DEVELOPMENT OF AN INDICATOR TO IDENTIFY MULTIPLE INTELLIGENCES PREFERENCES OF ADULT LEARNERS

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CHAPTER 1

INTRODUCTION

Multiple Intelligences

Knowledge is power. In today's education arena, being successful encompasses understanding how to learn effectively. Traditionally, teaching in the United States has been what is termed frontal teaching or chalk and talk (Snyder, 1999, p. 11). These are teaching methods that put the teacher in front of the classroom using a teaching-centered approach to the instruction. This mode of teaching has not been successful for all students as is evidenced by the dropout rate of 50% in high schools in the United States (Snyder, 1999, p. 11). Statistics such as these portray a serious educational problem. Realizing the American dream of completing an education should not just be for those that can score high on a traditional intelligence test.

In 1983, Howard Gardner developed the theory of Multiple Intelligences which explains the presence of nine different Intelligences: these include Bodily/ Kinesthetic, Existential, Interpersonal, Intrapersonal, Logical/

Mathematical, Musical, Naturalist, Verbal/Linguistic, and Visual/Spatial (Gardner, 1997, p. 8). The following are the personal learning styles based upon the nine Multiple Intelligences.

1. Bodily/Kinesthetic Intelligence is the proficiency of using the entire body to express ideas and feelings and the competence of using the body to produce or transform things (Gardner, 1983, pp. 205-236).
2. Existential Intelligence is the appreciation of spirituality and understanding questions about life. This intelligence relates to exploring human existence in the universe (http://surfaquarium.com/MIinvent.htm.).
3. Interpersonal Intelligence is the proficiency of an individual in perceiving the moods, aims, motivations, and emotions of others (pp. 237-276).
4. Intrapersonal Intelligence is having a positive self-concept and life direction which is intrinsically grounded. The competency in knowing oneself and acting to modify oneself based on that knowledge (pp. 237-276).
5. Logical-Mathematical Intelligence involves the elevated skill of manipulating and understanding numbers and the ability to reason effectively (pp. 128-169).
6. Musical Intelligence is the ability to appreciate, distinguish, compose, and perform in various musical forms (pp. 99-127).
7. Naturalistic Intelligence is the ability to appreciate, categorize, classify, explain, and connect to things encountered in nature (Gardner, 1999, p. 115).
8. Verbal/Linguistic Intelligence is the ability to understand, use, and manipulate written or spoken words productively (Gardner, 1983, pp. 73-98).
9. Visual/Spatial Intelligence is characterized by being able to see an image or situation and quickly assess areas that could be changed to transform or improve the appearance (pp. 170-204).

In his 1983 landmark book Frames of Mind, Howard

Gardner, Ph.D., of Harvard University introduced his theory of Multiple Intelligences. Gardner is the author of many books and articles. His theory of Multiple Intelligences has challenged long-held assumptions about intelligence.

Gardner's (1983) theory conceptualized intelligence as consisting of several distinct intelligences rather than a singular cognitive capacity. Multiple Intelligences celebrates the uniqueness and diversity of all students. Gardner suggests the need for a broader view of the human mind and of human learning than what currently exists. Multiple Intelligences holds that every student is smart not just in one or two ways but in many. Gardner believes instructors must attempt to reach all students and develop their diverse intelligences. Moreover, instructors need to teach in a variety of ways which provide varied learning experiences for students.

Many educators have begun to recognize that students have unique differences and would like to modify teaching methods to include Multiple Intelligences. However, for educators to apply various teaching methods for the various Multiple Intelligences, they must have a valid and reliable way to identify their Multiple Intelligences. While the concept of Multiple Intelligences has been around for almost 30 years, there is currently no valid or reliable tool that is easily accessible.

Intelligence traditionally has been defined in terms of Intelligence Quotient (IQ), which measures a narrow range of

Verbal/Linguistic and Logical/Mathematical abilities (Gardner & Hatch, 1989). Gardner argues that humans possess a number of distinct intelligences beyond Verbal and logical abilities that appear in different skills and abilities. All human beings apply these intelligences to solve problems, invent processes, and demonstrate their creativity (Gardner & Hatch, 1989).

Throughout most of this century, the popular definition of intelligence is what is measured in an IQ Test. That has basically been how intelligence is viewed (Fellenz & Conti, 1990). To be considered intelligent, a person has to do well on an intelligence test. In fact, one cannot gain access to higher education without doing well on such test (Fellenz & Conti, 1990).

In the 1970's, a group of cognitive psychologists began to feel that the definition of intelligence was also wrong. They felt as though the definition was missing the understanding of what intelligence really is (Sternberg, 1990). The conclusion of Earl Hunt, Jack Carrol, Jim Pelegrino, Bob Glaser, and Robert Sternberg was that what is missing is an understanding of the mental processes that underlie intelligence (Sternberg, 1990). In other words, the tests can give you a score, but what they do not give you is an understanding of the mental processes that underlie the score (Sternberg, 1990).

Howard Gardner (1993) argues that humans possess a number of distinct intelligences beyond verbal and logical

skills that are measured on traditional instruments. These intelligences appear in different skills and abilities. All human beings apply these intelligences to solve problems. His concept that celebrates individual differences is the theory of Multiple Intelligences.

Traditionally, intelligence is defined operationally as the ability to answer items on tests of intelligence. The inference from the test scores to some underlying ability is supported by statistical techniques that compare responses of subjects at different ages. The correlation of the test scores across ages and across different tests corroborates the notion that the general faculty of intelligence does not change much with age or with training or experience (Gardner, 1993, p. 15).

However, Gardner believes intelligence is an inborn attribute or faculty of an individual. Human cognitive competence is better described in term of a set of abilities, talents, or mental skills which is referred to as intelligence (Gardner, 1993, p. 15). All normal individuals possess each of the skills to some extent; however, individuals differ in the degree of skill and their combinations (p. 15). This theory of intelligence may be more humane and more controversial than alternative views of intelligence. Moreover, it more adequately reflects the data of human intelligent behavior (p. 15). Such a theory has important educational implications, including opportunities for curriculum development (p. 15).

Multiple intelligence theory pluralizes the traditional concept of intelligence. Multiple Intelligences is the ability to solve problems or devise products that are of significance in a particular cultural setting (Gardner, 1993, p. 15). The problem solving skill allows one to approach a situation that requires a goal to be met and locate the appropriate route to that goal (Gardner, 1993, p. 16). Multiple Intelligences theory is framed in light of the biological origins of each problem solving skill. Only those skills that are universal to the human species are treated. Therefore, the biological tendency to participate in a particular form of problem solving must also be coupled with the cultural nurturing of that domain (p. 16). For example, the use of language, which is a universal skill, may expose itself particularly as writing in one culture, as oratory in another culture, and as the secret language of anagrams in a third (p. 16).

Gardner (1993) identified intelligences that are rooted in biology and that are valued in one or more cultural settings. Evidence was obtained from several different sources: knowledge about normal development and development in gifted individuals; information about the breakdown of cognitive skills under conditions of brain damage; studies of exceptional populations, including prodigies and autistic children; data about the evolution of cognition over the millennia; cross-cultural accounts of cognition; psychometric studies, including examinations of correlations

among tests; and psychological training studies, particularly measures of transfer and generalization across tasks (p. 16). Only those intelligences that satisfied all or a majority of the criteria were selected as bona-fide intelligences.

Gardner based the Multiple Intelligences theory on three foundation principles: (a) individuals are not the same--individuals differences exists; (b) people do not all have the same kinds of minds; and (c) education becomes most effective if these individual differences are considered (Gardner, 1999). It is the existence of the individual differences that started Gardner on his path of developing the theoretical bases of Multiple Intelligences. In addition, he believed his task was to envision forms of education and modes of assessment that would have a firm root in current scientific understanding and that contributes to enlightened educational goals (Gardner, 1993, p. 163). In adult leaning, individuals should be able to understand and articulate their learning preferences, which are specified by their intelligences.

Adult Learning

The role of the adult learner's experience has become an increasingly important focus for educational institutions and the private sector. Adults have an independent self-concept, and it is important to acknowledge them as individuals in an educational setting. Adults possess characteristics that influence how they learn which should

be considered when developing educational programs (Knowles, Holton III, & Swanson, 1998). Creating a learning environment which meets the needs of adult learners is one factor for a successful adult education program. The challenge is to create a non-threatening atmosphere in which adults have learning options. To do this, educators should provide multiple learning options, which enable learners to choose those methods and materials best suited to their individual need (Knowles, Holton III, & Swanson, 1998). The following concepts are vital to understanding the methods adults use when engaged in learning activities: (a) andragogy, (b) learning how to learn, (c) self-directed learning, and (d) real-life learning. These concepts are enhanced by addressing individual differences and individualized approaches to learning.

Andragogy

Malcolm Knowles popularized the word "andragogy" and is often referred to as the father of adult education. Androgogy is the art and science of helping adults learn (Knowles, 1980, p. 43). The concept of andragogy was originally based on the following four assumptions: (a) As individuals mature their self-concept progresses from a dependent personality to being self-directed; (b) adults accrue a tremendous reservoir of experience that becomes a rich resource for learning; (c) adults are ready to learn (d) since their application of knowledge is immediate, the learning shifts from

subject- centeredness to performance-centeredness (Knowles, 1970, pp. 43-44).

As he worked with the concept, Knowles (1998) added two more assumptions. In 1994, the fifth assumption was added. The fifth assumption states as a person matures, individuals become internally motivated to learn (p. 68). Finally, the sixth assumption details that adults need to know why they need to learn something before committing to the learning (p. 64). Knowles concept of androgogy has been the foundation of thinking in the field of adult learning during the last decade (Hiemstra & Sisco, 1990).

Knowles continued to advance the understanding that the ultimate discovery of the learning experience is dependent upon the learner. He believed when people have the opportunity to learn by being pro-active and perceived the learning in the context of their own life circumstances, a person would internalize information quicker, retain information more permanently, and apply it more confidently (Knowles, 1992, p. 11).

