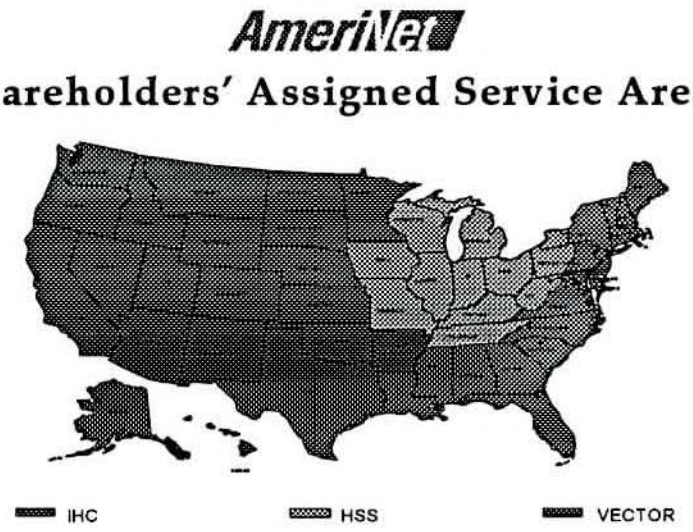
ValuSource 3.0 is the name of the software package developed by AmeriNet, a group purchasing organization (GPO) for healthcare supplies and equipment, which provides confidential pricing information for its exclusive membership.

AmeriNet is considered one of the premiere GPOs in the United States. The company was founded in June 1986 as a "purchasing cooperative" by a consortium of regional group purchasing organizations. This group purchasing cooperative operates through its three participating shareholders whose responsibility includes providing marketing and membership support services. Each of the three shareholder organizations covers approximately one-third of the nation's licensed health care beds. The following map (in Figure 1) illustrates the geographical coverage for each of the shareholder organizations (AmeriNet 51).

As a GPO, AmeriNet negotiates, on behalf of its member facilities, volume discount contracts with its suppliers, providing members with very favorable pricing, terms and conditions, and other benefits. The 5,700-plus member facilities participating in the AmeriNet purchasing program consist of hospitals, medical group practices, nursing homes, surgery centers, managed care organizations,

closed pharmacies, and integrated delivery networks, to name a few. All supplier contracts are the sole property of AmeriNet (1).

Figure 1



SOURCE: AmeriNet Shareholders' Assigned Service Areas. Map. 1998

In order to best serve the various purchasing needs and expectations of its member facilities, the company is organized into a number of purchasing and support divisions: ValuHealth (medical/surgical supplies and equipment); ValuPharm (pharmaceuticals); ValuQuip (equipment and furniture); ValuLab (clinical lab supplies); ValuFood (dietary); ValuCare (alternate-site); ValuNet (distributor relations); and National Accounts. Other principle departments involved in carrying out the mission and work of the company include corporate management, fiscal, information services, ValuSource and cost study (1).

The ValuSource Department is responsible for producing, maintaining and supporting the ValuSource software. This electronic concept was first introduced in 1990 and was the industry's first, true leading edge, direct access computerized contract and pricing catalog that would simplify product ordering by member facilities and enable members to realize greater efficiencies and productivity AmeriNet members receive the software free of charge (7).

Currently, each Valu-division has its own version of the electronic catalog. These versions have become out-dated as they are based on a DOS platform. Decisions had to be made to move the information to a newer platform that would be capable of supporting the year 2000 issue. This past year, ValuSource introduced its new Windows-based software platform for medical/surgical and clinical laboratory supplies. A great deal of research went into the design of this new package, as well as a sizable sum of money. Because of the enormous budget, incorporation of the pharmacy and dietary products have subsequently been postponed while a strategic plan for the future of Information Services is explored and developed.

Literature will show that many factors affect the adult learning process when interfacing with a computer. These factors include attitude regarding the use of a computer, different styles of learning, and the design of the instrument to be learned.

It is difficult for many to give up their familiar routine. For AmeriNet members, this includes using paper catalogs and microfiche media. Members are being asked to trust in an electronic system that has the potential to literally bring them close to tears. Computers and software programs can intimidate most adults. The current generations of employed adults seem to live in fear of pressing the wrong button that could ultimately destroy the earth. This is an exaggeration, of course, but there is this hesitancy for many people who refuse to attempt

something new on a computer without an instructor or trainer close by to guide the way. The continual churning of computer systems and the corresponding need for training is creating headaches all across corporate America (Strandberg 37).

The use of information technologies by professionals in business, law, medicine and other disciplines has become essential for success, particularly so in the last ten years. The majority of businesses, including healthcare facilities, utilize some type of computer system in their day to day operations. Often when implementing new technologies, a relatively large percentage of funding is allocated to the purchase of hardware and software and little is allocated towards training. These decisions are based upon a false economy. If all the best equipment in the world is provided to a facility, but it is not being used, then the money has not been invested wisely. Experts feel that 50% of a computer technology budget should be dedicated for training purposes, 10% towards hardware, and 40% for software (Polk 98).

Computer-based information systems have become an integral part of managerial decision making. Despite the widespread use of computers, many organizations do not gain the full benefit of their equipment because some individuals resist using them. In fact, understanding why people accept or reject computers has proven to be one of the most challenging issues in information systems research. Most research has, to date, been mixed and inconclusive. This has been attributed to the wide array of different attitudes, beliefs and satisfaction measures which have been employed (Shaft 1).

Researchers studying MIS users' attitudes suggest that attitudes provide people with a framework within which to interpret the world and integrate new experiences. Also, that "by understanding an individual's attitudes towards something, one can predict that individual's overall pattern of responses to that object as new experiences occur." A person's intention is in turn a function of his

attitude towards performing the behavior. When there is a clear linkage between the target action and any attitudes that are formed, the degree of predictability will be highest. Investigating a ValuSource 3.0 user's attitude toward using a computer should have some bearing on their ability to utilize this software (2).

Given the importance of training, the type and quality should be addressed. It seems intuitively obvious that when trainees are placed in training situations where they experience a high frustration level, they are also less likely to learn. Also, if individuals are placed in a highly structured and inflexible learning environment, they are less likely to understand the value of acquiring new skills if these new skills are perceived as not immediately applicable to their work. Given the nature of the ValuSource 3.0 software, for the purpose of looking up contract pricing and determining contract utilization, the tasks are not necessarily required daily, and there is the possibility of using a paper hardcopy versus the software. The need to understand the best way to access this information becomes paramount if the user is to perform these tasks successfully. There is also the question regarding the desire the user has for getting information via the software package. Because of this, it is important to examine the subjects' attitudes towards using a computer in the first place. It is logical to assume that if attitude toward learning is related to motivation, and motivation to the success of learning, then there would be a relationship between attitudes towards computers and the success of learning new computer skills (Polk 98-103).

Learning computer skills on the most basic level unavoidably involves acquiring procedural, or how-to knowledge. The user needs to learn such things as how to turn on the machine, how to start a program, how to open an existing document or create a new document, etc. Most ValuSource users will exhibit enough technical ability to bring them to the first screen within the software package. As individuals become more experienced, they may learn conceptual

skills as well that may apply to the management and retrieval of information in general. Learning these basic skills involves memorization and repetition (101).

There are two types of adult students: self-directed professionals and tentative career seekers. In analyzing the users of the ValuSource 3.0 software, the learners will probably be composed mainly of self-directed professionals who are typically affluent, educated, older and male. They tend to be interested in high technology and changing or advancing their careers (Nordstrom 20).

Adults learn to achieve both intrinsic and extrinsic rewards. The literature on workplace motivation demonstrates clearly that money is generally not a primary motivator. In the case of education, the extrinsic reward, money, is often associated closely with other motivators and rewards. Employers may encourage their employees to improve their education by offering paid tuition benefits. In the case of some companies, full tuition reimbursement may be made on the basis of appropriateness of the studies, or the extent to which they coincide with the employer's needs. The cost of tuition at the institutions catering to the needs of adult learners can be sufficiently high making an employer's offer of tuition reimbursement for specific degree programs a powerful incentive (Dinmore 461).

The question, though, is what motivates adults to learn on-the-job as technology presents new advances? On the surface, there is no extrinsic reward involved. The only motivator in this type of situation would be internal satisfaction at having mastered a perceived difficult task.

People demonstrate consistency in how they form and use concepts in interpreting information, thinking, and problem solving. Relational-contextual categorizing involves a tendency to use concepts of functional or thematic similarity. Bits of information are made to go together. Analytical-descriptive conceptualizing involves finding similarity in things based on the external, objective, physical attributes of stimuli and information. Analytical-descriptives

use external categories in which the self does not play as central a role as it does with relational-contextuals. Confronted with three items—meat, cheese, and bread, for example—the relational-contextual person might describe them as a sandwich, while the analytical-descriptive person might call them edibles (Smith 62).

When discussing theories of learning, it is interesting to note that there is more known about how animals learn (especially rodents and pigeons) than about how children learn. There is even less known about how adults learn. There are two types of literature about learning theory: that produced by "propounders" of theories and that produced by interpreters of theories, as noted by Malcolm Knowles, one of the nation's leading authorities on adult education and training. Propounders tend to be dogmatic and argumentative, while interpreters tend to be reconciliatory (Knowles 11).

Learning has been defined as the act or process by which behavioral change, knowledge, skills, and attitudes are acquired. It is difficult to define learning since it can have multiple uses. Learning is used to refer to the "acquisition and mastery of what is already known about something, the extension and clarification of meaning one's experience, or an organized, intentional process of testing ideas relevant to problems." More simply put, it is used to describe a product, a process, or a function (10).

There is the general feeling that adults have difficulty dealing with the graphical user interfaces that have become the standard for today's operating systems, even though they are intended to make applications easier to use. These obstacles include both physical decline and changes in behavior as natural results of the aging process. The extent to which these characteristics become evident in the older computer user may determine his or her ability to use standard interface

features. Subsequently, older persons often experience significant difficulty understanding and using common computer applications (Hutchinson 497).

Specific data detailing the relationship between computer interfaces and the characteristics of older adults are presented in only a few published works, and none of the texts propose verified solutions for improving the situation, which appears to reflect the newness of this field of research. Nevertheless, by applying general principles of user interface design, several conclusions can be drawn (497).

Every computer application has new concepts to digest, including screen design, commands, menu layout, terms and definitions. Older adult users can learn and understand computer skills at the same level of expertise as younger users but typically require twice as much training as the younger group. In addition, says Hutchinson, et al, seniors request help from trainers two to three times more frequently than nonsenior users (500).

Although, older adults represent a sizable group of potential computer users, it is really not surprising that they have been virtually ignored by user interface advances. In general, seniors have a more negative view of technology than the young and are therefore less likely to use it. Even though it has been pointed out that the physical needs of older adults present a formidable barrier to their use of today's popular software features, software developers have chosen to disregard these limitations (500). Some researchers have concluded that older adults cannot make full use of today's complex computer systems. None of the research available proposes verified solutions for improving the situation. The problem arises because current software producers and manual writers are basically computer engineers (or have been trained by computer engineers) who understand how the machine works but have no idea about how adults learn. Consequently, their software and manuals are geared to teaching the user how a

machine works rather than helping the user learn how to use the machine to perform the real-life tasks for which it was purchased (Knowles 163).

Knowles feels that the computer is one of the most potent tools for adult learning to appear in modern history. It is his opinion that the computer industry needs to focus on the following principles regarding adult learners:

1. Explain why adults need to know a particular function before they are willing to invest time and energy in learning it.
2. Adults are task-oriented in their learning versus memorizing. Teach to the person not to the machine.
3. Adults have a wide background of experience and must be approached from different experiential bases.
4. Adults have a deep psychological need to be self-directing and need to be treated as such (164-165).