Self-Directed Learning

When it comes to self-directed learning, individuals take the initiative in assessing their learning needs, formulating learning objectives, ascertaining resources for learning, adopting appropriate learning strategies, and evaluating learning outcomes (Knowles, 1975, p. 18). This could be a simple learning task or a very detailed learning objective. These experiences could consist of learning alone

or with several participants and may develop within various settings. The results of research associated with self-directed learning reveals that 90% of adults participate in at least one self-directed learning project annually and that 70% of adult learning is self-directed in nature (Tough, 1978).

Self-directed learning is a process commonly associated with the field of Adult Education. Anything worth knowing is worth discovering through a formulated learning plan (Goodman, 1964). The notion that adults assume control of their learning became a major focus in the field of Adult Education in the 1970's and 1980's. The emphasis on self-directed learning can be traced primarily to Allen Tough's work with adult learning projects. While unidentified for centuries, self-directed learning has only become formally recognized and studied during the last several decades (Knowles, 1990).

Learning How to Learn

People learn in a variety of ways. Learning how to learn is subject to a variety of interpretations and is not readily defined with precision (Smith, 1976, p. 4). Learning how to learn is the idea that it is as important to teach adults "how" to learn as it is to specify particular curricular domains for learning (Brookfield, 1986, p. 64). Learning how to learn is the approach of possessing, or acquiring, the knowledge and skill to learn effectively in whatever learning situation one encounters (Smith, 1982, p.

19).

Understanding the concept of learning how to learn is important to the field of Adult Education for it holds great promise for helping adults expand their learning effectiveness (Knowles et al., 1998, p. 166). In everyday life, learning how to learn is the basis of building knowledge, yet little research about learning how to learn outside of formal educational or organizational settings exists. Much of the research related to learning how to learn (Smith, 1982) involves college students' meta-cognitive processes (Brookfield, 1986). Instead of focusing just on traditional school settings, learning how to learn should be conceived as a lifelong learning project (Brookfield, 1986).

Real-Life Learning

Real life learning involves learning in daily life situations, prospects, predicaments, and experiences. As a field of study, Adult Education explores the benefits of learning that are readily applicable to adult learners' lives as opposed to learning that is from a teacher-centered curricula in formal education. Real-life learning is learning which is "relevant to the living tasks of the individual in contrast to those tasks considered more appropriate to formal education" (Fellenz & Conti, 1989, p. 3).

Historically, the learning processes used in formal educational programs differ significantly from the processes

of real-life learning. During real-life learning, more attention is offered to the living tasks of individual participants rather than tasks recommended by formal education (Fellenz & Conti, 1989). People are typically not prepared through formal education to learn from everyday life experience (Sternberg, 1990, p. 35).

Learners challenge the unknown by making associations with what is known (Mezirow, 1991). Much of the disappointment with today's present educational system is the result of academic environments which tend to be impersonal, detached, and unrelated to student interests, experiences, and needs (Moustakas, 1973). On the other hand, real-life learning is "relevant to the living history of the individual correlating to those tasks considered more appropriate to formal education" (Fellenz & Conti, 1989, p. 3).

Addressing Individual Differences

Groundwork was laid throughout the United States in the early part of the 20th century regarding individual differences. An early influence within education was the progressive education movement, led by John Dewey in 1926. Research on individual differences looked for the one best teaching method for every learner but failed to get consistent results (Dunn & Dunn, 1978).

In the early 1960s, instructional improvement projects began to explore individual differences as the factor which decided the effectiveness of various methods. Instructional

improvement projects began to explore individual differences as the agent that decided the effectiveness of various methods. Concerns of instruction influenced a shift from the more laboratory-based concepts to concern with the more practical oriented styles (Dunn & Dunn, 1978).

Learning Styles and Learning Strategies

Learning styles and learning strategies provides students with concrete approaches of learning. Learning style is defined as a person's distinctive ways of information processing, feeling, and behaving in learning situations and of using those preferences, dispositions, and tendencies that influence one's learning (Smith, 1982, p. 60). Learning style is one of the three components of the learning how to learn process (Smith, 1982, p. 23). Learning styles are generally established and are fixed throughout the learner's life (Fellenz & Conti, 1989, p. 8). However, learning strategies are the technique or skills that an individual elects to use in order to accomplish a learning task (p. 7).

Learning strategies can also be described as a way in which learners arrange their resources during learning situations (Smith, 1982, p. 113). While learning styles are inspired by the internal ways of information processing, learning strategies deal with the methods learners use to acquire information in diverse learning situations (Conti & Kolody, 1995). Rather than being intrinsic ways of learning, learning strategies involve more selections on the part of

the learner. Learning strategies are the particular behavior that the learner chooses to use when attempting a learning task (Fellenz & Conti, 1989).

In the field of Adult Education, the concept of learning strategies has been defined as consisting of five areas; metacognition, metamotivation, memory, critical thinking, and resource management (Conti & Kolody, 1995). The research using these five areas has identified three separate groups of learners. These groups are referred to as Navigators, Problem Solvers, and Engagers (Conti & Kolody, 1999). Navigators are focused learners who chart a course for learning and follow it (Conti & Kolody, 1999a, p. 9). The strategies these learners utilize are planning, attention, identification and use of resource, and testing assumptions. Navigators are very comfortable with deadlines, clear-cut goals, and definite clearly-communicated expectations (p. 9).

Critical thinking is a characteristic often times associated with the Problem Solver group. Similar to the Navigators, these types of learners look externally at accessible resources which will best assist in their learning endeavors (Conti & Kolody, 2004, p. 186). Problem Solvers rely on a reflective thinking process which employs elevated thinking skills (Conti & Kolody, 1999a, p. 11). Problem Solvers constantly test assumptions, generate alternatives, and use provisional acceptance strategies. Problem Solvers are skillful at adjusting their learning

processes and resources to fit their particular learning needs (p. 12).

Engagers are motivated internally and must ensure that a learning activity will be meaningful to them before they are compelled to participate (Conti & Kolody, 1999a, p. 14). They are passionate learners who love to learn, learn with feeling, and learn best when they are actively engaged in meaningful manner (p. 13). Engagers consider their endeavors as an extension of themselves and are motivated by feelings of satisfaction and pride (p. 15). They tend to focus on the process of learning rather than the content of material being learned.

Problem Statement

There is no question that the traditional method of measuring and assessing students' intelligence works well for some students (Gardner, 1993). However, understanding and meeting the needs of all students should be the goal. An improved approach is needed for assessing intelligence. In Gardner's view, the purpose of school should be to develop intelligences and to help people reach vocational and avocational goals that are appropriate to their particular spectrum of intelligences (p. 9). It is of the utmost importance for society to recognize and nurture all of the possible human intelligences. If recognized early, the chance of dealing with educational problems could be addressed appropriately and effectively (p. 9).

In order for teachers to understand how to implement

various teaching methods which incorporate Multiple Intelligences, they must be able to easily and accurately identify a students' intelligence ranking. In addition, for individuals to understand and articulate their own learning preferences specified by their intelligences, they too must be able to easily identify individual strengths.

Although practitioners have embraced the concept of MI, they do not have an easily accessible, affordable, valid and reliable tool for identifying MI. Many surveys, checklists, and inventories have been devised for classroom use. However, most lack validity and reliability information, and several are cumbersome to score. Most of these instruments have been developed as curricular tools rather than as valid and reliable instruments. In addition, it is not known how accurate they are. In order for teachers to competently use the concept of Multiple Intelligences in their classes, they need a valid and reliable tool which is suitable for classroom use and which can be easily used with students.

I became involved in the effort to develop such a tool upon meetin with Howard Gardner in 2001 while attending an educational conference in Tulsa Oklahoma. Gardner spoke to an overflowing crowd of educators about his theory of Multiple Intelligences. I had the opportunity to be a part of the committee that spent the evening with Dr. Gardner. While explaining to Gardner why I wanted to take on this research project, he encouraged his support through Project Zero where he serves as Co-Director.

Purpose

The purpose of this study was to develop a valid and reliable preference indicator that practitioners could use to identify the Multiple Intelligences of adult learners. This tool was designed for use in instrumented-learning situations rather than for psychological testing in clinical settings. This preference indicator was constructed by compiling a pool of items congruent with Gardner's (1983) concept of MI and by doing multiple rounds of filed testing and data analysis to reduce this pool to a useable set of valid and reliable items. As part of this process, the survey based on these items was given to a large number of community college students, and their responses were used to confirm the final form of an indicator to identify MI preferences.

Research Questions

Instrument construction consists of a sequential process of establishing validity and reliability for the instrument. The advisor for this research has developed several instruments which includes the Principles of Adult Learning Scale (1982), the Self-Knowledge Inventory of Lifelong Learning Strategies (Conti & Fellenz, 1992), and Assessing The Learning Strategies of Adults (Conti & Kolody, 1999), In addition, he has advised students such as Tapp (2002) in instrument development. Since the process for developing instruments for educational use is fairly

consistent the design and research questions for this study were patterned after the study by Tapp.

The following research questions were addressed in this study:

1. What is the pool of items that can be used to produce a survey to identify Multiple Intelligences for adult learners?
2. What is the construct validity for a survey identifying Multiple Intelligence?
3. What is the content validity for a survey identifying Multiple Intelligences?
4. What is the criterion-related validity for a survey identifying Multiple Intelligences?
5. What is the reliability for a survey identifying Multiple Intelligences?

The following procedures were used to address each research question:

Question 1	Review of existing instruments
Question 2	Compare items to Gardner's theory
Question 3	Frequency distribution, Correlation, t-test, and factor analysis
Question 4	Correlations
Question 5	Correlations

CHAPTER 2

LITERATURE REVIEW

Multiple Intelligences

The state of literature related to Multiple Intelligneces (MI) can be divided into five categories. The first category includes a review of data that begins with the history of intelligence testing. The second category provides the theoretical foundation of MI. The third category of literature relates to other researchers interested in MI. The fourth category includes research on educating adults with Multiple Intelligence in mind and how MI fits with how adults learn. Finally, the fifth category relates to developing instruments to test for MI.