Although seniors' computing needs are unique, the basic principles of good interface design are still applicable, and, by following those principles, significant advances can be made in this area (Hutchinson 502).

Modifying technology to meet user needs is a driving force in the computer industry. Thus far, large amounts of discussion and research have been targeted at the computing needs of the physically disabled. Among the organizations addressing this issue are the Apple Computer Worldwide Disability Solutions Group, the IBM National Support Center for Persons with Disabilities, and the ACM special interest group for Computers and the Physically Handicapped. Computer scientists agree that every effort should be taken to make computers accessible to everyone. Unfortunately, there appears to be a tendency in the computing community to view computer accessibility in two extremes: designing interfaces for either the common user or the physically handicapped. In contrast, one may argue that there exists a spectrum of computer accessibility (512).

As previously stated, more research is needed in this area. Software solutions need to be developed and evaluated by older adults. That is, the construction of new interface features should be followed by experiments testing their effectiveness with computer users representative of the senior population. Operating system manufacturers need to provide accessibility to a wider range of users. Microsoft has taken a step in this direction with the introduction of Windows 95 that includes an option for users to customize their computer environment by enabling big-button screen controls (512).

As previously mentioned, intense research went into developing the next-generation of the ValuSource software, later to be named ValuSource 3.0. Many surveys were sent out to members to discover the depth of functionality desired. One of the topics of importance was to determine the preferred type of media. A report of survey results compiled by Vector Healthsystems (shareholder responsible for the eastern part of the United States) indicated an overwhelming desire for contract information to be provided on CD-ROM (73%). The second choice at 43.5% was to receive data on paper (1997 Vector Survey).

The survey requested user information regarding the DOS-based version of ValuSource currently being utilized. This information included frequency of utilization. Another unidentified source indicated that out of 36 responses, 44.4% referenced ValuSource several times a week, 36.1%, once a week and 19.4% used the software on a daily basis (1997 Vector Survey).

In June, 1994, Hospital Shared Services (shareholder representing the Midwest portion of the United States) conducted a survey of its members to evaluate the then current versions of ValuSource and suggestions for enhancement. Several major topics were discussed. First was consistency, requiring all divisions to have a similar design ("ValuSource Evaluation"). At present, ValuSource for ValuPharm and ValuFood are programmed in Paradox, a

database programming language and DOS-based environment. Both programs can be selected from the same menu, but have an entirely different design. The ValuLab program, released in 1996, utilized the Folio VIEWS Infobase system and a Microsoft Windows environment. The newly designed ValuSource 3.0 program includes products for the ValuHealth, ValuQuip, ValuCare, and ValuLab divisions and is programmed in Powerbuilder, an object-oriented application design tool, and is a highly functional Microsoft Windows-based design.

The second issue in the HSS survey, dealt with the manner and frequency of updating the software ("ValuSource Evaluation"). Because of rapid market changes, contract pricing requires frequent revisions. Members currently receive software updates on a monthly basis. They have the option of receiving this update information via modem or diskette for ValuPharm. ValuLab and ValuFood updates are sent out on diskette only, and ValuSource 3.0 is sent out monthly on CD-ROM.

Most users of the ValuSource software agree that the programs should move towards a Windows environment. At present, ValuLab and ValuSource 3.0 function in Microsoft Windows. ValuPharm and ValuFood still operate under DOS.

Another requirement mentioned in the survey was the flexibility to work with members and Information Systems vendors to interface with the facilities' information systems and also have the capability to access a bulletin board to network with each other. AmeriNet's Information Systems department is investigating the future of Internet and Intranet use. There is no real means, as yet, to interface with other information systems.

The most promising program produced by the ValuSource department is the ValuSource 3.0 release. It proclaims the ease of finding products to assist members in making critical purchasing decisions. Its design was supposed to be

flexible enough to support the power user, as well as the infrequent user. The brochure claims that ValuSource 3.0 is "highly intuitive, user friendly and includes options for the user to custom design and select specific distributors, pricing levels, etc." The software offers other options such as the ability to view contract information sheets in a text display. It can perform multiple level searches and execute mathematical computations, as well as build reports and display results. It claims the capability of producing information that can be used in spreadsheets, materials management information systems, commercial database systems and word processors ("ValuSource 3.0").

More functionality of this program includes a pick list tool that allows users to generate reusable invoice audits, product comparison spreadsheets, priced requisition lists, priced procedure trays, and much more. Its extensive analysis tools quickly turn raw data into valuable contract, product and pricing information. ValuSource 3.0 comes equipped with an on-line help system to answer user questions and assist with system operation. There is a video demonstration library of on-line tutorials, as well as a toll-free number for technical support ("ValuSource 3.0").

What has happened with this highly effective software program by including practically every wish and desire expressed, is a tool that has so much functionality that the average computer user gets lost in its overwhelming capabilities.

Realizing this problem, the manager of the ValuSource department has analyzed the calls being received through the Technical Support Hotline, and determined many of the difficulties users are experiencing. She has developed a tool that accompanies the monthly update, entitled, Tip of the Month. The first tip was sent out in November 1997 and included a small survey of questions regarding the usefulness and acceptability of this type of tutorial. Although, only a few

surveys were actually returned, they all indicated a favorable response and gratitude for the assistance. The Tip of the Month focuses on one main element of the ValuSource 3.0 software, and includes step-by-step instructions for performing the highlighted function. Reference is made throughout the instructive guidelines regarding the assistance available through the software's Help function. Subsequent "Tips" also included references to the Help function to allow the user to become accustomed to utilizing this tool to look up other problems. The Help function for ValuSource 3.0 seems very complete and addresses all the individual components of the software package. The manager of the department, however, theorized that many people are unaware of its existence and are hesitant to use this component. Therefore, she highlights the capabilities of Help as often as possible.

The research to be conducted regarding ValuSource 3.0 will include a survey instrument that addresses adult attitudes towards computers, the user's current knowledge of computer functions and ease of using a computer, as well as addressing the functionality of the ValuSource 3.0 software. The response format for the majority of statements on the survey will utilize a five-point Likert scale that spans from Strongly Disagree (negative) to Strongly Agree (positive). This survey will be distributed to a random ten percent sample of the ValuSource user database. It is the belief of the researcher that survey results will prove that the majority of the users are experiencing difficulty in using the software and would benefit from a structured training program. Another aspect of the survey is to discover if the users are able to utilize the software to assist in their daily routine.

Results of the survey will be shared with upper management at AmeriNet. If results indicate that members are not using the software due to an insufficient understanding of its functionality, then steps may be taken to develop a training program to assist members in utilizing the software. The design of the software could also be analyzed to determine which components of the software are

responsible for causing confusion. Although, a change in design would be very costly, training could be focused on those problematic areas. Noting areas that users stumble over will make revisions and updates to the AmeriNet ValuSource software more user-friendly.

Chapter II

LITERATURE REVIEW

In order to determine if the ValuSource 3.0 software was designed properly for adults to easily learn its functions, it is important to understand how adults learn. This study will explore experts' theories of learning, their theories on what motivates adults to learn, as well as understanding exactly how adults are able to learn. Next, this study will explore the various styles of learning and discuss the best methods. It is also important to examine adult attitudes towards the use of computers, since apprehension may play a big part in their ability to learn computer functions. Finally, this study will discuss the proper design of computer software to be used by adults and ValuSource 3.0's compliance to that type of design.

Malcolm Knowles, one of the nation's leading authorities on adult education and training, has written several books on the subject as well as produced a nine-segment videotape workshop that addresses the adult learner. Knowles states in his book, The Adult Learner: A Neglected Species, that learning theories typically fall into two major families: stimulus-response theories and cognitive theories, although not all theories belong to these two families. Stimulus-response theories include those of Thorndike, Pavlov, Guthrie, Skinner and Hull (Knowles 14).

Edward L. Thorndike introduced the first systematic investigation of learning in the United States through a study of learning in animals in 1898. He

conceived learners to be empty organisms that responded to stimuli more or less randomly and automatically. A specific response is connected to a specific stimulus when it is rewarded. He developed three laws which he believed governed the learning of animals and humans: (1) the law of readiness (the circumstances under which a learner tends to be satisfied or annoyed, to welcome or to reject); (2) the law of exercise (the strengthening of connections with practice); and, (3) the law of effect (the strengthening or weakening of a connection as a result of its consequences). Thorndike's system of thought provided the subfoundation of the behaviorist theories of learning (18).

Most notable, is Ivan Pavlov's (1898-1936) theory of reinforcement, in which a conditioned reflex becomes fixed by following the conditioned stimulus repeatedly by the unconditioned stimulus and response at appropriate time intervals. Another was extinction, which stated that when reinforcement is discontinued and the conditioned stimulus is presented alone, unaccompanied by the unconditioned stimulus, the conditioned response gradually diminishes and disappears. Another was generalization, in which a conditioned reflex evoked to one stimulus can also be elicited by other stimuli, not necessarily to the first. A fourth basic concept was differentiation. Here the initial generalization is overcome by the method of contrasts in which one of a pair of stimuli is regularly reinforced and the other is not; in the end, the conditioned reflex occurs only to the reinforced stimulus and not to the nonreinforced stimulus. Pavlov's system

has been termed classical conditioning to distinguish it from later developments in instrumental conditioning and operant conditioning (18-19).

Edwin R. Guthrie (1886-1959) built on the works of Thorndike and Pavlov by adding the principle of contiguity of cue and response. His one law of learning, "from which all else about learning is comprehensible," was stated as follows: "A combination of stimuli which has accompanied a movement will on its recurrence tend to be followed by that movement." Later, he placed increasing emphasis on the part played by the learner in selecting the physical stimuli to which it would respond; thus, the importance of the attention or scanning behavior that goes on before association takes place (19).

The next major advance in behaviorist psychology was the result of the work of B. F. Skinner and his associates. The educational technology of programmed instruction and teaching machines became very popular in the 1960s as a result of their work (20).

Another development in behaviorist psychology occurring during the middle decades of the century was the construction of Clark L. Hull's systematic behavior theory, which included reinforcement as an essential characteristic of learning. Hull devised an elaborate mathematico-deductive theory revolving around the central notion that there are intervening variables in the organism which influence what response will occur following the onset of a stimulus. He stated his premise in such precise terms that they were readily subjected to

quantitative testing. His work stimulated the rash of mathematical models of learning which were developed after 1950 (20).

The cognitive theories include those of Tolman and the classical gestalt psychologists. John Dewey made the first direct protest against the mechanistic model of the associationists in 1896. Although his work falls into the category of educational philosophy rather than learning theory, his emphasis on the role of interest and effort and on the child's motivation to solve his own problems became the starting point for a line of theorizing that has been given the label of functionalism. Functionalism provided the conceptual basis for progressive education which encompassed the ideal of growth toward independence and self-control through interaction with an environment suited to the child's developmental level.

Edward C. Tolman (1886-1959) represents a bridge between the mechanistic and the organismic models. His system was behavioristic in that he rejected introspection as a method for psychological science. He rejected the idea that learning is the association of particular responses to particular stimuli, in contrast to the associationists, who believed that it is the response or sequence of responses resulting in reward that is learned. Tolman believed it is the route to the goal that is learned. He believed that organisms, at their respective levels of ability, are capable of recognizing and learning the relationships between signs and desired goals. Tolman called his theory purposive behaviorism (21-22).

The most complete break with behaviorism occurred at the end of the first quarter of the century with the importation of the notion of insight learning in the gestalt theories. These theorists took issue with the proposition that all learning consisted of the simple connection of responses to stimuli, insisting that experience is always structured. We react not to just a mass of separate details, but to a complex pattern of stimuli; and, we need to perceive stimuli in organized wholes, not in disconnected parts. The learner tends to organize his perceptual field according to four laws:

1. The law of proximity states that the parts of a stimulus pattern that are close together or near to each other tend to be perceived in groups; therefore, the proximity of the parts in time and space affects the learner's organization of the field.
2. The law of similarity and familiarity which contends that objects similar in form, shape, color, or size tend to be grouped in perception; and, familiarity with an object facilitates the establishing of a figure-ground pattern.
3. The law of closure states learners try to achieve a satisfying end-state of equilibrium; incomplete shapes, missing parts, and gaps in information are filled in by the perceiver; and,
4. The law of continuation deals with organization in perception and tends to occur in such a manner that a straight line appears to

> continue as a straight line, a part circle as a circle, and a three-sided square as a complete square (22).

Most interpreters classify gestalt psychology as within the family of field theories, which propose that the total pattern or field of forces, stimuli, or events determine learning. Kurt Lewin (1890-1947) developed what he referred to specifically as a field theory. Using concepts from geometry, he conceptualized each individual as existing in a life space in which many forces operate. The life space includes features of the environment to which the individual is reacting. For example, material objects that are encountered and manipulated, meeting people, private thoughts, tensions, goals and fantasies. Behavior is the product of the interplay of these forces; the direction and relative strength of which can be portrayed by the geometry of vectors. Learning occurs as a result of a change in cognitive structures produced by changes in two types of forces: (1) change in the structure of the cognitive field itself, or (2) change in the internal needs or motivation of the individual. Because of its emphasis on the immediate field of forces, field theory places more emphasis on motivation than any of the preceding theories. Lewin felt that success was a more potent motivating force than reward and gave attention to the concepts of ego-involvement and level of aspiration as forces affecting success. The urge for self-actualization is the driving force motivating all of man's behavior (23).

Two other contemporary psychologists, Jean Piaget and Jerome Bruner, have had great impact on thinking about learning, although they are not literally

learning theorists. Their focus is on cognition and the theory of instruction. Piaget has conceptualized the process of the development of cognition and thought in evolutionary stages. According to him, the behavior of the human organism starts with the organization of sensory-motor reactions and becomes more intelligent as coordination between the reactions to objects becomes progressively more interrelated and complex. Thinking becomes possible after language develops and with it, a new mental organization (24).

Piaget's evolutionary stages are defined as:

1. The formation of the symbolic or semiotic function which occurs between the ages of two to seven or eight. This function enables the individual to represent objects or events that are not at the moment perceptible by evoking them through the agency of symbols or differentiated signs.
2. The formation of concrete mental operations which occurs between the ages of seven or eight until age eleven or twelve and include linking and dissociation of classes, the sources of classification; the linking of relations; correspondences, etc.
3. The formation of conceptual thought which occurs between the ages of eleven or twelve through adolescence. "This period is characterized by the conquest of a new mode of reasoning, one that is no longer limited exclusively to dealing with objects or directly representable realities, but also employs hypotheses" (25).

Some reservations have been expressed about the rigid age scale and minimization of individual differences in Piaget's schema, but his conception of evolutionary stages adds a dimension that is not generally given much attention in the established learning theories (25).

Jerome Bruner's main interest has been in the structuring and sequencing of knowledge and translating this into a theory of instruction. He does, however, have a basic theory about the act of learning which he views as involving three almost simultaneous processes. First, the acquisition of new information that may run counter to or is a replacement of what the individual has previously known and is a refinement of previous knowledge. Second, transformation, or the process of manipulating knowledge to make it fit new tasks; and third, evaluation, or checking whether the way the information was manipulated is adequate to the task (25).

Theorists have identified and supported the following key assumptions with regards to the learning theory of the modern adult:

1. Adults are motivated to learn as they experience needs and interests that learning will satisfy; therefore, these are the appropriate starting points for organizing adult learning activities.
2. Adults' orientation to learning is life centered; therefore, the appropriate units for organizing adult learning are life situations, not subjects.

3. Experience is the richest resource for adults' learning; therefore, the core methodology of adult education is the analysis of experience.
4. Adults have a deep need to be self-directing; therefore, the role of the teacher is to engage in a process of mutual inquiry with them rather than to transmit his or her knowledge to them and then evaluate their conformity to it.
5. Individual differences among people increase with age; therefore, adult education must make optimal provision for differences in style, time, place, and pace of learning (31).

Cyril O. Houle along with Allen Tough, from the University of Chicago, began a line of investigations about the process of adult learning in the 1950s. Their approach was a study through in-depth interviews of a small sample of adults who were identified as continuing learners. Through an involved process of the analysis of the characteristics uncovered in the interviews, they discovered that their subjects could be placed into three categories that somewhat overlap. The three types are first, the goal oriented learners who use education for accomplishing fairly clear-cut objectives. These individuals usually did not make any real start on their continuing education until their middle twenties and after, sometimes much later (46-47).

Second, the activity-oriented learners who take part because they find in the circumstances of learning a meaning which has no necessary connection, and

often no connection at all, with the content or the announced purpose of the activity. These individuals also begin their sustained participation in adult education at the point when their problems or their needs become sufficiently pressing (47).

Third, are the learning-oriented who seek knowledge for its own sake. Unlike the other types, most learning-oriented adults have been engrossed in learning as long as they can remember (47).

Knowles has developed his own learning model based on the following assumptions:

1. The need to know. Adults need to know why they need to learn something before undertaking to learn it. When adults undertake to learn something on their own, they will invest considerable energy in probing into the benefits they will gain from learning it and the negative consequences of not learning it. Adolescents typically question the value of attending classes because they do not understand the need to know what is being taught or how it can benefit them in real life (57-58).
2. The learners' self-concept. Adults have a self-concept of being responsible for their own decisions. They develop a deep psychological need to be seen by others and treated by others as being capable of self-direction. They resent and resist situations in which they feel others are imposing their wills on them. In

contrast to this theory, adults relate to their childhood educational experiences when they perceive something will be taught to them and become dependent upon the instructor for direction (58).

3. The role of the learners' experience. Adults come into an educational activity with both a greater volume and a different quality of experience. This difference in quantity and quality of experience has several consequences for adult education. It becomes more important for adult learners to have learning strategies more individualized because of the vast experiential diversity among adults. There is also the possibility for adults to have developed mental habits, biases, and presuppositions that tend to cause them to close their minds to new ideas, fresh perceptions, and alternative ways of thinking (59).

4. Readiness to learn. Adults become ready to learn those things they need to know and be able to do in order to cope effectively with their real-life situations (60-61).

5. Orientation to learning. In contrast to children's subject-centered orientation to learning, adults are life-centered in their learning orientation. Adults are motivated to devote energy to learn something to the extent that they perceive that it will help them perform tasks or deal with problems that they confront in their life situations. Furthermore, they learn new knowledge,

understandings, skills, values, and attitudes most effectively when they are presented in the context of applications to real-life situations (61-62).

6. Motivation. While adults are responsive to some external motivators, such as better jobs, promotions, and higher salaries, the most potent motivators are internal pressures such as the desire for increased job satisfaction, self-esteem, and quality of life (62-63).

Based on these assumptions, it becomes important to examine learning styles and how they correlate with learning theories. Robert M. Smith, a professor of Adult Education at Northern Illinois University, defines three modes of learning: self-directed, collaborative, or institutional (Smith 22).

The self-directed mode involves carrying out personal learning projects. Collaborative learning is most often found in voluntary organizations, and, as with self-directed learning, credit is seldom a concern. The institutional, or traditional mode, is associated with formalized instruction in such settings as schools and colleges (22).

It has long been apparent to teachers, educators, and observers that people differ in how they go about certain activities associated with learning. They differ as to how they think and how they approach problem solving. They also differ in their manner of information processing. These individual differences have always been identifiable and have resulted in an emphasis on individualizing instruction.

People differ with regard to the amount of structure and autonomy that they want (23-24).

When designing a curriculum, course, workshop or even a software package, it is important to make decisions about the learners, goals, subject matter, and methodology. The designer should strive to bring about educational situations and learning experiences that will meet certain needs, interests and objectives in an effective and economical way. Although some program-planning models have as many as thirty steps, the basic components they most often account for are participant needs and interests, goals, learning resources, procedures and strategies, and evaluation (74-75).

Programmers also need to insert learning style into the planning process. They need to carefully examine their intended audience or clientele. Careful programmers have reflected on the potential participants' age, experience, and knowledge of what is to be learned before making decisions about content and procedures. Style diagnosis should also include how the learner learns best. Knowledge of learning style provides a framework and tool for counseling to help people find appropriate instruction, profit from that instruction, and participate until personal goals are achieved (76-77).

Style inventories and style-related diagnostic questions can be used for placement purposes or for diagnosing causes of difficulty and sidestepping potential dropout. When multiple program options are available, learning-style diagnosis provides a basis for helping the student make an appropriate choice—

for example, deciding between a curriculum requiring a great deal of self-direction and one that provides a considerable amount of structure (77).

Instructors of adults can use learning-style inventories to get a perspective on how they themselves prefer to learn. Teachers have a tendency to teach the way they prefer to learn. They can also use these inventories to gather information for making decisions about teaching and helping people learn. The decisions may concern materials selection, presentation of information, individualizing, and subgrouping of students as well as evaluative procedures. Since every learner is unique and every class has a different mix, style inventories represent a tool for looking more clearly at one's objectives and procedures in relation to the specific clients at hand (77).

Although there are many professionally designed learning-style inventory programs, instructors can diagnose learning style without a ready-made tool. They can adapt existing ones or devise their own. Merely observing people, listening to them, and asking them questions about how they prefer to learn and undergo evaluation can yield useful information. Following are some pertinent questions Smith suggests about perceiving and processing information:

> "What kind of activities does the learner respond to with interest or handle best?
> Does the learner seem to get the most from reading, reading and listening, listening only, or an activity such as simulation and role-play?
> Is the learner's choice of words more visual or action oriented?
> Does the learner tend to define things in abstract or concrete terms?
> Does the learner try to see the 'big picture' first or does he or she begin working in a narrower, more linear fashion?" (78)

He also suggests questions about environment, structure, and motivation such as:

> "When and where does the learner prefer to learn?
> How much structure, direct feedback, and support seem needed?
> How does the learner respond to learning with peers?" (78)

Instructors and counselors of adults can involve learners in style diagnosis by putting such questions to them and by sharing with them the results when style inventories are administered. The secure instructor can share information concerning his or her own learning and teaching preferences in an effort to get the best fit with learners and help them to make wider applications of insights into preferred learning style. Finally, instructors should bear in mind that style diagnosis, like teaching itself, remains an art, and that no amount of instrumentation will compensate for faulty interpretation of the information available (78).

In short, when diagnosing, the instructor must follow these steps: (1) use, adapt, or devise one or more instruments; (2) ask questions and observe; (3) try to avoid jumping to conclusions or an overly simplistic diagnosis; (4) share tentative conclusions with the learner, making adjustments as they seem warranted; and, (5) reflect on the implications for instruction, learning, and the individual's better understanding of himself or herself as a learner (78).

A primary difference between adult and pre-adult learners resides in their motivation. For pre-adult learners, education is externally imposed until their mid-to-late teens. Children have little choice about their participation in the

educational process. Substantial numbers of teenagers embark upon college-level studies less from a burning sense of motivation than because it is expected, or because it will delay their inevitable entry into a world of adult responsibilities. Learning is the main social role of the pre-adult learner. For adult learners, however, learning is not an externally imposed, secondary role, but one that they freely choose (Dinmore 462).