History of Intelligence

Traditionally, human intelligence has been described as a specific set of cognitive competencies. Alfred Benet, a leading psychologist, was commissioned by the French minister of public instruction to study the problem of retardation among public school children in Paris in 1904. Benet's position was individual differences in intelligence should be determined by measurement of complex mental

processes such as memory, imagination, attention, comprehension, and suggestibility (Minton, 1905).

With this conceptualization of intelligence in mind, Benet and Theodore Simon, a young French physician, began the work of developing a test designed to measure these higher mental processes. The result of this endeavor was the test known as the Benet-Simon scale (Minton, 1905). The results of this test were expressed in the age which a normal person could be expected to accomplish. Benet and Simon's original test served as the accepted basis for defining human intelligence throughout most of the twentieth century (Meier, Minirth, Wichern, & Ratcliff, 1991, p. 152-153). Largely, this acceptance and use were influenced by the writings of Lewis Terman.

According to Terman, intelligence testing was the key to reducing crime, reducing prostitution, raising social morality, preserving the national gene pool, and identifying national leaders. Terman became highly visible in the mental testing movement. Eventually, Terman's work with the assistance of his students, was used by the United States Army to screen soldiers for service during World War I. After the war, Terman chaired the National Education Association's committee on the use of intelligence tests in changing elementary education. Terman assisted in completing

the use of standardized group intelligence testing in public education and programming to identify gifted students (Minton, 1905 & Terman, 1916).

There continued to be an overwhelming acceptance of the definition of intelligence based upon Benet's theory. His theory was supported by a 1981 study in which both psychologists and lay people agreed that intelligence could be divided into two categories: verbal ability and problem solving skills (Sternberg, Conway, Ketron, & Berstein, 1981, pp. 37-55).

The theory of Multiple Intelligences

With the publication of Frames of Mind: The Theory of Multiple Intelligences (1983), Howard Gardner revolutionized how many researchers viewed the subject of human intelligence. The essence of Gardner's theory centered on the premise that there is no single human intelligence. Rather, Gardner proposed human beings possess varying aptitudes in at least seven distinct intelligences; this has now been expanded to nine. The independent nature of each of the intelligences was emphasized by seven criteria: potential for isolation by brain damage; the existence of "idiot savants", prodigies, and other extraordinary people with aptitude for the intelligence; one or more information processing functions which deals with certain kinds of

input; an independent developmental sequence with an expected result; an evolutionary history and credibility; support from experimental psychology; support from psychometric testing; and proneness to being encoded in a system of symbols (Gardner, 1983, pp. 3-11).

According to Gardner (1983), intelligence is not just one construct, but it is multiple constructs. There is not one Intelligence, but nine Multiple Intelligences (Sternberg, 1994, p. 281). These Multiple Intelligences are: (1) Bodily-Kinesthetic Intelligence, used in athletics and in different forms of dancing; (2) Existential Intelligence, used in relating to the spiritual existence, was added as the ninth intelligence. (3) Interpersonal Intelligence, used in relating to others; (4) Intrapersonal Intelligence, used in understanding ourselves; (5) Logical-Mathematical Intelligence, used in thinking logically and in solving mathematics equations; (6) Musical Intelligence, used in singing, listening, and appreciating music; (7) Naturalist Intelligence, used in understanding and appreciating nature; (8) Verbal/ Linguistic Intelligence, used in reading and word games; and (9) Visual/Spatial Intelligence, used in arranging the physical environment (p. 281).

The first seven were part of Gardner's original concept, and the last two Naturalist and Existential have

been added since the mid-1990s (Sternberg, 1994, p. 281).

These intelligences are relatively independent of each other, although, they may be linked by higher order modules. If one accepts this theory, then conventional intelligence tests would be seen as being quite limited, because conventional intelligence tests focus on Linguistic, Logical-Mathematical, and Visual/Spatial Intelligences but measure little or nothing of the other six intelligences (Sternberg, 1994, p. 281).

Gardner tested his theory not by collecting experimental evidence in support of the theory but by reviewing diverse literatures relating to human abilities and finding results that are consistent with his theoretical proposal. For example, he believes the literature discussing brain functioning, “idiots savants”, and cognitive development supports his claims. When it comes to matters of definition as with the term “intelligence”, it is not clear that there are any empirical operation that can specify the right or wrongness of a proposal. However, there is certainly evidence to suggest the existence of the abilities of which Gardner speaks (Sternberg, 1994, p. 281).

To support MI theory, Gardner (1993a, 1993b) invokes the kind of evidence that range well beyond the traditional tests. His procedure included reviewing evidence from a

large unrelated group of sources (1) studies of prodigies, (2) gifted individuals, (3) brain-damaged individuals, (4) idiots savants, (5) normal children, (6) normal adults, (7) experts in different lines of work, (8) and individuals from diverse cultures. A preliminary list of candidate intelligences were partially validated by converging evidence from these diverse sources (Gardner, 1993, p. 9). Gardener was "convinced of the existence of an intelligence to the extent that can be found in relative isolation in special populations; to the extent that it may become highly developed in specific cultures; and to the extent that psychometricians, experimental researchers, and experts in particular disciplines can posit core abilities that, in effect, define the intelligence. Absence of some or all of these indices, of course eliminate a candidate (p. 9).

In a typical life, as Gardner will show, "these intelligences usually will work in harmony, and so their autonomy may be invisible. But when the appropriate observational lenses are donned, the peculiar nature of each intelligence emerges with sufficient (and often surprising) clarity" (Gardner, 1993, P. 9).

The primary educational implication of MI theory is that students differ from one another in their profile of intelligences, so they learn differently and must be

educated differently (Gardner, 1993b p. 228; Gardner, 1998 p. 101; Gardner, 1999a p. 72; 1999b pp. 45, 150, 154). This is the direct contrast of what Gardner (1999b) takes to be the traditional practice of teaching all students similar content, using similar methods and similar assessments (p. 150). Rather than urging a single MI approach to education, Gardner (1999b) has encouraged teachers to "let a hundred flowers bloom" (p.89). His own proposals (Gardner, 1999a, pp. 186-213; Gardner, 1999b, pp. 157-181) include assessing students' intelligences, using many different entry points when approaching new topics, teaching with metaphors and analogies, and multiple representations (Klein, 2003, p. 51).

MI theory has often been criticized both conceptually and empirically (Ericsson and Charness 1994; Klein 1997, 1998; & Sternberg 1983,). Many psychologists agree with Gardner on several concepts: (a) the mind has modules, some are assigned to specific content; (b) knowledge is essentially different in kind; and (c) people differ in their skills in various domains (Ericsson & Charness 1994; Guilford 1967; & Paivio 1986;). Many theories, however, are compatible with these claims. To support MI theory specifically, Gardner's challenge was to show that its specific claims are valid; that is, he needs to show that it

is the theory that best fits the available evidence. The specific claims are:

- That the mind consists of about eight modules, specific to the kinds of content that Gardner has proposed;
- That each of these intelligences coheres within itself (convergent validity); and
- That each is largely independent of the other parts (divergent validity). (Klein, 2003, p. 52)

Other Intelligence Researchers

Following Gardner's introduction of MI theory, other scholars began to seek specific applications for the theory. Among these scholars were educational specialists Thomas Armstrong and David Lazear. Armstrong's published work in the area of MI began in 1987 with the publication of In Their Own Way: Discovering and Encouraging Your Child's Personal Learning Style. Armstrong introduced MI to audiences by presenting the seven intelligences to parents as a means of understanding their childrens' learning strengths and weaknesses. Moreover, Armstrong (1987) surmised the combination of a person's strengths and weaknesses in the intelligences represents that individual's personal learning style (pp. 14-19).

Armstrong made the connection between the intelligences and an individual's preference for certain learning activities. For example, a linguistic learner learns best by

"saying, hearing, or seeing words" (Armstrong, 1987 p. 57). Therefore, learning activities that best address a heavily linguistic learner were proposed to be mainly dependent on these skills. Similar connections between certain skills and activities and each of the other intelligences were made throughout the book.

Armstrong presented his most significant contribution in the closing sections of the book. He asserted that any topic may be taught in seven different ways in order to address each of the seven intelligences (Armstrong, 1987, p. 66-67). This solidified the idea that teaching activities should be personalized to accommodate the needs of the learner, and the personalization should be based on the individual's intelligence profile (p. 67).

Following the initial work of Armstrong, David Lazear introduced two books. The first of these books, Seven Ways of Knowing: Teaching for Multiple Intelligences, was Lazear's (1991) attempt to aid educators in awakening, amplifying, teaching, and communicating the intelligences of their students. His goal was advanced by a presentation of each intelligence. Perhaps the most noteworthy of Lazear's contributions in the work was the clear, concise explanation of the relationship of human brain activity and function to each of the intelligences. This explanation of locations and

operations of brain function provided the physiological basis for Gardner's original argument regarding the potential for the physical "isolability" of each intelligence.

Lazear also continued the discussion of effective educational practices regarding the MI theory. He proposed that teachers should acquaint themselves with a variety of teaching techniques which he collectively called the "Multiple Intelligences Toolbox" (Lazear, 1991, pp. 170-173). The theoretical toolbox includes a set of 10 teaching activities or techniques related directly to each of the intelligences. In practice, Lazear advocated teachers building lesson plans by using at least one technique from each of the seven intelligence categories from the toolbox in each lesson (pp. 170-173).

To compliment the first book, Lazear (1991) produced Seven Ways of Teaching: The Artistry of Teaching with Multiple Intelligences. This book complimented the original toolbox concept, which was to apply MI to teaching. Lazear theorized four stages of the teaching and learning process: "awakening the intelligence, extending the intelligence, teaching for or with the intelligence in mind, and transferring the intelligence" (p. 3).

First, Lazear proposed that the intelligences were

related to the senses, and they could be activated by stimulating the senses. Second, once an intelligence was awakened through the senses, he believed the intelligence could be enhanced through regular use. Third, he asserted that appropriate classroom activities should be used both to exercise the intelligences and to communicate lesson material, goals, and objectives to the learner effectively. Fourth, lesson content should be taught in a form that most relates to the learner's intelligence strengths. This practice increases learning and transfer of lesson content to application. In the balance of the book, Lazear (1991) also presents lesson planning techniques using the MI toolbox as a source of teaching activities to accomplish these four stages of the teaching and learning process (pp. 3-106).