When decisions about programs and methodologies are made by academics unfamiliar or unconcerned with the realities of adults' needs, or the ways in which they learn, the results can be inappropriate. In one instance in the mid-1980s, a California-based corporation asked a group of colleges to produce a degree program for its employees. While the program was well designed, interesting and appropriately rigorous, many students eventually dropped from the program because they were expected to attend class three to five nights per week, following a full day's work. Class locations were such that students had to travel from the work site to the college and from there to their homes. Not only were students expected to spend an unrealistic amount of time away from their families, they were also involved in such additional costs as cash outlays for babysitting services and travel. Interdisciplinary methodologies frequently involve realigning the locus of power away from the traditional hierarchy to one that values and validates students, their experiences, and their frequently non-university/college-derived learning (461).

It is generally recognized that learning takes place in all settings, in the workplace, in the home, and in the classroom, and in both informal and formal ways. Experiential learning is fundamentally non-disciplinary—when applied in a formal environment, it serves as the foundation for, and complements, interdisciplinary education. Adult education, often ignored in the literature of interdisciplinarity and integrative studies, is a highly appropriate point of application for experiential learning. The combination of experiential learning and interdisciplinarity is a powerful tool for adult learners (456).

The twentieth century has witnessed increased scholarly interest in the two important fields of interdisciplinarity and adult education. Practitioners in the field of adult education often incorporate integrative methodologies into their teaching practices. Empirical data and theoretical models reveal that adults are not concerned with disciplinary boundaries, because they do not view the world as a series of discrete subjects. Theorists have noted that the real problems of society do not happen in discipline-shaped blocks. There has been an increasing popularity of utilizing the case study approach, particularly in management and business programs, that asks students to solve complex problems that resemble real life, workplace problems. Integration of experience is a prevalent learning style among managers and business people (456-457).

With increasing passage of time away from the formal learning environment, people lose many valuable skills. Particularly noticeable are declines in quantificational, writing, and critical thinking skills. Data reveal that

few adults can successfully complete even basic arithmetic tasks. Combining real world experience, whether formally or informally acquired, with theoretical concepts validates both experience and theory (465).

Educators of today are living in the transition between the information age and the computer or communication age. Researchers have studied constraints to the use of computers. Anxiety, lack of confidence, and lack of enjoyment have been related to low computer use. Limited computer experience has been found to be a factor influencing anxiety. The relationships between computer literacy and age, gender, and educational level have been studied, and findings have been contradictory. Information on the relationship between job position and variables related to computer technology would help in the design and implementation of computer training and support programs (Park 8).

A study conducted by Sung-Youl Park and Julia Gammon of Iowa State University examined the computer use, experience, knowledge and attitudes of the university's extension personnel and its implications in designing educational programs. They analyzed responses of Iowa Extension personnel to questions about their use of computers as well as identifying differences related to all the various kinds of job positions. Their results would have implications for computer training and support (1-2).

Their study included all the current Extension personnel listed in the university directory. All positions were included, field, state, professional, paraprofessional, clerical, support, administrative, and university Extension as

well as Cooperative Extension appointments. The total population was 974 employees. Their questionnaire was sent to a sample of 200 of which 95% responded.

The five-part questionnaire measured computer attitudes (24 items), computer experience (2 items), computer knowledge (7 items), computer use (3 items), and demographic information (6 items). Three Extension computer specialists and faculty members established content validity of the instrument in the Department of Agricultural Education and Studies (2).

The questions in the computer attitude section were adapted from the computer attitude scales originally developed by B. H. Loyd and C. P. Gressard, and contained four subscales: computer anxiety, confidence, enjoyment, and usefulness. A Likert-type scale was used ranging from strongly disagree (1) to strongly agree (5).

To measure computer experience, two items were employed: participation in computer training courses and years of computer use. Computer knowledge was measured by self-reported ability to use specific computer systems and programs. The five-point scale ranged from 1, very poor to 5, excellent. Computer usage was measured by three items: frequency, length of time, and use of e-mail and the Iowa State University Extension computer network (2).

The study indicated that Iowa Extension personnel were experienced with computers and well trained. The average years of use was eight, and 64% of the respondents had used computers for more than six years. Ninety-five percent of

the respondents had participated in at least one computer training workshop or course with an average of five workshops and more than 25% had participated in six or more (3).

Iowa State University Extension personnel had very positive attitudes towards computers, with the most positive sub-attitude of computer usefulness versus the least positive of computer enjoyment. The study utilized various statistical methods including calculating means and standard deviations and the use of t-tests and analyses of variance. Wilks' lambda was used to measure overall effects. The higher the lambda value, the less the variance could be explained by the factor (2-5).

From these analyses, the study concluded that the Extension personnel in Iowa were trained and experienced with computers. Their results also indicated that personnel had very positive attitudes toward the use of computers even though there was a significant difference in attitude, experience, knowledge and use of computers when compared by job position. Program assistants ranked significantly lower than other job positions on all four measures. Word processing emerged as the topic in which all positions were most knowledgeable. Respondents preferred individual training and support on computers whereas off-campus professionals (county directors and field specialists) were least likely to want on-campus computer training (8).

Based on these results, Park and Gamon made the following recommendations:

1. Educational training workshops should be targeted to specific job positions. For example, program assistants would require a more basic level of training on communication via computer than would office workers or professional staff.
2. Training and support should focus on computer aspects other than word processing because personnel feel fully knowledgeable in this area.
3. Training should be designed specifically for program assistants in the areas most needed. A further study is needed to determine what areas they need to be competent.
4. Support should be personalized, perhaps through an 800-telephone number.
5. Training for Extension personnel should be provided both on-campus and off-campus.
6. Computer specialists should develop some easy-to-read manuals or instruction sheets.
7. Computer specialists should recommend user-friendly commercial manuals to Extension personnel.

Based on this study, the identification of job position is an important factor to consider in the design and implementation of computer training programs. Personnel with different attitudes, experience, knowledge, and use levels may need different teaching methods and content of inservice programs.

Individuals whose levels are high may not be interested in basic introductions to computer systems and programs. Therefore, they should be grouped together and educated differently (8).

Another study was performed by the University of Tulsa that examined the criterion validity of computer attitudes instruments. The researchers, Shaft and Sharfman, agree that computer-based information systems have become an integral part of managerial decision making. Despite the widespread availability of computer systems, many organizations do not gain the full benefit of their systems because some individuals resist using them. They state that "understanding why people accept or reject computers has proven to be one of the most challenging issues in information systems research" (Shaft 1).

They also agree that research in this area has been limited, and findings from these studies has been mixed and inconclusive. This is due partly to the wide array of different attitude, belief and satisfaction measures which have been employed, often without adequate theoretical or psychometric justification. What is needed is a common frame of reference that can be utilized in various research streams (1).

Shaft and Sharfman hoped to achieve the goal of a theoretically and psychometrically justified set of Information Systems (IS)-related measures through their research. The most frequently used attitudes towards computer instruments include Attitudes Towards Computers Scale (ATCS) and the Computer Attitude Scale (CAS) which both focus on computer attitudes in an

educational setting. This fact makes them somewhat less usable in the investigation of a broad range of computer-related phenomena. Their approach seems broader in its applicability and therefore, a more versatile instrument. One issue when considering the psychometric properties of an instrument is an assessment of whether the instrument measures the construct space of interest. To address this issue, Shaft and Sharfman conducted a criterion validity study. Criterion validity assesses the relationship between the instrument under investigation and that of a previously developed measure of the same construct. If the results of the analysis show a high degree of relationship, then one gains confidence that the instrument is measuring the desired construct space. Thus, their study compared scores on their instrument to scores from two other measures of attitudes towards computers (1-2).

They hoped that investigating attitudes towards computers would play an important part in understanding the decisions individuals make regarding computer usage. They hoped to be able to gauge the importance of the attitudes towards computers construct in IS research by the variety of ways researchers have used it. Measures of attitudes towards computers have been used to predict constructs as varied as satisfaction with end-user computing, the effect of implementing IS on organizational power distributions, and inventory-management choices (2).

Shaft and Sharfman examined the theoretical link between attitude and behavior. Researchers have stated that by understanding an individual's attitudes

towards something, one can predict that individual's overall pattern of responses to the object as new experiences occur. The arguments state that a person's intention is in turn a function of his attitude towards performing the behavior. When there is a clear linkage between the target action and any attitudes that are formed, the degree of predictability will be highest. Investigations of attitudes towards computers should be fruitful based on the following reasoning. Given the pervasiveness of computers in society, it is assumed likely that any research participant will have developed some attitudes towards these machines. Any intentions about computer use should also be well developed. Consistent with these arguments, if one understands attitudes towards computers, one should be able to predict specific computer-related behaviors and choices. To predict these behaviors and decisions with assurance requires an instrument in which researchers have confidence (2).

Shaft and Sharfman's instrument was distributed to a sample of 56 freshman and sophomore business students at a Southwestern university. Since their study was not designed to make specific predictions about attitude towards computers, but to assess psychometric properties of the instrument, they felt the use of student subjects was reasonable. The participants were told that the data were being collected as part of an overall study about computer use. The students were given three instruments in a packet with minimal instructions. When designing the study, they considered the possibility that administering all three instruments at the same time could influence their results. They therefore,

arranged the packets in six different orders to examine whether order of presentation could bias the results. In each combination, any instrument could appear first, second or third. Packets were randomly distributed to the subjects. Fifty-one of the 56 subjects completed all three instruments (3).

Statistics compiled on all three instruments indicated that they all measured similar parts of the construct space called attitudes towards computers. Shaft and Sharfman demonstrated the criterion validity of the instrument by means of a correlation analysis with two other respected measures of computer attitude. Their instrument was designed for broader applicability to be a more versatile instrument than either of the referents. The criterion validity results provide Information Systems researchers with evidence that the instrument known as ATCI (Attitudes Towards Computer Instrument) is measuring the construct space of interest. The result of the study should give researchers more confidence in the instrument. Developing and validating measures such as the ATCI moves the IS field one step closer to the goal of a common set of measures that "provide a common frame of reference within which to integrate various research streams" (Davis 983).

Another study entitled, "Attitudes Toward Computers: The Impact on Performance," was completed by several colleagues of Indiana University's Department of Accounting and Information Systems. These researchers contend that a variety of training mechanisms exist that allow workers to introduce, develop and hone any needed computer skills, but that identical training

mechanisms are likely to result in individuals with different computer abilities (Speier 1).

Much of the research that has examined the area of computer attitudes has focused on the changes in attitudes, e.g. computer anxiety that occur due to a training intervention. Research to date, however, has not extended this effect of training on attitudes as well as to performance (1).

The theory of reasoned action suggests that attitudes will influence behavior, including performance. The Technology Acceptance Model (TAM) presented by F. D. Davis and P. R. Warshaw in 1992 in their article, "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," also suggests that attitudes towards use directly influence intentions to use the computer and ultimately actual computer use. Davis and Warshaw demonstrate that an individual's initial attitudes regarding a computer's ease of use and a computer's usefulness influence attitudes toward use. In addition to the attitudes of computer ease of use and computer usefulness, a number of other attitudes related to computer use have been identified in the research literature (1).

Speier et al. examined the attitudes and measures of perceived usefulness, perceived ease of use, computer anxiety, anticipation of computer use, fear of computer use, and attitude toward previous academic achievement. Computer anxiety has been an attitude of primary focus that corresponds closely to the concept of math anxiety. Although computer anxiety has definitions ranging from psychological, physical or sociological discomfort to fear, the definition of

anxiety in this study referred to the psychological discomfort that might come from using a computer. This discomfort might come from using something unknown, concern over making mistakes, or destroying pertinent information. In addition to measuring computer anxiety, they also wanted to measure computer fear. Although extreme anxiety might become fear, there is a distinction between the two constructs. Fear was defined as trepidation that computers would change something about the individual, such as making the person too dependent on computers. Anticipation was defined as comfort with the idea of learning and using computer skills. Academic achievement provided a perceived measure of a subject's past performance in both math and other academic endeavors (1-2).