Armstrong made the argument that at least some teaching styles could be directly related to specific types of learners. Gardner's reply to this complex problem of learning style application came in the form of individual-centered instruction. Gardner believed teaching should be based upon and tailored to the complex intelligence profile of the individual and was the most effective and efficient way to teach (Gardner & Walters, 1993, p. 70-73).

Another Armstrong (1994) book, Multiple Intelligences

in the classroom, was the first of several books by various authors written for the purpose of suggesting appropriate lesson plans to be used in school classrooms. The common thread of all of these books was their overwhelming emphasis on teaching strategies.

As Gardner (1993) addressed the problem of assessment, he believed that formal education has drifted too far toward the extreme of standardized formal testing for the purpose of assessing progress and learning. A balance was proposed that maintained a place for formal testing while it equally emphasized the evaluation of curricular activities such as projects and portfolios (p. 179). A noteworthy implication of Gardner's thinking was the possibility of the development of standardized formal testing instruments for the assessing of MI.

Again following Gardner's lead, Armstrong (1993) sought to foster more popular interest and application of MI theory with the publication of his book 7 Kinds of Smart: Identifying and Developing Your Many Intelligences. The balance of the book was a simple but thorough examination of the seven intelligences that focused on the individual's ability to self-assess strengths or weaknesses regarding personal intelligences. The new contributions of Armstrong's work was evident when he addressed the issues of the

enhancement of weaker intelligences and the connection of intelligences to career issues and personal relationships. Armstrong's observations regarding the relationship of intelligences and career planning was particularly interesting. He believes that strengths in certain intelligences predispose individuals to greater levels of satisfaction and success or greater levels of unhappiness and failure in certain career choices. This reasoning opened the logical question of whether people of similar intelligences gravitate toward certain types of careers.

Other investigators have suggested the importance tasks for measuring intelligence (e.g., Cattell, 1971; Piaget, 1972; Raaheim, 1974). The idea is that a task that is totally novel such as calculus problems for a five-year-old is not a good measure of intelligence because the person has no cognitive structures to rely upon. Automatization, required in learning to read or to speak a foreign language, is also important for effectively functioning in everyday life. Without it, people could not adequately accomplish even the most common tasks, such as walking or driving (p. 282).

Multiple Intelligence Studies

Several empirical studies of MI theory require examination for the exact understanding of the state of

research. A qualitative study of the relationship of MI to the instructional process was completed by Sue Teele in 1995. The main purpose of this research was to examine the quality of the relationship of MI to instructional process. Four key components were found to be necessary to provide an environment where MI could be applied: "physical setting, organizational structure, human aggregate, and social climate." (p. 6). Components of the four factors were considered in the development of an interactive model of instruction that promoted a personalized learning environment for every student. In Teele's model, MI was the central component for designing curriculum and became the way to maximize achievements for individual students (p. 6). This study examined the relationship of MI to the instructional process. The next study examined the relationship of MI in adult literacy. The Adult Multiple Intelligences Study was the first organized effort related to Multiple Intelligences (MI) theory in adult literacy education.

Gardner purposes that every person has an MI profile which manifests as different areas of strength (Kallenbach & Viens, 2002). This research hypothesized that MI theory would be useful in responding to three well-documented needs and conditions in adult literacy education: (1) the high

incidence of learning challenges and low self efficacy among adult learners; (2)need to improve learner retention rates; and (3) limited professional development opportunities for adult literacy educators (Kallenbach & Viens, 2002).

This research was encouraged by positive experiences with MI theory at the pre-K–12 level and the lack of MI research, practices, and resources in adult literacy education (Kallenbach & Viens, 2002). Also considered was the following: How can MI theory support instruction and assessment in adult basic education (ABE), adult secondary education (ASE), and English for speakers of other languages (ESOL) programs (Kallenbach & Viens, 2002)?

Two qualitative research projects were incorporated focusing on applying MI theory in practice. The focus was on the second project which was a study across 10 different adult literacy programs with different teachers and learner populations. This study used methods such as on-site observations, qualitative interviews, and teacher journals (Kallenbach & Viens, 2002).

Data analysis reported two broad categories of teachers' understanding and application of MI theory, which was termed MI-Inspired Instruction and MI Reflections. MI-Inspired Instruction centered on classroom practices and materials, whereas the MI Reflections focused on using MI to

engage students in reflecting on their strengths, weaknesses, interests, and preferences (Kallenbach & Viens, 2002).

The findings suggested that the teachers' MI efforts rewarded with high levels of student engagement. Specifically, the choice-based activities—prominent in the study allowed students to identify, use, and demonstrate their certain areas of strength. This also increased their confidence about taking greater control of their learning (Kallenbach & Viens, 2002).

Measuring Intelligence

In the human sciences questions arise about the intellect, what it consists of, how it works, how it develops, and how to strengthen it? Addressing these questions invokes a second and ultimately more complex set of questions. How can human intellect be measured? How can it be to ensured that assessments are valid and reliable? Accordingly, scientifically oriented-theories of human intelligence are linked to a model of intellectual assessment (Torff, 2000, p. 345).

Recent historical critiques of the scientific study of intelligence show a dominant position; it is one favoring a general factor of intelligence ("g") and a particular brand of psychometric tests (e.g., IQ tests). Beginning with the

work of Alfred Binet in the early days of the twentieth century, researchers and educators have focused on a single flexible form of “general intelligence” thought to operate across the range of tasks and content areas. This emphasis on general intelligence has been accompanied by a set of measurements in the form of intelligence tests (e.g., Stanford-Binet, Otis-Lennon Scales). Patterned after the methodological rigor of "hard sciences" such as physics, intelligence testing involves pencil-and-paper instruments that make it possible for large numbers of individuals to be evaluated inexpensively and in a short period. In the wake of the original IQ tests, a variety of similarly crafted test instruments have been devised to evaluate school performance, employment aptitudes, and other outcomes (Torff, 2000, p. 345).

The traditional model of intellect and its assessment have been criticized. A number of researchers have put forth “pluralistic” theories of human intelligence that questions the explanatory power of “g” and asserts the existence of special purpose modules that govern thinking in specific content areas such as mathematics and spatial reasoning (Anderson, 1992; Ceci, 1996; Fodor, 1983; Guilford, 1967; Karmiloff-Smith, 1992; Thurston, 1938). In addition, psychometric tests have come under attack on questions of

validity, especially tests such as Scholastic Aptitude Test(SAT), that weigh heavily in educational decisions (Gardner, 1998). Moreover, questions arise concerning the extent to which tests capture the full range of human abilities in a valid and reliable manner. Among the more radical of these pluralist approaches, the theory of Multible Intelligences (MI) calls into question the explanatory value of "g" and the utility of traditional psychometric models of intellectual assessment (Gardner, 1983, 1993, 1998).

Questioning General Intelligence

Around the world, one sees a great many intelligent performances in action. Of course, what constitutes intelligent depends on the setting. An intelligent action in New York may do little good in the Himalayas. Only in a cultural context can intellectual activities be deemed valuable or intelligent. Accordingly, "MI puts forth a broad definition of intelligence: a psychological potential that can be activated to solve problem or fashion products that are valued in one or more cultural settings" (Gardner, 1983, 1993). The term intelligence is often used as a means of organizing and describing human potentials in relation to the cultural contexts on which they are developed, used, and given meaning (Torff, 2000).

To examine the full range of intelligence performances of which human beings are capable, Gardner conducted an extensive inventory that departs from traditional theory and research in intelligence (Gardner, 1983). Drawing on diverse sources of empirical evidence (e.g., brain research, studies of exceptional individuals, research on the development of specific cognitive capacities, and cross-cultural investigations of problem-solving), he specified eight criteria that must be met by a candidate for intelligence. This analysis yielded a list of eight relatively autonomous intelligences. They are autonomous in that one cannot predict strength or weakness in one intelligence from strength or weakness in another. Moreover, in practice, intelligences make use of some of the same processes (e.g, that musical rhythm has mathematical components. According to Gardner, it is unnecessary and misleading to suggest the complete autonomy of intelligences (Torff, 2000, p. 346).

Before discussing the criteria and intelligence however, it is important to note that MI is empirical through not experimental in the usual sense of the term. It is not the kind of theory that can be proved or disproved by a crucial experiment, but it is subject to supporting or invalidating evidence. MI works by establishing a set of criteria for what constitutes an intelligence; additional

information, experimental or otherwise, could have an impact on the resulting list of intelligences and the relation that obtain among them (Torff, 2000, p. 346)

Questioning Assessment of Intelligence

The heart of MI is the claim that apparent support for "g" may be an artifact of the procedures and instruments used in cognitive research. Psychometric tests are paper-and-pencil exercises that rely mostly on linguistic and logical-mathematical abilities. Accordingly, individuals who are strong in these areas perform well on tests of general intelligence, and individuals who are gifted in other areas typically perform poorly. Schools often place a premium on the mental abilities inherent in linguistic and logical-mathematical tasks, and, therefore, psychometric tests can predict school success with some accuracy. Predicting success outside the educational arena has proven more difficult for psychometricians. However, on average less than one-quarter of the variance in job performance is accounted for by scores on cognitive ability tests (Hunter & Hunter, 1984; Wigdor & Garner, 1982). In other words, three-quarters of the variance in job performance falls outside the skills captured on tests. Clearly, there is more evidence in adult success than the academic skills captured on psychometric tests (Torff, 2000, p. 348).

Results as such have prompted Gardner to question not just the utility of "g" but also the notion of psychometric testing as well. Hence, developing a set of eight assessment instruments with one for each intelligence, is not a very effective strategy. To start with, a single intelligence is an inappropriate unit of analysis for research on normal intellectual development. According to Gardner, single intelligences are visible only in exceptions ("freak") cases or in the cases of mental disease or other impairments which renders an intelligence apart from the rest and allow activity to take place that grows out of a single faculty. Research findings of exceptional cases provide a window on the structure of the human intellectual endowment. However, they do not present a solid indication of the way the intelligences work when unimpaired individuals combine them in activities. Difficult performances can be understood only by recognizing the combination of intelligences involved. For example, skill sets in the practice of law cannot be predicted by administering a battery of separate tests, one for each of the intelligences required by the discipline (e.g., Linguistic, Logical/Mathematical, and Interpersonal). Only an assessment that captures the combination of constituent intelligences can predict who will be successful (Torff, 2000, p. 348).