Within this study, the researchers defined the constructs of perceived ease of use and usefulness as having been established in a work by Davis and Warshaw. Perceived usefulness was defined as "the degree to which a person believes that a particular system would enhance his or her job performance." Perceived ease of use was defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis 320).

Subjects in their study were students enrolled in an introductory computer course at a large Midwestern university. The courses consisted of class time in a computer laboratory two days a week to provide hands-on training of computer skills. In addition, a one-day per week lecture was required to provide conceptual information pertaining to technology and the use of computers. Subjects were given a questionnaire the first day of class before the students had any exposure to

computers. A second questionnaire was used to collect data after fifteen weeks of training at which point, the students had completed eight software assignments in addition to performing two 2-hour practical examinations. The examination scores were used as a measure of performance and the dependent variable in the study. A total of 959 subjects completed both exams and both questionnaires (2).

Factor analysis was performed on the items used in the questionnaire. Based on the scoring, it was determined that the psychometric properties of the instrument were acceptable. Correlation techniques were used to examine the effect of training on attitudes as well as the effects of attitudes on performance. Table 1 illustrates the correlation coefficients of attitudes at each time period and attitudes on performance.

Table 1

Correlation Matrix of Attitudes After Training and on Performance

Attitude (Time 1) / Attitude (Time 2)		Attitude (Time 1) / Performance		Attitude (Time 2) / Performance	
Ease of use	0.36	Ease of use T1	0.15	Ease of use T2	0.28
Usefulness	0.14	Usefulness T1	0.15	Usefulness T2	0.17
Anxiety	0.66	Anxiety T1	0.17	Anxiety T2	-0.32
Fear	0.38	Fear T1	-0.12	Fear T2	-0.14
Anticipation	0.49	Anticipation T1	0.11	Anticipation T2	-0.19
Achievement	0.38	Achievement T1	-0.19	Achievement T2	-0.14

SOURCE: "Attitudes Toward Computers: The Impact on Performance" by Cheri Speier, Michael G. Morris, and Carl M. Briggs (1996).

In order to better understand the effect of training and its effect on potential changes in attitudes over time, t-tests were run between initial and final attitudes on performance. These results are shown in Table 2.

Table 2

Changes in Attitudes Related to Training and Computer Use

1-test comparison	Mean Time 1	Mean Time 2	t-value	p-value
Ease of use	3.44	3.66	5.835	0.000
Usefulness	4.40	4.36	0.941	0.347
Anxiety	3.44	3.73	-11.515	0.000
Fear	4.02	4.05	-0.867	0.386
Anticipation	2.07	2.11	-1.677	0.094
Achievement	2.07	2.19	-3.86	0.000

SOURCE: "Attitudes Toward Computers: The Impact on Performance" by Cheri Speier, Michael G. Morris, and Carl M. Briggs (1996).

All of the attitudes examined exhibit a significant relationship with performance. Subjects who perceive computers to be easier to use and who perceive computers as useful tend to exhibit greater skill performance. The ease of use/performance relationship is significant across the two time periods where training and computer use occurred. The relationship between ease of use and performance almost doubles across the training intervention (correlation of 0.15 to 0.28) (3).

Results of this study also confirmed that increased fear and anxiety are related to decreases in skill performance. This finding is particularly interesting when examined over time and training. The negative correlation between anxiety

and performance actually increased over fifteen weeks of training and mandatory system use and is highly significant as indicated by the t-test results. This finding suggests that subjects who exhibit computer anxiety prior to the class are likely to continue to be anxious about computer use after going through training (correlation of 0.66). This suggests that training and use of a computer does not mitigate subject anxiety. Training and computer use may reinforce anxiety in students who indicated high initial anxiety and ultimately results in poor performance (3).

These findings have direct ramifications for both student and end-user computer performance. Although training techniques differ (and some training techniques may result in different findings), these findings would suggest that to facilitate the successful teaching of computer skills, a given training method should include a component to focus on attitude change. Specifically, training mechanisms should emphasize the ease with which work can be accomplished using a specific computer tool (4).

Another component of training should focus on attitudes related to computer anxiety. It may be appropriate to measure initial anxiety in order to identify those individuals high in computer anxiety early in the training process. Once identified, an intervention, such as increased one-on-one instructor and student training might be considered to overcome the feelings of computer anxiety. Future research in this area should try to ascertain what factors cause

individuals to be anxious as well as methods which can be used to reduce computer anxiety (4).

Computer-based training (CBT) is frequently seen as a solution for companies seeking to increase effectiveness of training programs. The reaction to technology-based training, particularly by adult learners, is likely to change with time as technology develops and becomes increasingly accessible and included in everyday life at work and at home (Russell 196).

The development of cognitive learning theory has included increasing focus on the general strategies and styles of learning that students adopt. This developed largely from the interest in individual differences and their effect on learning that gained popularity during the 1960s and 1970s and has been resurrected by recent work. There have been a number of labels describing learning styles, preferences or strategies, most of which have been argued to be different dimensions of the same concept (196).

As the computer industry puts more emphasis on software interface design, the average computer user has found today's applications more powerful and easier to use. Graphical user interfaces have become the standard for today's operating systems. This interface connects the user and the machine and generally consists of physical devices available to the user plus the documentation (Foehr 86).

When designing a computer program, it is important to realize that no two computer users are alike. Some people wish that the computer would just go

away. They are afraid of the technology and suspicious of its long-term effects. Others postpone any involvement until they can figure out how to apply it to their own particular job (96).

There are those, with no technical experience, that feel a computer is a magic wand that can perform any task. Others with limited experience, become acquainted with a computer through a word processing package or spreadsheet. As they gain confidence with the technology, their allegiance to the technology grows. Meanwhile, users with some computer background eagerly follow the new developments in the industry (86-87).

The common denominator among these people is that each person, regardless of experience or attitude, must use the computer in some form. And, in order to do so, they must be able to get the computer to work. The challenge to the designer in bridging these differences is to include tools that make the machine understandable to each person (87).

Computer technology changes by the minute. Each new generation of computers represents a significant leap in technological change. It is no wonder that the average user becomes easily overwhelmed.

The human/system interface consists of the physical devices used to interact with a computer system, as well as the documentation. The documentation can be either online or off-line. Online refers to electronic documentation that resides in the software and is accessed on the video screen. Off-line documentation is located in manuals and books (88-89). ValuSource

3.0's documentation resides online and was designed with the familiar Windows look and feel.

The purpose of computer documentation is to communicate to the user information about how to use and maintain the system. Most documentation, however, attempts to tell people how to use the system without utilizing the best teaching methods based on a methodology of how people learn. What is generally lacking in the area of documentation is a clear understanding about how people perceive, receive, and analyze information (93).

A very simple hierarchy of needs can be drawn up for automation that parallels Maslow's hierarchy. At the bottom of the hierarchy is usefulness. The next factor is cost effectiveness. For the on-line, operational environment, performance and availability make up the next level of needs. Finally, at the top of the hierarchy, comes user friendliness. Once a system meets these needs, then the issue of user friendliness can become the center of attention. The major challenge to the documentor is to model the documentation according to these needs (94).

Human-based documentation must be written to create a desire to move forward through the material. The user is primarily concerned with getting the job done quickly and efficiently. A good tutorial spells out the most basic facts. The user should gain both competence and confidence as he or she moves through the steps of the tutorial. A sense of satisfaction is derived as the user accomplishes each step of a task or function and motivates greater interaction

with the computer. Positive feedback, such as user-friendly messages, generate rapport between the individual and the computer. Positive feedback also consists of being able to accomplish a task easily. This necessitates that the documentation be written in a way that each step is divided into doable parts. When the new user feels like he or she can easily use the system, this leads to excellent word-of-mouth advertising (94).

The manner in which that information is presented can help or hinder the process. Efficient use of human and machine resources is dependent on four factors: hardware, software, documentation, and user attitude. The documentor should understand the relationships among these factors because the system will be used at the level dictated by any one of these components. For example, if the hardware is very sophisticated, the software custom-tailored to fit the end user's needs, the documentation complete and user-friendly, but the user's attitude is hostile, then the system will probably be used, or not, based on the attitude factor (95).

In the same light, changing any one of the other factors to a less than desirable level will undoubtedly produce the same result. It is important that the documentor recognize these dynamics because they are what guarantee user satisfaction. The documentor should remember that the user's attitude is shaped by the documentation. User-friendly documentation creates a friendly attitude in the user toward the system (95).

ValuSource 3.0 software was designed to provide a great deal of functionality to the user. It is up to each individual user to determine what functions most benefit their particular need. In order to do that, the user must experiment and investigate the many tools and capabilities the system offers to them. For a computer power user, one who utilizes many software packages and easily adapts them to their job needs, this type of experimentation comes easily and without much thought. For the computer user who tends to use only those functions that have been demonstrated to them as necessary to their job, the initiative to investigate and time constraints of their job make this task very difficult.

The ValuSource programmers included several types of training options available to the users. One is an online help system that allows the user the capability to continually drill-down through key words to define specific tasks and functions. Another is the use of Lotus Screen-Cam, a video demonstration library, that allows the user a selection of on-line tutorial options. The user makes the desired selection and the software runs a video displaying the steps required to fulfill the task. Finally, the ValuSource department has a toll-free number the user can call and ask questions regarding techniques and hints to perform their tasks.

All of these options are self-directed. Meaning they require the user to take the initiative to perform the task. Given this type of direction, those users who have computer anxiety or require a more one-on-one approach to learning

may find utilizing this type of software to be cumbersome. If they are unable to find the answers to their questions or stumble upon the correct procedure to perform their tasks, they are likely to put the software aside in frustration and discontinue its use.

It is important for AmeriNet members to utilize this software appropriately, as it provides them with contract pricing information that could be beneficial in making their purchasing decisions. Such decisions could be wisely beneficial to both the member and AmeriNet.

It thus, becomes paramount to examine the current population of ValuSource users to determine the software's effectiveness in the field. As such, the stated hypothesis being scrutinized is that the users of the ValuSource 3.0 software package will require additional training in order to use the program more effectively.

Chapter III

RESEARCH METHODOLOGY

The actual hypothesis to be tested by this study states that the users of ValuSource 3.0 will require additional training in order to use the program effectively. The statistical hypothesis is stated as: H_1: Statistical survey results will indicate that the average response of ValuSource users will be significantly less than 3 on a five-point Likert scale. The statistical null is stated as: H_0: Statistical survey results will indicate that the average response of ValuSource users will be greater than or equal to 3 on a five-point Likert scale.

Subjects

The population for this study was drawn from the ValuSource 3.0 membership database. ValuSource members are employees of healthcare facilities that belong to AmeriNet, usually administrators or materials managers. These members are associated with their facility name in the database system. At the time of selection, there were approximately 1,075 members who had signed up to use the software. From that total, a ten percent random sample was drawn.

Prior to selection, however, members who were employees of AmeriNet were deselected as it was felt that they might exhibit a level of bias. Many of the AmeriNet employees listed on the database are programmers directly involved with

the creation and maintenance of the program. Their understanding of the program would be greatly enhanced given that they developed the system. They could not be considered normal users of the ValuSource software package.

By definition, a random sample implies that every member of the population has an equal chance of being selected. For the random selection, Microsoft Excel's Random Number Generation analysis tool was utilized. This tool fills a range with independent random numbers drawn from one of several distributions. The Random Seed distribution was chosen for the purposes of selecting the sample for this study. The Random Seed method allows the researcher to enter an optional value from which to generate the random numbers. Each member of the population was assigned a line number based on their position in the database and utilizing the list of random numbers, 108 members were selected for the sample.