Not only is the single intelligence of limited use as a unit of analysis, but also certain intelligences are also difficult to test. The personal intelligence and musical or bodily expression are not well suited to direct testing. For example, it would be difficult to develop a valid test that captures the lawyer's skill in matters interpersonal (e.g., predicting a jury's response to a particular argument)(Torff, 2000, p. 348).

A departure from psychometrics as usual, MI calls for a tremendous shift in assessment practices. Today, there is the need for fair intelligence assessments that look directly at an individual's skill instead of through the window of Linguistic or Logical-Mathematical intelligence. Specifically, fair intelligence assessment has two requirements. First, procedures should be contextualized (or authentic), assessing individuals in situations that closely resemble working conditions typical of their work environments. For example, a better assessment of the lawyer's work should focus on activities specific to what lawyers actually do such as analyzing relevant facts in a case or interacting with clients and colleagues. Second, fair intelligence assessments are ongoing and are not a one-time shot. Even if tests could be devised to capture, for example the lawyer's work, a single test administration

could not capture long-term aspects of the target performance (e.g., degree of motivation or ability to bring difficult projects to fruition). Only by assessing the individual over time, using multiple measures, can a true measure be taken. The term performance assessment is often used to describe such contextualized and ongoing assessment procedures (Torff, 2000, p. 348).

Relation of Pluralistic Theories of Intelligence

There are some important contrasts between MI and other pluralistic models of human intelligence. In particular, MI differs from multifactorial approaches to intellect such as those of Anderson (1992); Guilford (1967); or Thurstone (1938). First of all, these models do not share MI's rejection of general faculties such as perception and memory, which may cut across content areas. Multifactorial theories typically combine general faculties with those that reflect a content area such as spatial or linguistic abilities. Second, multifactorial approaches provide limited role for development while MI assumes important developmental changes of the intelligences. Third, unlike MI, the multifactorial approach is definitely psychometric. It focuses on the correlations among test scores and, therefore, makes little contact with evolutionary biology or studies of human culture. Finally, the multifactorial

approach does not allow the full scope of intellectual competencies to be considered. “Drawn from research methodologies that focus on paper-and-pencil tests or brief interviews, these approaches are precluded from examination of an individual’s competence in a number of faculties, such as personal intelligences and musical or bodily expression (Torff, 2000, p. 348).

MI is somewhat more comparable with pluralistic theories proposed by Kamiloff-Smith (1992) and Ceci (1996). These models share with MI a doubtful view of the explanatory power of “g”, a development perspective, and the view that human intellect must be explained in relation to the ambient cultural context. In addition, Gardner (1992) concurs with Karmiloff-Smith that at least one strand of development moves in the direction that are increasingly modular. What Gardner has termed later developing modularity (the development of expertise in domains) is congruent with Karmiloff-Smith’s notion of modularization (Torff & Gardner, 1999). However, MI differs from Karmiloff-Smith’s model. Specifically, MI requires no domain-general processes such as the “representational redescription” specified by Karmiloff-Smith.

MI is very similar with Ceci’s bio-ecological concept of intelligence (Ceci, 1996). His model calls for multiple

cognitive potentials, as does MI, which goes on to specify a set of intelligences according to precisely stated criteria (Torff, 2000, p. 349).

Educating the Intelligences

Multiple Intelligence was referenced as a psychological theory and not as an educational one. However, the theory has a number of implications for educational practices. Initially, it is imperative to view the intelligences as means and not as an ends. The first order of business in education is the goal that the culture or community thinks is important. Once this is specified, it becomes possible to analyze the intelligences that are typically involved and to design vehicles for curriculum and assessment. For example, the ability to write distinctly is a valued skill, and whereas Linguistic Intelligence is in the forefront, writing also involves Logical/Mathematical, Interpersonal, and Intrapersonal Intelligences. An educational design should address all these intelligences not as goals themselves but as the pillars that support the valued target skill, writing ability. In short, the sensible policy involves teaching through and not for intelligences (Torff, 2000, p. 349).

Second, MI calls for educators to provide multiple entry points to learning. This offers learners a variety of ways to approach subject matter. For example, learning

history by reading a text may be effective for students strong in Linguistic Intelligence, but other students flourish when the curriculum is expanded to include activities that draw on other intelligences, such as, drawing maps and writing plays. Providing multiple entry points produces a learning environment conducive for students with diverse profiles of intelligences.

Finally, MI asks educators to reconsider "factory" approaches to education in which groups of students engage in the same activity and instead to place greater emphasis on individual-centered instruction. Specifically, it can be beneficial to design individually designed "bridging activities" for students, especially those at risk for school failure. Bridging activities draw together intelligences in which the student is stronger with those that are weaker so that the weaker areas are strengthen through activity sustained by the stronger ones.

Multiple Intelligences can inspire creative and effective vehicles for curriculum development strategies. However, it is in assessment that the theory's most important educational implications lie. In essence, the theory encourages educators to reconsider the current extensive relevance on standardized tests. These tests limit students by capturing too narrow a range of intelligences

and working in a decontextualized and single manner. Moreover, since test scores are so highly prized, there is a focus in schools to boost scores by "teaching the test," often reducing education to memorization of target facts. MI encourages educators instead to turn to fair intelligence assessments that capture intellectual achievements in context and over time (Torff, 2000, p. 349). "The theory of Multiple Intelligences has proved to be enormously successful in capturing the attention both of the psychological public and of the public in general" (Reynolds & Miller, 2003, p. 35).

When Gardner proposed his theory of Multiple Intelligences, there was the inevitable mixed reception that accompanies any new and innovative theory. Since Gardner presented no new research designed specifically to test his theory, the theory was viewed as rather speculative. Therefore, the criticisms of the theory were speculative as well. The universal hope and expectation was that with time and specific tests conducted of the theory, it would be possible for both theorist and critics to become more concrete (Reynolds & Miller, 2003, p. 35).

As Gardner (1983) referenced in his book, his own attention turned to educational interventions, and apparently others did also because the number of educational

interventions is indeed impressive. Many psychologists and educators are pleased that a promising theory of intelligence is being recognized, acclaimed, and implemented (Reynolds & Miller, 2003, p. 35).

Identifying MI

Deborah Bordelon Rivera sought to establish the validity and reliability of an MI assessment instrument in a 1996 study. The goal of this study was to identify an instrument that could be used by teachers to observe and assess the MI profile of their students. Rivera used both MI literature and a series of invalidated MI checklists to develop her instrument, The Multiple Intelligences Inventory for Teachers. There was a pilot test conducted with 388 teachers from the Jefferson Parish School System in Louisiana. Of the instruments distributed, 306 were returned and considered eligible for inclusion in the survey. There were 131 eligible fourth grade and 175 fifth-grade students included for examination (Rivera, 1996, p. 66). A factor analysis was conducted on the surveys that were completed. A minimum factor of .40 was used to indicate association with a factor. A seven factor solution was determined to be the most understandable solution, and the factors were extracted and named (Rivera, 1996, pp. 78-79). The seven factors extracted in the solution did not completely match the

theoretical factors proposed by Gardner. However, they did correspond with aspects of MI theory (Rivera, 1996, p. 118). Rivera concluded that with additional refinement and further testing, this instrument could be established as a valid and reliable measure of MI (Rivera, 1996, pp. 142-143).

Another 1996 study investigated the validity and reliability of several MI assessment instruments. These instruments were teacher checklists, performance-based assessment activities, and MI inventories. Only four intelligences were used as from these instruments: Spatial, Logical/Mathematical, Linguistic, and Interpersonal. Factor analysis was used to determine the presence of the four intelligences in the series of measurement activities. A minimum loading requirement of .40 was required for inclusion of a variable in the interpretation of a factor. Reliability values for the factors of all four intelligences were extensive. Two subscales, Linguistic and Logical/Mathematical were confirmed to be present by factor analysis, but the lack of evidence for the other subscales indicated a need for further development of the instruments before application (Plucker, Callahan, & Tomachin, 1996, pp. 81-89). The inclusion of only four of the seven intelligences represented a major deficiency in this study. While results of this study indicates the promise of

developing an MI assessment instrument, this study must be recognized as only the initial point in the process.

The most useful MI assessment instrument developed to date began with a 1994 study by C. Branton Shearer and James A. Jones. The Multiple Intelligence Development Assessment Scales (MIDAS) provides an efficient method of obtaining a descriptive assessment of a student's MI profile. The Profile outlines the results of a self-report measure of intellectual disposition. Originally, the instrument was created to measure the premorbid intellectual profile of brain-injured individuals through an interview with family members. Later the MIDAS was modified to serve as an assessment tool for measuring the MI profile of a respondent by either a self-report or by the report of a knowledgeable informant (Shearer, 1996, p. 7).

A comprehensive testing process was conducted throughout the development of the MIDAS. Pilot testing of the instrument yielded 84 items that were considered reliable for both test-retest and inter-rater reliability. Inter-rater reliability refers to a study of the agreement among the responses of two or more informants with regard to a particular individual on a certain question or factor. The rationale for this type of testing was that if two or more raters were able to agree within a reasonable rate of error,

then the MIDAS was more than likely describing the designed construct (Shearer & Jones, 1994, pp.4-8). Factor analysis was performed on these items, and a solution of eight factors was specified. The first seven of the factors corresponded nicely to Gardner's seven theoretical intelligences. The eighth factor was composed primarily of questions from the Interpersonal and Linguistic scales and was referenced as leadership (Shearer & Jones, 1994, pp. 4-8).