From this sample of 108, 30% of the members belonged to Hospital Shared Services (HSS), 40% to Intermountain Healthcare (IHC), and 30% belonged to the shareholder, Vector Healthsystems. The sample represented the following facility type breakdown of 57% hospitals, 18% surgery centers, 8% nursing home/extended care facilities, 6% clinics, 3% HMOs, 2% home health with 5% considered as Other. Looking at the facility type breakdown percentage of the entire database , hospitals account for 59%, surgery centers 18%, clinics 13%, nursing home/extended care facilities 7%, HMOs and home health each represent 1% and all others represent less than 1%. The sample percentages seem to be in line with those representative of the entire database. As well, the shareholder

breakdown for the entire population is as follows: HSS 35%, IHC 33% and Vector at 32%.

No attention was given prior to distribution, as to the makeup of the sample regarding age, gender, position, education, experience, etc. None of this information was available as a part of the membership database. However, these demographics were included as a part of the survey instrument.

Instrument

Since subjects for this study were to be healthcare personnel at various types of facilities throughout the United States, it was determined that a survey would be the best tool in regards to expense, ease of administration, efficiency and accuracy. The surveys were all mailed to the respondents at the same time.

The survey (Appendix A) was designed to employ statements requiring the respondents to signify their level of agreement on a Likert-scale basis. The ability to respond to statements utilizing a fixed response format is generally more acceptable and easier for the participants. As well, this type of approach provides the researcher an excellent method to categorize and tabulate responses.

In an effort to ensure the thoroughness of the construct being tested, the survey also included several open-ended questions that allowed the respondents the opportunity to verbalize any additional comments or feelings regarding that category.

The survey form requested demographic information such as gender, age, position, facility type, operating system and shareholder affiliation. This type of information could be used to segment data for various purposes.

The survey consisted of 36 statements. The first ten attempted to identify the respondent's attitudes towards computers, followed by two open-ended questions for further clarification. The next six statements dealt with the construct of learning a task or function on the computer, followed by two open-ended questions. The next nineteen statements were devised to get an idea of the respondent's feelings about and overall utilization of the ValuSource software package. These were also followed by two open-ended questions. The survey included an area to note a desire to receive survey results and a statement regarding overall confidentiality of survey responses.

Finally, the survey was accompanied by a cover letter (Appendix B) that included an introduction of the researcher, instructions for completing the survey, and a preferred return deadline. A self-addressed stamped envelope accompanied all surveys.

Procedure

Surveys were mailed out to all respondents on the same day. The cover letter explained to the respondents why the study is important and how results might ultimately benefit them. Respondents were assured that their responses would remain anonymous and confidential. Instructions regarding the statements and the fixed response format were explained. It was felt that including a stamped,

self-addressed envelope and providing results of the survey would be sufficient incentive to assure an acceptable return rate.

The statements presented on the survey were kept short in form and applied to the defined constructs of computer attitude, learning styles, and user satisfaction. The survey provided open-ended questions to enable the respondent to provide any additional comment.

Data Analysis

Based on the surveys returned, data will be compiled and will include defining a mean response, variance and standard deviation for each of the survey statements. As well, each of the data groupings will be tabulated and defined. There will be a grand or overall mean, variance and standard deviation determined. The purpose of calculating these descriptive statistics is to order the data for interpretation and manipulation. Descriptive statistics also define characteristics of the data.

Demographic data provided will be measured on a nominal scale and used later as a means to cut the data for comparison purposes.

The inferential test that will be applied to each dimension, or construct grouping of survey statements will be a one-tailed univariate t. Inferential statistics are calculated to allow the researcher to make judgements regarding the data. A univariate data analysis is utilized when there is only one variable under discussion and will either reject the null hypothesis and support the actual, or fail to reject the null therefore, failing to support the actual hypothesis. Univariate data analysis is

used when the researcher wishes to compare the sample mean against the null mean or to generalize from a sample about one variable at a time.

The significance level is a critical probability for choosing between the null hypothesis and the alternative hypothesis. The level of significance determines the probability level that would be considered too low to support the null hypothesis. The alpha level to be applied for the inferential statistics in this research project is 10% or .10.

Once the deadline date for survey return has been reached or a significant number of surveys have been returned, the researcher can begin calculating the statistics that will assist in proving or disproving the stated hypothesis.

Chapter IV

RESULTS

Of the 108 surveys sent out to healthcare personnel, 38 were completed for a 35% return rate. Because this was a mail-out survey, it was felt that anything over 25% returned would be considered acceptable. Several surveys were returned but not completed, as they indicated they had not received their software at that time. Since there were no responses on these surveys, they were not counted in the total returned.

Section 1 - Demographic Statistics

The demographic information is broken down in the following table:

Table 3

Demographic Statistics

	M	**%**	**F**	**%**	**NR**	**%**				
Gender:	17	44.7	20	52.6	1	2.6				
	25-35	**%**	**36-45**	**%**	**46-50**	**%**	**>50**	**%**	**NR**	**%**
Age:	7	18.4	19	50.0	4	10.5	6	15.8	2	5.3

Position:					
	Admin Asst	2	5.3%	Materials Manager	8 21.1%
	Asst Director	2	5.3%	Purchasing Agt/Anlst	4 10.5%
	Buyer	3	7.9%	Purchasing Manager	3 7.9%
	Director	11	28.9%	Other	5 13.2%
Facility Type:					
	Clinic	3	7.9%	Nursing Home	3 7.9%
	HMO	1	2.6%	Surgery Center	4 10.5%
	Hospital	20	52.6%	Other	7 18.4%

	W95	%	WNT	%	W31	%	Oth	%
Oper Sys:	28	73.7	4	10.5	4	10.5	2	5.3

	AFF	%	HSS	%	IHC	%	VEC	%	NR	%
Member:	6	15.8	7	18.4	9	23.7	7	18.4	9	23.7

Section 2 - Computer Attitudes

The next table indicates the tabulated results for survey items numbered 1-10. These statements dealt with attitudes towards working with computers.

Table 4

Computer Attitudes

	1		2		3		4		5		Total
Q1	0	0.0%	0	0.0%	3	7.9%	12	31.6%	23	60.5%	38
Q2	0	0.0%	2	5.3%	7	18.4%	18	47.4%	11	28.9%	38
Q3	4	10.5%	9	23.7%	6	15.8%	12	31.6%	7	18.4%	38
Q4	8	21.1%	6	15.8%	12	31.6%	9	23.7%	3	7.9%	38
Q5	2	5.3%	0	0.0%	3	7.9%	8	21.1%	25	65.8%	38
Q6	25	65.8%	5	13.2%	5	13.2%	2	5.3%	1	2.6%	38
Q7	0	0.0%	0	0.0%	0	0.0%	15	39.5%	23	60.5%	38
Q8	19	50.0%	9	23.7%	4	10.5%	6	15.8%	0	0.0%	38
Q9	26	68.4%	6	15.8%	4	10.5%	1	2.6%	1	2.6%	38
Q10	0	0.0%	0	0.0%	5	13.2%	16	42.1%	17	44.7%	38

Following the first 10 statements were two open-ended questions. The first asked if the respondent disliked working on a computer and if so, to indicate the reasons. Following are the comments received for this question:

"Lack of skills, training, etc."

"Programs once learned are usually OK. Getting them set up correctly is a pain."

"I don't dislike working on the computer entirely. I am in the early learning stages and don't feel comfortable yet."

The next question asked the respondent is there were any other issues regarding computer utilization that were worth mentioning. The comments for this question were:

"Not enough time during the day to experiment with computers."

"Environment, age of equipment."

Section 3 - Learning/Training Styles

The next seven statements on the survey examined the respondents' preferred method of learning or training. The following table exhibits the responses to these statements:

Table 5

Learning/Training Styles

	1		2		3		4		5		Total
Q11	2	5.4%	3	8.1%	6	16.2%	17	45.9%	9	24.3%	37
Q12	2	5.4%	7	18.9%	14	37.8%	10	27.0%	4	10.8%	37
Q13	2	5.4%	2	5.4%	11	29.7%	10	27.0%	12	32.4%	37
Q14	2	5.4%	14	37.8%	6	16.2%	10	27.0%	5	13.5%	37
Q15	1	2.7%	2	5.4%	6	16.2%	18	48.6%	10	27.0%	37
Q16	4	10.8%	7	18.9%	17	45.9%	8	21.6%	1	2.7%	37
Q17	3	8.1%	2	5.4%	10	27.0%	10	27.0%	12	32.4%	37

Following these statements, were two questions. The first asked the respondent to list additional learning/training techniques of which they were aware. The answers given were:

"I usually just plod on through a program to see what it will do."

"Community college; CD-Rom; Video-tape; '____ for Dummies' books; practice; trial and error."

"videotapes"

"Satellite seminars"

"videoconference"

The second question asked whether the respondent disagreed with multimedia methods of training and to explain reasons why. The answers given were:

"Not necessarily disagree with, but interactions w/instructor and other students can be of benefit and add to the learning experience. Other aspects can be brought to discussion."

"I hate the instruction manuals provided with software."

Section 4 - ValuSource 3.0

The remaining survey statements addressed the respondent's feelings towards ValuSource 3.0 and its ease of use. The following table displays responses to these statements.

Table 6

ValuSource 3.0

	1		2		3		4		5		Total
Q18	1	2.7%	5	13.5%	9	24.3%	13	35.1%	9	24.3%	37
Q19	4	11.4%	6	17.1%	7	20.0%	14	40.0%	4	11.4%	35
Q20	12	35.3%	3	8.8%	5	14.7%	7	20.6%	7	20.6%	34
Q21	4	12.5%	0	0.0%	12	37.5%	8	25.0%	8	25.0%	32
Q22	3	8.6%	1	2.9%	11	31.4%	15	42.9%	5	14.3%	35
Q23	3	8.8%	4	11.8%	13	38.2%	8	23.5%	6	17.6%	34

	1		2		3		4		5		Total
Q24	4	11.8%	3	8.8%	16	47.1%	8	23.5%	3	8.8%	34
Q25	6	17.1%	4	11.4%	12	34.3%	13	37.1%	0	0.0%	35
Q26	4	11.4%	3	8.6%	15	42.9%	13	37.1%	0	0.0%	35
Q27	3	8.6%	2	5.7%	10	28.6%	18	51.4%	2	5.7%	35
Q28	3	8.6%	4	11.4%	8	22.9%	5	14.3%	15	42.9%	35
Q29	3	8.6%	6	17.1%	9	25.7%	11	31.4%	6	17.1%	35
Q30	3	8.6%	1	2.9%	7	20.0%	20	57.1%	4	11.4%	35
Q31	0	0.0%	1	2.9%	8	22.9%	9	25.7%	17	48.6%	35
Q32	10	28.6%	7	20.0%	9	25.7%	6	17.1%	3	8.6%	35
Q33	7	20.0%	4	11.4%	5	14.3%	13	37.1%	6	17.1%	35
Q34	5	14.3%	5	14.3%	12	34.3%	6	17.1%	7	20.0%	35
Q35	16	47.1%	8	23.5%	6	17.6%	4	11.8%	0	0.0%	34
Q36	3	8.6%	7	20.0%	14	40.0%	4	11.4%	7	20.0%	35

Following these statements were two questions to fully cover the construct regarding ValuSource 3.0 and the users' feelings. The first question asked the respondent to list any other issues regarding their utilization of VS 3.0. The answers were:

> "More training perhaps, but making improvements to the software will also help."
>
> "I am very new to my position as Purchasing Agent. I haven't utilized the VS 3.0 much."
>
> "No training given."
>
> "I have not figured out how to have the distributor mark-up actually show on the pick-it printout."
>
> "It's hard to know what the correct name of an item is so you can search for it."
>
> "Too many steps to find pricing compared to DOS versions."
>
> "Recently I have been guided on use of VS 3.0 and I feel better about it. My answers are based on experience prior to recent assistance."