A second study was conducted to revise and refine the instrument. First, the revisions involved the readability of the instrument. The research used adults to uncover readability issues. These adults were recruited from a vocational counseling program. Initial revisions were made based on the findings of this readability examination, and then the instrument was reviewed by both a cultural anthropologist and Howard Gardner. Twenty new items were then added based on their input (Shearer, 1996, p. 64).

The third study focused on inter-rater reliability of the factor scales and the creation of 24 new subscales within the 7 intelligence item sets. The fourth and final study included 224 college students. At this point, the instrument had evolved to include use as a self-report measure of MI. "The internal consistency of the items within

each scale ranged from mean Alpha coefficients of .76 to .85 with an average consistency of .83. Inter-rater measures of reliability revealed only five items with less than a 65 percent rate of agreement between informants." These five items were either removed or revised (Shearer, 1996, pp. 65-67).

With validity in mind, discriminate and convergent validity were investigated for the Midas. The results indicated that the MIDAS scales possessed sufficient ability to discriminate for the areas they proposed to measure. There was further testing done to correlate the MIDAS scales with objective tests that measured similar or related constructs. Correlations were satisfactory to meet or exceed research expectations and to validate the results further (Shearer, 1996, pp. 70-73). In the final stage, the predictive validity was assessed by comparing the college students' self-report scores with ratings reported by their instructors. "The result was that student and instructor ratings agreed a mean of 86 percent of the time. These findings indicated an adequate predictive value for the instrument" (p. 74). However, Shearer advised that further revisions may be undertaken to improve the measure of internal validity (Shearer, 1996, pp. 74-75).

The final product in this process was an instrument

named the MIDAS. It is a MI profile measurement instrument that may be completed by the research subject as a self-report assessment. The produced results of the MIDAS were calculated by computer scanning of respondent score sheets by the creator. These results were presented in the form of both a raw score and a scaled score for each of the intelligences.

Another MI survey was created by Walter McKenzie, of Surfaquarium Consulting. In researching the validity and reliability of his instrument, Mr. McKenzie advised that he resisted the temptation to translate his ideas into psychometric terms. He advised that his survey was a snapshot in time of a subject's MI preference. He considers that this is not a test and therefore, no data has been collected (http://surfaquarium.com/MIinvent.htm).

In summery, the Multiple Intellignces theory presents a concept of intelligence. Many researchers have began to seek specific applications for the theory. While others have criticized the concepts of MI. Several studies have been conducted to apply the practice MI theory.

It is important to acknowledge the there are various types of MI instruments currently being used in the field. However, just a few have established some level of validity and reliability. Midas has done a good job establishing

validity and reliability. However, access to MIDAS is expensive and not very practical for practitioners.

Adult Learning

During the 1970s and 1980s, there was a shift from adult education to adult learning. This shift indicated the transition toward a field of study with the focus on the individual learner (Fellenz & Conti, 1989, p. 1). The critical part of the teacher-learning process is “how the learner is aided to embark on this active, growing, changing, painful, or exhilarating experience we call learning” (Kidd, 1973, p. 14).

Tough (1971) had a major effect on how the Adult Education field viewed learning by providing early insights into what he described as "a major, highly deliberative effort to gain certain knowledge and skill (or to change in some other way)" (p. 1). Tough studied and interviewed adults engaged in learning projects in groups, private lessons, and self-planned learning. He attempted to answer "what and why adults learn, how they learn, and what help they obtain" (p. vii).

Tough concluded that adults learn in many ways. Adults accomplish learning projects in stages, and deciding and planning are important elements of the process. Tough’s

interviews with learners also included several 10-year-old and 16-year-old students, and he concluded that their "out-of-school learning is extensive, and is similar in some ways to adult learning" (p. 4).

Learning strategy research is seeking answers to describe elements of the deciding and planning processes. While the research is now focused on adults, it may soon lead to additional developments to assist all levels of learning. One result of focusing on adult learning rather than teaching has been an increase in research "on helping learners to expand their learning abilities through 'learning-how-to-learn' interventions" (Knowles et al., 1998, p. 66).

Andragogy

Andragogy is the art and science of facilitating adult learning (Knowles, 1980, pp. 43-44). This concept should be used to direct instructional design. As adults mature, they move along a continuum of becoming less dependent on the instructor. Adults become progressively self-directed and autonomous. Individuals move along this continuum at independent learning rates. The life experiences of adults become immense learning assets. Adults are typically ready to learn when an issue or incident becomes meaningful and applies to them. Adults' social roles also motivates their

need to learn. Adult learners aspire to progress or become more knowledgeable in their areas of interest. As people mature into adulthood, they begin to analyze themselves. They are no longer just learners, but they become contributor to their communities. They want to immediately implement what is learned to their everyday lives. Educators of adults have an enormous responsibility to know exactly where learners are on the continuum of autonomy to promote and cultivate self-directed learning.

Knowles expanded on his original assumptions about androgogy by adding two more assumptions to these initial assumptions in his later writings. In 1984, he wrote that the impetus for adults to learn is driven by internal not external factors (p. 12). A sixth assumption was added in 1990 regarding the magnitude of adults knowing why they were required to learn content material (p. 57). If adults cannot establish the gravity or significance of the knowledge or skill, they probably will not see the need to learn information simply to complete a requirement (Davis, 2000).

From these assumptions of andragogy, Knowles (1980) presents detail recommendations and applications to planning education programs and learning opportunities for adults. Initially, the facilitator must establish an environment that is conducive to learning with regard to both physical

and psychological qualities. Physically, the environment should be engineered so that learners are comfortable in the seating, temperature, and lighting. Efforts should also be made to arrange seating to enhance group and personal interaction while maintaining group sizes that are appropriate for learning.

Psychologically, the environment should be welcoming for adult learning from the moment the learners enter the setting (Knowles, 1989). This includes fostering an atmosphere of mutual respect. Fostering mutual respect can be done by demonstrating an accepting attitude that the learner's experiences are valuable. Also, mutual respect can be garnered by actively listening to all individuals. The learning environment should be safe, encouraging, friendly, and collaborative. The environment should promote mutual trust and responsibility from all participants. The learning environment should also be learner-centered instead of teacher-centered (Knowles, 1980, p. 223).

The second step in program planning in andragogy is mutual planning of learning activities by the learners and instructors. Research has found that adult learners are more committed and genuinely invested in goals and activities that they take part in planning. Techniques to employ mutual planning include permitting small groups to plan class

activities with coordination by the facilitator, using subcommittees and designated representatives, and having topics reviewed by the group for final decisions (Knowles, 1980, p. 226).

Kidd (1973) wrote that the scope of learner dependency on the facilitator is extensive, particularly when choosing learning objectives and curriculum (p. 271). Adult learners may need some assistance at the beginning of the learning activity. Assuming educational control may first be a new and uncomfortable experience for the adult learner; however it is productive because it encourages the learner to be responsible for the direction of learning activities. The third stage of program planning for adult education is for the adult learners to take part in assessing their own learning needs. A learning need is "a need in the sense that the learner lacks some information or skill that it is assumed he should have, or that is enjoyed by most members in society" (Kidd, 1973, p. 271). Learning needs may be associated to such things as family, health, community, hobby, consumerism, profession, or faith (p. 272). When adults assess their own learning needs, their incentive to learn becomes more personal and will assist them in focusing their own learning (Knowles, 1980, p. 227). When adult students have an opportunity to identify their Multiple

Intelligences, it may assist them in assessing their learning needs.

The fourth step in program planning is to plan the course of the learning activity. Participants are encouraged to identify objectives that have special meaning which will assist them in directing their own learning (Knowles, 1980, p. 234). Adult students who are motivated may be encouraged to identify learning goals that are specific to their Multiple Intelligences.

The next two stages of program planning relate to developing the design and operation of the learning activities. Some scholars promote organizing the curriculum with sequence, continuity, and integration of essentials (Knowles, 1980, p. 235). Knowles (1980) promotes dividing up learning activities based on the natural sequence of the small group meetings, social interaction periods or specified tasks (p. 236). There are various approaches that may be used to introduce material including whole group meetings, reading times, individual sessions, and activities outside of the classroom (pp. 236-237).

It is also vital in andragogical program planning to adjust the teaching technique to the desired outcome. For example, when discovering new skills, role playing and engaging in practicing the activity in movement may be the

most successful manner of delivery (Knowles, 1980, p. 240).

Assessing and re-evaluating the needs of the learner is the final step in program planning in the andragogical model. This encompasses measuring changes from the initial performance, determining how and if the learning is progressing, and determining if another direction should be chosen (Knowles, 1980, p. 47).

Learning How to Learn

A leader in learning how to learn research, Smith (1982) acknowledged that this concept has different meanings to different writers. Smith (1982) preferred the broad definition which is learning how to learn involves possessing, or obtaining, the knowledge and skill to learn effectively in whatever learning circumstance one encounters (p. 19).

The learning how to learn concept is a well documented and important contribution to the field of Adult Education and adult learning. It is a process that "involves possessing, or acquiring, the knowledge and skill to learn effectively in whatever learning situation one encounters" (Smith, 1982, p. 19). More precisely, if learners develop a self-awareness and self-understanding, they have learned how to learn (p. 57). Similarly, with instrumented learning, individuals that possess and comprehend their behavior

through the use of instruments are empowered to learn how to make self-change for the better (Blake & Mouton, 1972a, p. 114).

Though defining it is a challenge, understanding the concept of learning how to learn is important to the field of Adult Education for it "holds great promise for helping adults expand their learning effectiveness" (Knowles et al., 1998, p. 166). Thus, understanding the concept of learning how to learn is more important than establishing a definition. Learning how to learn occurs in everyday lives, yet little research about learning how to learn outside of formal educational or organizational settings exists. Much of the research related to learning how to learn (Smith, 1982) involves college students' meta-cognitive processes (Brookfield, 1986). Rather than focusing on traditional school settings, learning to learn should be viewed as an assignment for life (Brookfield, 1986). Smith cautions against any attempt to shorten the phrase learning how to learn by eliminating the word "how" (Smith, 1976, p. 5; Smith, 1982, p. 19). Shortening the phrase learning to learn may be easier to write and speak but "loses some of the impact and flavor useful in calling attention to the concept and its importance" (Smith, 1982, p. 19). The inconvenience of using "how" is in the final analysis, the matters under

consideration include also learning what, why, when, and where to learn (Smith, 1976, p. 5). An understanding of the three closely related subprocesses are important to better relate it to the process of learning with instruments.

There are three components necessary to understand the concepts of learning how to learn. They are the learners' needs, learning style, and training. These interrelated components support the concepts of learning how to learn (Smith, 1982, p. 17). The learners' needs are typically a general understanding of learning. This includes their fundamental skills of reading and writing, self-knowledge, and learning process skills in self-direction, collaboration, and institutional learning methods (pp. 20-22). The learners' learning styles are the ways that people differs as they reason, approach problems, and process information during a learning activity (p. 23). Training applies to deliberate efforts to help people become better at learning and more successful in the educational setting.

Learning style is "the individual's characteristic ways of processing information, feeling, and behaving in learning situations" (Smith, 1982, p. 24). Learning styles tends to be different with adult learners. Consequently, using instruments to assess those differences are important for programs in their planning, teaching, and learning (p. 24).

The third subconcept of learning how to learn is training. Training refers "to deliberate efforts to help people become better at learning and more successful in the educational arena" (Smith, 1982, p. 25). The force behind instrumental learning is to aid or train "individuals to better understand themselves as learners and to adapt to any learning situation for successful application to professional practice" (Bryant, 2002, p. 99).

Smith outlined several examples of when he considered the learning how to learn concepts to be functional. Among them is "when a person decides to better organize the learning projects he or she carries out at home" (p. 20). This concept of learning how to learn is fundamental to learning strategy preference research.

Self-directed Learning

Knowles (1975) was an advocate of self-directed learning. He defined self-directed learning as:

> A process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. (p. 18)

Knowles advised that self-directed learning is the best method by which to learn. Instructors assisting learners to become self-directed should be part of all teaching (p. 18).

Much has been said regarding self-directed learning and its objectives. Researcher often define the objectives of self-directed learning with respect to the researchers' certain philosophical position (Merriam & Caffarella, 1999). Published writings on self-directed learning can be characterized into three groups; these groups are (a) to strengthen the ability of adult learners to be self-directed, (b) to elevate transformational learning as key to self-directed learning, and (c) to stimulate learning and social action as part of self-directed learning (p. 290). The position of the first group is "grounded primarily in the assumptions of humanistic philosophy, which posits personal growth as the goal of adult learning" (p. 291). Scholars who share this philosophy of self-directed learning include Knowles (1975, 1980), Maslow (1970), and Rogers (1969). The research in this group describe learners as embracing responsibility, as being proactive, as being self-sufficient, and as having free will to make personal choices.

The position of the second group which focuses on advocating transformational learning as central to self-directed learning is based upon the work of Mezirow (1985) and Brookfield (1985, 1986). Mezirow (1985) states that self-directed learning only happens when participants are

can freely compare interests and make appropriate revisions. Brookfield's work in this are a calls for the integration of self-directedness and reflection (Merriam & Caffarella, 1999, p. 291).

This self-directed learning takes place when participants obtain meaning through a blend of process and reflection (Merriam & Caffarella, 1999, p. 291). Brookfield distinguishes between two forms of self-directed learning. The first type uses methods including specifying goals, identifying resources, implementing strategies, and evaluating progress for seeking out and processing information. The second type of self-directed learning can refer to a particular internal change of consciousness (p. 291).

Brookfield's second type of self-directed learning can be found in the aim of the third category of encouraging learning and social action (Merriam & Caffarella, 1999, p. 292). Brookfield suggested that specific political atmosphere must exist for the true practice of self-directed learning and that shifting to self-directed learning in a highly controlled culture such as some educational institutions would be arduous (p. 292).

Real-Life Learning

Vital to the concept of learning is the construct of

real-life learning. As important as formal education is, it is more valuable for adult learners to "learn on an ongoing basis in everyday, real world situations" (Kitazawa, 1991, p. 31). As the field of Adult Education has (a) moved toward an emphasis on individual learning rather than an organized educational programs, (b) seen the continued development of the concept of andragogy, and (c) seen the increased emphasis on the concept of self-direction in learning and learning how to learn, it “has witnessed a growing emphasis on learning in real-life settings” (Fellenz & Conti, 1989, p. 23). Real-life learning means having the facility to learn on an habitual basis in every-day, real-world situations. This learning transpires from the learner’s actual real-life circumstances and requires a grasp of such "personal factors as the learner’s background, language, and culture as well as social factors such as poverty and discrimination" (p. 25).

This construct of real life learning "has been used to distinguish typical adult learning from the academic learning of formal situations that is usually spoken of as studying or educating" (Fellenz & Conti, 1993, p. 3). Considerable differences exist between real-life dilemmas and problems found in formal education (Fellenz & Conti, 1989; Sternberg, 1990). In real life, learners must

acknowledge that a problem exists and have the capability to identify and resolve it without the assistance of an instructor assistance (Sternberg, 1990, p. 35). Real-life problems are unstructured, connect directly to the learners' lives, and have multiple solutions which are in contrast to the rigid, out-of-context, single-answer problems of formal education (pp. 37-39). Learners in academic environments are seldom challenged to probe their beliefs, and the feedback they receive is well-defined and instantaneous. On the contrary, real-life learning participants frequently receive feedback in a muddled, untimely, and objectionable manner (pp. 39-40). Real-life problems are rarely resolved individually unlike the individual problem-solving concentration of traditional educational settings (p. 40). Thus, "the real-life learning tasks of adults are distinct for each individual, seldom follow a clear pattern, defy measurement, and often are so episodic in nature that beginnings, patterns, and outcomes are impossible to define" (Fellenz & Conti, 1989, p. 4).

Learning Styles

Henry David Thoreau said, "If a man does not keep pace with his companions, perhaps it is because he hears a different drummer. Let him step to the music which he hears, however measured or far away" (Guild & Garger, 1985, p.

vii). The fact that people learn differently is ancient, and learning styles reveals a conflict of terminology. The term probably had its beginnings with the Greeks (Diaz & Cartnal, 1999). The concept of learning styles appears in the literature as one approach to consider when individual differences in learning are of concern.

Research in cognitive style appears often and is used interchangeably with the term learning style. Cherry (1981) reports:

> During the winter quarter of 1980, a group of potential learning style researchers at the University of Tennessee, Knoxville met weekly to discuss the general thrust and results of past research in the area of personal learning style. It was decided that the most logical and appropriate overall term for this field of study was "Learning Style." Additionally, secondary levels of the pattern were labeled "Modalities." The original four modalities identified were: Perceptual, Cognitive, Emotional, and Social. (p. 26).

Learning styles are "personal qualities that influence a student's ability to acquire information, to interact with peers and the teacher, and otherwise to participate in learning experiences" (Guild & Garger, 1985, p. 41). A person’s learning style is the individual’s unique way of processing information, feeling, and behaving in certain learning conditions (Smith 1982, p. 24). Knowledge about ones’ learning styles is also a means to help learners learn how to learn. There are three steps which must be taken to

develop activities using concepts of style. First, there must be an awareness and knowledge of the concepts, ideas, and issues. Individuals should possess a clear, personal understanding of style. Second, once the individual is aware of style differences, there must make an obligation to respect and honor individual diversity. For many learners and educators alike, it may be easier to accept individual diversity in theory than in practice. After awareness and personal commitment, the third and final step is for each individual to develop a plan of action and ask fundamental questions about the implications of style (p. 24).

The term learning style "surfaced when researchers began to look for specific strategies for combining course presentation and materials to match the particular needs of each learner" (Claxton & Murrell, 1987, p. 71). "A widely accepted definition of learning styles refers to characteristic cognitive, affective, and psychological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment" (Keefe, 1979, p. 4). Thus, "learning styles are stable individual differences in cognition and personality" that influence the ways which individuals learn and perform (Messick, 1976, p. 2).

The fact that people learn differently is an ancient

idea formulated over 2,500 years ago. At that time, people were seen as active or passive and as emotional or thoughtful (Fizzell, 1984, p. 304). Numerous researchers have examined a variety of learning style elements. German psychologists Guild and Garger examined cognitive style at the turn of the century. Carl Jung's work on "psychological types" first appeared in 1921. Gordon Allport embraced the word "style" to refer to steady patterns on the part of individuals. Klein (1951) identified "levelers," who retreated from objects and avoided competition and "sharpeners" who were more competitive and had a strong need for attainment and autonomy (Claxton & Murrell, 1987, p. 3).

A cross-reference matrix of 62 learning style elements presented by 18 writers indicated that more than two-thirds (13) of the writers failed to define elements in common with other authors of the group (Oen,1973). Only 7 of the 62 elements were duplicated by more than one of the authors (Oen, 1973). Style elements examined by this study were visual, oral/aural, physical/tactile, perceptual/conceptual, auditory, olfactory, and kinesthetic.

Research of learning styles reveal a conflict of terminology and contradictory findings. This may be because learning style has been addressed by researchers in various disciplines who were asking different questions and focusing

on different aspects of the learning process (Claxton & Murrell, 1987, p. 4).

Personality Learning Style Models

Learning style research models can be divided into four areas: personality models, information processing models, social interaction models, and instructional preference models. There are several instruments based on personality models. Field dependence and independence is a personality model researched extensively by Witkin. The culmination of several years of Witkin's research resulted in the publication of the 1954 report, Personality Through Perception. The instruments used to study field dependence-independence are the rod-and-frame test, the body-adjustment test, and the embedded-figures test (Witkin, 1976).

Studies in academic contexts show that field dependence-independence is a significant variable in a student's selection of major, course, and career (Claxton & Murrell, 1987, p. 8). Critics of the Witkin's model highlight the negative-sounding traits in field dependents. Since women tend to be field dependent more than men, "some people view the description of this style as sexist" (Claxton & Murrell, 1987, p. 12).