"Easy to use, I would like to see the software/contracts to be on the Internet."

"I just received VS 3.0 – haven't used it yet."

The second question asked what would encourage the respondent's usage of VS 3.0. The answers given:

"More time in the day."

"The software seems appropriate and good but we do not use it. We do very little on the computer. I did not use the microfiche either."

"1. Software improvements; 2. More contracts."

"More time available in my work schedule."

"Make it easier."

"More windows type presentation/commands."

"I haven't found the time yet."

"Training -- one-on-one."

"Faster speed."

"Faster."

"Splitting the CD into sections – Med/Surg; Hskp; etc."

"Less steps."

"Better training."

"We would need to work with more AmeriNet hospitals in order to increase our usage. We basically use it on an as needed basis."

"Training."

Section 5 - Descriptive and Inferential Statistics

The next table will display the descriptive statistics for each question. The first three statistics are those of central tendency. This means the statistics will show those values that are at the central or middle area of the frequency distribution. These include the mean, or arithmetic average of the observations, the median, or middle value of the data, and the mode, or the most frequently occurring value. The next set of statistics will include the measures of dispersion which show the tendency for observations to depart from the central tendency. These include the variance, or the measure of the spread, and the standard deviation, which is also a measure of the spread. The purpose of calculating these descriptive statistics is to order the data for interpretation and manipulation. Descriptive statistics also define characteristics of the data.

The inferential test that will be applied to each dimension, or construct grouping of survey statements is a one-tailed univariate t. Inferential statistics are calculated to allow the researcher to make judgments regarding the data. A univariate data analysis is utilized when there is only one variable under discussion and will either reject the null hypothesis and support the actual, or fail to reject the null, therefore, failing to support the actual hypothesis.

Table 7

Descriptive & Inferential Statistics

						Descriptive						Inferential	
	1	*2*	*3*	*4*	*5*	*Total*	*Mean*	*Median*	*Mode*	*SD*	*Var*	*tcalc*	*tcrit*
Q1	0	0	3	12	23	38	4.53	5.00	5	0.647	0.418	14.55	1.30
Q2	0	2	7	18	11	38	4.00	4.00	4	0.838	0.703	7.35	1.30
Q3	4	9	6	12	7	38	3.24	3.50	4	1.304	1.699	1.12	1.30
Q4	8	6	12	9	3	38	2.82	3.00	3	1.249	1.560	0.91	1.30
Q5	2	0	3	8	25	38	4.42	5.00	5	1.030	1.061	8.50	1.30
Q6	1	2	5	5	25	38	4.34	5.00	5	1.072	1.150	7.71	1.30
Q7	0	0	0	15	23	38	4.61	5.00	5	0.495	0.245	19.98	1.30
Q8	0	6	4	9	19	38	4.08	4.50	5	1.124	1.264	5.92	1.30
Q9	1	1	4	6	26	38	4.45	5.00	5	0.978	0.957	9.12	1.30
Q10	0	0	5	16	17	38	4.32	4.00	5	0.702	0.492	11.56	1.30
Sec1	**16**	**26**	**49**	**110**	**179**	**380**	**4.08**	**4.00**	**5**	**1.524**	**2.323**	**13.798**	**1.282**
	1	*2*	*3*	*4*	*5*	*Total*	*Mean*	*Median*	*Mode*	*SD*	*Var*	*tcalc*	*tcrit*
Q11	2	3	6	17	9	37	3.76	4.00	4	1.236	1.528	3.72	1.30
Q12	2	7	14	10	4	37	3.19	3.00	3	1.158	1.340	0.99	1.30
Q13	12	10	11	2	2	37	2.24	2.00	1	1.182	1.398	3.89	1.30
Q14	2	14	6	10	5	37	3.05	3.00	2	1.284	1.648	0.26	1.30
Q15	1	2	6	18	10	37	3.92	4.00	4	1.136	1.289	4.92	1.30
Q16	4	7	17	8	1	37	2.86	3.00	3	1.069	1.144	0.27	1.30
Q17	3	2	10	10	12	37	3.70	4.00	5	1.346	1.813	3.17	1.30
Sec2	**26**	**45**	**70**	**75**	**43**	**259**	**3.25**	**3.00**	**4**	**1.306**	**1.706**	**3.045**	**1.282**
	1	*2*	*3*	*4*	*5*	*Total*	*Mean*	*Median*	*Mode*	*SD*	*Var*	*tcalc*	*tcrit*
Q18	1	5	9	13	9	37	3.65	4.00	4	1.224	1.497	3.22	1.30
Q19	4	6	7	14	4	35	3.23	3.00	4	1.461	2.134	0.93	1.30
Q20	12	3	5	7	7	34	2.82	2.50	1	1.751	3.067	0.59	1.30
Q21	4	0	12	8	8	32	3.50	3.00	3	1.723	2.970	1.64	1.30
Q22	3	1	11	15	5	35	3.51	4.00	4	1.403	1.969	2.17	1.30
Q23	3	4	13	8	6	34	3.29	3.00	3	1.506	2.267	1.14	1.30
Q24	4	3	16	8	3	34	3.09	3.00	3	1.403	1.969	0.37	1.30
Q25	6	4	12	13	0	35	2.91	3.00	4	1.317	1.735	0.38	1.30
Q26	4	3	15	13	0	35	3.06	3.00	3	1.249	1.560	0.27	1.30
Q27	3	2	10	18	2	35	3.40	4.00	4	1.339	1.793	1.77	1.30
Q28	3	4	8	5	15	35	3.71	4.00	5	1.654	2.737	2.55	1.30
Q29	3	6	9	11	6	35	3.31	3.00	4	1.469	2.159	1.27	1.30
Q30	3	1	7	20	4	35	3.60	4.00	4	1.397	1.952	2.54	1.30
Q31	0	1	8	9	17	35	4.20	4.00	5	1.436	2.063	4.94	1.30
Q32	3	6	9	7	10	35	3.43	3.00	5	1.569	2.461	1.62	1.30
Q33	6	13	5	4	7	35	2.80	2.00	2	1.553	2.413	0.76	1.30
Q34	7	6	12	5	5	35	2.86	3.00	3	1.478	2.185	0.57	1.30
Q35	0	4	6	8	16	34	4.06	4.00	5	1.618	2.617	3.82	1.30
Q36	3	7	14	4	7	35	3.14	3.00	3	1.448	2.097	0.58	1.30
Sec3	**72**	**79**	**188**	**190**	**131**	**660**	**3.35**	**3.00**	**4**	**1.507**	**2.270**	**5.917**	**1.282**
ALL	**114**	**150**	**307**	**375**	**353**	**1299**	**3.54**	**3.00**	**4**	**1.478**	**2.183**	**13.20**	**1.282**

Scores for survey statements number 6, 8, 9, 13, 32, 33, 34 and 35 were flipped to match the general tone of the other survey statements. For example, all responses of 5 were changed to 1, 4 to 2 and 3 remained the same.

Chapter V

DISCUSSION

Summary

Based on the final statistical calculations, the overall mean score of 3.46 is greater than 3, meaning the research does not support the stated hypothesis. As well, the calculated univariate t is much greater than the critical t. Normally, this means that the null hypothesis is rejected and the actual hypothesis is supported. In this case, the stated hypothesis is negatively slanted while the survey statements are positively slanted. Therefore, the calculated t score needs to be less than the critical t score, meaning the null hypothesis (H_0: >=3) is not rejected and the actual hypothesis (H_1: <<3) cannot be supported. It becomes an uncertainty whether there is a need for training for ValuSource 3.0 users.

Reviewing those statements where the mean score was less than 3.00 is worthy of some discussion. Statement 4: "I consider myself an expert when it comes to using the computer," had a mean score of 2.82, indicating that most of the respondents do not feel as if they are computer experts. Only twelve of the 38, or one-third, responded to this statement with a Likert response greater than 3.

Statement 6: "I get a sinking feeling when I think of trying to use a computer," scored an overall mean of 1.66 (prior to being flipped) indicating that the respondents generally disagreed with this statement. Statement 8: "Working

with a computer makes me nervous," and statement 9: "I will do as little work with computers as possible," scored an overall mean of 1.92 and 1.55 respectively, indicating a general disagreement with these statements.

The overall mean score and calculated t score for section 1, dealing with computer attitudes, showed significantly that most of the respondents felt comfortable working with computers.

Section 2, dealing with learning techniques, asked respondents their level of agreement on statements regarding various training/learning methods. With the exception of one statement, the mean scores ranged from 3.05 to 3.76 indicating that any of a variety of methods is acceptable on average. Statement 16: "I prefer reading about a topic I am interested in versus attending a class," had a mean score of 2.86, suggesting that most of the respondents would not be in favor of classroom learning.

Section 3 surveyed the users' feelings regarding ValuSource 3.0, its ease of use, and various tools available for task guidance. Statement 20: "I have called the VS Technical Support Help Desk for assistance utilizing VS 3.0," had an overall mean score of 2.82. Even though this facility is available to assist users with problems and to answer questions, the average user probably does not utilize this service.

Statement 25 referred to the respondent's use of the Help menu to aid in performing a task. This researcher would have guessed that the majority of VS 3.0 users probably were not aware of this function. Surprisingly, however, the mean

score for this statement was 2.91. Somewhat less than average, but not too far off the mark.

Also surprising was the mean score of 4.20 for Statement 31: "I think a manual should be provided for utilizing VS 3.0 software." Most computer software manufacturers might agree that manuals provided to users are rarely opened, however, this survey tends to indicate that the respondents miss having the book around for reference.

Statement 32 on the survey, "I had difficulty utilizing VS 3.0," scored 2.57 (prior to being flipped) meaning the respondents generally disagreed with this statement. Once the numerics were reversed on this statement, the mean score became 3.43 indicating the users found the software easy to use.

In contrast, Statement 33: "More training is required for me to effectively utilize VS 3.0 scored 3.20 (before being reversed) indicating a stronger agreement with this statement, as well as Statement 34: "I have experienced frustration when trying to utilize VS 3.0," scored 3.14 (prior to reversal).

When asked if the respondents chose not to use VS 3.0 because it is too difficult (Statement 35), they responded with a mean score of 1.94 (prior to reversal), indicating a strong disagreement with this statement. And, Statement 36: "I use VS 3.0 frequently (more than once a week)," seemed to mirror Statement 35 with an agreement level of 3.14.

The calculated t score for Section 3 is 5.917 which is greater than the critical t score of 1.282. This section also fails to reject the null hypothesis nor supports the actual. Even calculating a t score for only the critical statements

numbered 32-35, nets a score of 2.42 versus a critical t score of 1.282. Again, failing to reject the null or support the actual.

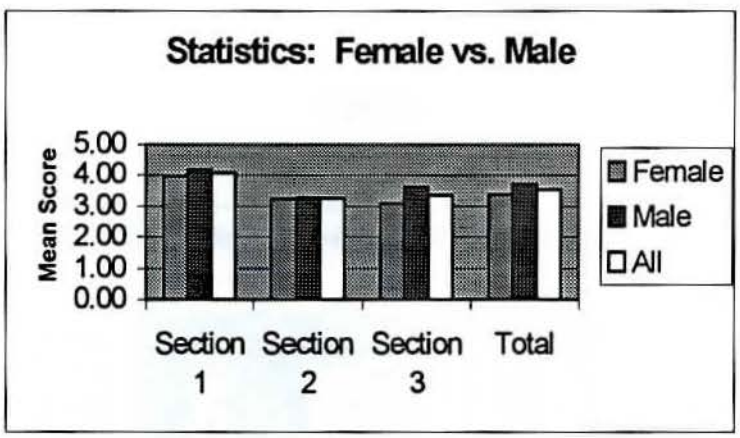
The statistics are somewhat interesting when the data is grouped by gender. Overall, males were slightly more satisfied than females with mean scores of 3.73 and 3.37, respectively. Analyzing the graph, it is apparent there is very little variance between males, females and the overall means.

Table 8

Statistics By Gender

Female	Mean	Resp	Median	Mode	Std Dev	Var	tcalc	tcrit
Section 1	3.97	200	4.00	5	1.188	1.411	11.49	1.282
Section 2	3.23	133	3.00	3	1.283	1.646	2.03	1.282
Section 3	3.10	356	3.00	3	1.335	1.782	1.35	1.282
Total	3.37	689	3.00	5	1.338	1.789	7.32	1.282
Male	Mean	Resp	Median	Mode	Std Dev	Var	tcalc	tcrit
Section 1	4.21	180	4.50	5	1.023	1.047	15.81	1.282
Section 2	3.27	126	3.00	4	1.141	1.303	2.65	1.282
Section 3	3.64	304	4.00	4	1.028	1.056	10.88	1.282
Total	3.73	610	4.00	4	1.102	1.215	16.38	1.282

Figure 2



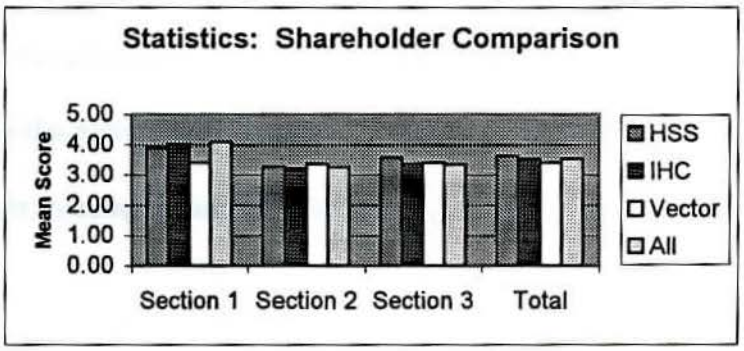
Another way to view the data is by shareholder. By reviewing the overall mean scores, it is apparent there is nothing that stands out. The responses seem to be fairly equal between the three shareholders, affiliates and the overall mean scores (see graph below).

Table 9

Statistics By Shareholder

Aff	Mean	Resp	Median	Mode	Std Dev	Var	tcalc	tcrit
Section 1	3.97	60	4.00	5	1.041	1.084	7.193	1.282
Section 2	3.05	42	3.00	3	1.147	1.315	0.269	1.282
Section 3	3.49	150	3.00	3	1.047	1.097	5.690	1.282
Total	**3.62**	**216**	**4.00**	**3**	**1.072**	**1.149**	**8.441**	**1.282**
HSS	Mean	Resp	Median	Mode	Std Dev	Var	tcalc	tcrit
Section 1	3.89	70	4.00	5	1.161	1.349	6.380	1.29
Section 2	3.29	42	3.00	4	1.019	1.038	1.817	1.29
Section 3	3.57	113	4.00	4	1.034	1.069	5.822	1.29
Total	**3.61**	**225**	**4.00**	**4**	**1.088**	**1.185**	**8.453**	**1.29**
IHC	Mean	Resp	Median	Mode	Std Dev	Var	tcalc	tcrit
Section 1	4.02	90	4.50	5	1.272	1.617	7.625	1.29
Section 2	3.21	63	3.00	4	1.416	2.005	1.157	1.296
Section 3	3.38	152	4.00	4	1.297	1.681	3.628	1.282
Total	**3.53**	**305**	**4.00**	**5**	**1.350**	**1.822**	**6.915**	**1.282**
Vector	Mean	Resp	Median	Mode	Std Dev	Var	tcalc	tcrit
Section 1	3.40	70	4.00	5	1.610	2.591	2.079	1.29
Section 2	3.37	49	4.00	4	1.302	1.696	1.975	1.29
Section 3	3.41	115	3.00	3	1.091	1.191	4.016	1.29
Total	**3.40**	**234**	**4.00**	**4**	**1.304**	**1.700**	**4.663**	**1.29**

Figure 3



Although the statistical calculations fail to support the hypothesis that ValuSource users would require additional training in order to use the software effectively, it is important to note that when specifically asked to respond to this statement (33), their level of agreement was above average. As well, the fact that the majority of users indicated some frustration when using the software is notable.

It is positive to note, also, that users are not putting the software aside from any frustration, but are finding ways to make the software work for them. It is also interesting that many users would prefer to have a manual.

Limitations

One of the main problems with this study might be the survey instrument. The researcher did not want the statements on the survey to be slanted negatively, although the hypothesis was stated negatively.

Based on the number of phone calls coming into the ValuSource department (prior to sending out the surveys) regarding users' difficulties with the software, this researcher was surprised at the overall positive responses given on the survey. It is possible that the survey was designed incorrectly or that it did not correspond with the stated hypothesis.

Suggestions for Further Research

Since there have been many software enhancements to ValuSource 3.0 since the time the survey was conducted, it would be interesting to re-survey the current sample to compare any difference in their scores. Some of the

improvements have included a quicker, more efficient search capability, better quality information and consistency in presentation, and addition of the ValuFood catalog. There are further improvements on the horizon that would provide the user with more information regarding pricing changes and item description detail. Members have commented positively regarding these improvements.

It is to AmeriNet's credit that they continue to improve the product based on user input. Steps have been taken to assist the user in their quest for information. The number of complaints regarding ValuSource 3.0 seems to have declined in the past few months.

Hopefully, the results of this study will be beneficial to the company, either by assuring that the users seem to be able to utilize the software effectively, or by identifying areas of possible concern for further study.

Appendix A

VALUSOURCE 3.0 SURVEY FORM

Gender: ❑ Male ❑ Female Age: _____ Position: _____

Facility Type: ❑ Hospital ❑ Surgery Center ❑ Clinic
❑ Nsg Home/LT Care ❑ HMO
❑ Other: _____

Operating Sys: ❑ Windows 3.1 ❑ Win95 ❑ WinNT
❑ Other: _____

Member of: ❑ HSS ❑ IHC ❑ VHS
❑ Affiliate: _____

Please select the answer that best describes your feelings as noted on the following scale.

1 - Strongly Disagree
2 - Disagree Somewhat
3 - Neither Disagree nor Agree
4 - Agree Somewhat
5 - Strongly Agree

1. I really enjoy working with computers.	1	2	3	4	5
2. I wish I could do all my work on a computer.	1	2	3	4	5
3. I require little or no help when learning new software.	1	2	3	4	5
4. I consider myself an expert when it comes to using the computer.	1	2	3	4	5
5. I prefer working in a Windows-type format, rather than DOS.	1	2	3	4	5
6. I get a sinking feeling when I think of trying to use a computer.	1	2	3	4	5

7. I know that computers give me opportunities to learn many new things.	1	2	3	4	5
8. Working with a computer makes me nervous.	1	2	3	4	5
9. I will do as little work with computers as possible.	1	2	3	4	5
10. I feel comfortable working with a computer.	1	2	3	4	5

If you dislike working on a computer, please indicate why:

_____

_____

_____

Are there any other issues, with regards to utilizing a computer, that you feel need mention:

_____

_____

_____

11. If I am unsure how to perform a task on the computer, I will try to find it in a manual.	1	2	3	4	5
12. I prefer going to computer classes to learn new computer tasks.	1	2	3	4	5
13. I prefer a trainer to work with me, one on one, when performing a new computer task.	1	2	3	4	5
14. I always go through a tutorial, if provided, when performing a new computer task.	1	2	3	4	5
15. If I am unsure how to perform a task on the computer, I will click on Help for assistance.	1	2	3	4	5
16. I prefer reading about a topic I am interested in versus attending a class.	1	2	3	4	5
17. I would like to utilize the Internet as a means of training for a particular topic.	1	2	3	4	5

Please list any other educational/learning techniques of which you are aware.

_____

_____

If you disagree with multimedia methods of training, please explain why.

_____

_____

_____

18. I enjoy using ValuSource 3.0 on CD-ROM.	1	2	3	4	5
19. I have been able to utilize VS 3.0 software without any difficulties.	1	2	3	4	5
20. I have called the VS Technical Support Help Desk for assistance utilizing VS 3.0.	1	2	3	4	5
21. The VS Technical Support Help Desk has successfully guided me through my task with regards to VS 3.0.	1	2	3	4	5
22. VS 3.0 on CD-ROM allows me to perform many or all of the functions I hoped it would.	1	2	3	4	5
23. The VS 3.0 Examples & Demos section helped me to learn how to use the software.	1	2	3	4	5
24. I was able to perform all my tasks after running through the Examples & Demos for VS 3.0.	1	2	3	4	5
25. I refer frequently to the Help menu selection to aid in performing a specific task.	1	2	3	4	5
26. The Help function successfully guided me through my desired task.	1	2	3	4	5
27. I think VS 3.0 is very easy to use.	1	2	3	4	5
28. I was able to easily install VS 3.0.	1	2	3	4	5
29. I was able to use VS 3.0 for desired functions immediately.	1	2	3	4	5
30. ValuSource 3.0 is easy to work through because it is similar to other Windows programs.	1	2	3	4	5
31. I think a manual should be provided for utilizing VS 3.0 software.	1	2	3	4	5
32. I had difficulty utilizing VS 3.0.	1	2	3	4	5

33. More training is required for me to effectively utilize VS 3.0.	1	2	3	4	5
34. I have experienced frustration when trying to utilize VS 3.0.	1	2	3	4	5
35. I do not use VS 3.0 because it is too difficult.	1	2	3	4	5
36. I use VS 3.0 frequently (more than once a week).	1	2	3	4	5

Please list any other issues regarding utilization of VS 3.0:

_____

_____

_____

What would encourage you to increase your usage of VS 3.0?

_____

_____

_____

Thank you for taking the time to complete this survey. Please return in the enclosed stamped, self-addressed envelope by May 30, 1997.

❑ Please send survey results to:

_____

_____

_____

(Note: Be assured that confidentiality will be maintained. Or, survey results may be requested under separate cover.)

Appendix B

COVER LETTER

March 16, 1998

«name»
«title»
«fac_name»
«address»
«city», «state» «zip_code»

Dear ValuSource 3.0 User:

My name is Terri Jarus. I am the Manager of Contract Information Services at AmeriNet and also a graduate student at Lindenwood University in St. Charles, Missouri. I am conducting some market research related to ValuSource 3.0 as a part of my Master's degree thesis. AmeriNet will also use the results of this survey in future enhancements of ValuSource. Data from this survey will be grouped collectively, statistically compiled and analyzed for these purposes.

Please complete the survey as truthfully as possible. There are no wrong or right answers. All surveys should be submitted anonymously and answers will be kept strictly confidential. Please give an answer for each statement or question. The participant should select their level of agreement with the statements presented on the survey, ranging from 1 - Strongly Disagree to 5 - Strongly Agree.

If at all possible, the survey should be returned by April 30, 1998. I have enclosed a stamped, self-addressed envelope for your convenience.

If you would like a copy of the results of the survey, please indicate by checking the box at the end of the survey.

I appreciate your time and valuable input. Thank you for taking part in this survey.

Sincerely,

Terri Jarus
Manager, Contract Information Services
AmeriNet, Inc.
2060 Craigshire Road
St. Louis, MO 63146

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