The Myers-Briggs Type Indicator (MBTI) is an instrument

that was designed to facilitate the application of Jungian theory in counseling, education, and business. Jung's theorizes that people can perceive the world in the two distinct ways of sensing or intuition and "that people use two contrasting ways to reach conclusions and judgements, thinking and feeling" (Claxton & Murrell, 1987, p. 13). In addition, an individual's preference for extraversion or introversion, and whether a person's attitude is judging or perceptive about life, is included (p. 13).

Another personality model examines reflection versus impulsivity. "This model refers to the tendency (in problems with highly uncertain responses) to reflect over alternative solution possibilities, in contrast with the tendency to make an impulsive selection of a solution" (Claxton & Murrell, 1987, p. 16). The tools used to measure this tendency include the matching-figures test and the identical pictures test (Claxton & Murrell, 1987).

The Omnibus Personality Inventory is another instrument that provides a comprehensive look at personality. The University of California at Berkeley used this inventory to measure the intellectual, interpersonal, and social-emotional development of college students. This instrument has 14 scales "that measure different modes of thinking, handling feelings and impulses, and ways of relating to self

and others" (Claxton & Murrell, 1987, p. 18).

The Holland Typology of Personality was originally developed for use in career development and to understand more about the environmental preference in the workplace. This typology identifies six personality types: realistic, investigative, social, conventional, enterprising, and artistic.

Information Processing Learning Style Models

The second area of learning style models includes the information processing models. The research of Pask (1975, 1976) identifies two types of learners: holists who use a global approach to learning and serialists who focus their attention on pieces of information low in the hierarchical structure (p. 21). Siegel and Siegel (1965) examined a cognitive style referred to as "educational set", a continuum "ranging from a preference to learn factually oriented material to a preference to learn conceptually oriented material" (Claxton & Murrell, 1987, p. 23). Ausubel (1963) purports it is best for all learners to learn concepts first, which then serve as an anchor for subsequent learning. Siegel and Siegel (1965) believe this only holds true for those learners whose educational sets are congruent with this subsumptive approach (p. 23). Schmeck (1981) identified two styles in terms of how individuals process

information: “deep-elaborative” processors and “shallow-reiterative” processors. Schmeck (1981) defines learning style as "a predisposition" on the part of some learners to adopt a particular learning strategy regardless of the specific demand of the learning task. Thus, a style is a "strategy that is used with some cross-situational consistency" (Claxton & Murrell, 1987, p. 24).

Another information processing model was developed by Kolb (1984). This model differs from the other information processing models in that it was developed from Kolb’s “experiential learning theory." This theory examines not just style but also learning and development. Kolb’s theory is based on the work of three researchers: Dewey (1938) who stressed the need for learning to be based in experience, Lewin (1951) who emphasized the importance of learners being active in learning, and Piaget (1952) who presented intelligence as being the outcome of the interaction of the individual and the environment (Claxton & Murrell, 1987, p. 25) .

The Learning Style Inventory conceptualized by Kolb describes learning as a four-step process. First, learning begins with a concrete experience. Learners involve themselves totally in the learning experience and then they reflect on the experience from different perspectives. After

these reflective observations, learners move on to engage in abstract conceptualization where they create observations into sound theories. The next step involves generalizations or principles that integrate their the learner's use of these generalizations or theories as guides to further action. Lastly, the learners engage in active experimentation, testing what they have learned in new, more complex situations. The end result is another concrete experience, but it is at a more complex level (Kolb, 1976). The four points on the experiential learning cycle are modes of dealing with information or adapting to the world. Kolb (1976, 1985) developed the Learning Style Inventory in which participants rank order 9 sets of four words (the 1976 version) or 12 stem completions (the 1985 version) concerning learning preferences. Similar to Kolb's model, Antony Gegorc (1979) believes that learning styles result from innate predispositions and that people learn both through concrete experience and abstraction (Claxton & Murrell, 1987, p. 33).

Social Interaction Learning Style Models

Mann (1973) conducted research on four undergraduate classes at the University of Michigan and developed a social interaction model which includes eight clusters. These clusters were as follows: the complaint students, the

anxious dependent students, the discouraged workers, the independent students, the heroes who felt superior to the rest of the group, the snipers, the attention seekers; and the silent students (Claxton & Murrell, 1987, pp. 38-39).

Various learning styles evolved from examining the learners' attitudes towards the different elements and participants in the learning process. One study examined the attitudes of learners toward learning, learners' views of the teacher and peers, and learners' interactions to classroom procedures (Grasha & Reichmann, 1974). The following learning styles were developed: independent students, dependent students, collaborative students, competitive students, participant students, and avoidant students. The Fuhrmann-Jacobs model involves three styles: dependent, collaborative, and independent. The Eison model examines students' attitudes toward grading and learning (Claxton & Murrell, 1987).

Instructional-Preference Models

Instructional-preference learning style models are concerned with the students' preferences for particular teaching methods. Hill (1973) believed that "it was possible to develop an underlying structure and scientific language for education" (Claxton & Murrell, 1987, p. 47). Hill (1973) developed educational sciences, which included: "(a) symbols

and their meanings; (b) cultural determinants of the meanings of symbols; (c) modalities of influence; (d) biochemical and electrophysiological aspect of memory concern; (e) cognitive style; (f) teaching, counseling, and administrative style; and (g) systematic analysis decision making" (Claxton & Murrell, 1987, p. 47).

Canfield (1980) developed the Canfield Learning Style Inventory, which was based on Maslow's hierarchy of needs and McClelland's research on achievement and motivation. The first area was concerned with the condition of learning. The second area examines the students preferences in the area of content. The third area evaluates the students' preferences in terms of mode: listening, reading, iconic, and direct experience. The final area examines the students' expectations about the grades students expect to receive.

Rita and Kenneth Dunn have researched learning styles extensively. The Dunns (1974, 1975) describe learning styles as the manner in which at least 18 different elements of 4 basic stimuli affect a person's ability to absorb and to retain information, values, facts, or concepts (Guild & Garger, 1985, p. 44). Environmental, emotional, sociological, and physical factors make up the four basic stimuli. Citing recent studies, the Dunns (1982) emphasize that (a) students can identify their own strong style

preferences, (b) teaching through learning styles increases academic achievement and improves students' attitudes toward school, and (c) learning style is often stable over time and consistent across subject areas (Guild & Garger, 1985, pp. 46-47).

Learning Strategies

The use of learning strategies is a way to learn how to learn. Because of the uniqueness of individuals, differences in how one conducts learning activities is expected. These differences in how individuals approach learning have been referred to as learning styles and learning strategies. Learning strategies are the techniques or skills that an individual elects to use in order to accomplish a learning task (Fellenz & Conti, 1989, p. 7). Furthermore, learning strategies are more a matter of preference; they are developed throughout life and vary by tasks (Fellenz & Conti, 1993, p. 4). Learning strategies are different from learning styles in that styles are a more permanent characteristic of the individual that does not change easily (Keefe, 1982).

The use of learning strategies may considerably effect the learners' success. Fellenz and Conti (1993) state that the skills or techniques selected to accomplish the task often have a great influence on the success of that learning

activity. “Adeptness and insight in the use of learning strategies is a significant part of one’s ability to learn how to learn" (p. 3).

Learning strategy research is probably a natural spin off of the mental process examined by cognitive psychologies in the sixties and seventies. Authors like Houle (1980), Tough (1971), Apps (1979), and Smith (1970) all wrote about how individuals take charge and manage their own learning process. Numerous researchers have examined learning strategies and have concluded that learning strategies are useful in the learning process (Conti & Fellenz, 1991; Ghost Bear, 2001; Hays, 1995; James, 2000; Korinek, 1997; McKeachie et al., 1989).

Improvement in both classroom achievement and the learning outside of formal educational institutions has been ascribed to learning strategies (Fellenz & Conti, 1993; McKeachie et al., 1986). “There is a need to teach students how to use learning strategies” (McKeachie, 1986, p. 30). Learning strategies which contribute to successful task completion are retained by individuals whereas those which have been ineffective or perhaps less productive are abandoned (McKenna, 1991).

Research in learning strategies indicates that one of the major differences between successful and unsuccessful

students is their understanding and use of effective learning strategies (James, 2000). Learning strategy research identifies two major themes:

> (a) The choice of which learning strategies to use in a given situation is affected by many factors which in turn affect the quality and end product of the learning experience; and (b) students can be taught learning strategies that will help them approach tasks more efficiently and effectively, thus improving their chances for success. (James, 2000, p. 58)

In the field of Adult Education, learning strategies have been conceptualized into five areas are identified in the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS), a valid and reliable instrument used to measure learning strategies of adult learners (Conti & Kolody, 1999, pp. 16-20). SKILLS uses real-life learning scenarios to determine how likely a learner is to use specific learning skills or techniques in circumstances one might encounter in life such as assembling a bicycle, writing a letter to the editor, or caring for a relative (Fellenz & Conti, 1993). "One of the major characteristics of adult learning is that it is often undertaken for immediate application in real-life situations. Such learning usually involves problem solving, reflection on experience, or planning for one of the numerous tasks or challenges of adult life" (p. 4). This approach conceptualizes learning strategies as consisting of the five areas of Metacognition, Metamotivation, Memory,

Critical Thinking, and Resource Management (Fellenz & Conti, 1993).

Metacognition

Metacognition is a concept from cognitive psychology of one's thinking and learning (Brown, 1985) and Smith (1982). Metacognition was also introduced by Ann Brown and John Flavell in the 1970s (Brown, 1985). Metacognition has to do with the ability of learners to make reflections, maintain control, and gain understanding of their learning (Kincannon, Gleber, & Kim, 1999). Adult learners should have control over their learning, processes and to become "aware of oneself as a learner" (p. 57). Metacognition strategies include Planning, Monitoring, and Adjusting (Conti & Fellenz, 1993).

Planning involves an individual deciding the best method for completing a learning task. Yussen (1985) suggests that planning are the steps taken by the individual to organize and identify the essential steps for the learning process. Learners must have an understanding of their own learning requirements, the requirement of the learning task, and a general idea of how to plan (Conti & Fellenz, 1993). Today's learners must assume increasing responsibility for planning and regulating their learning. It is difficult for learners to become self-directed when

learning is planned and monitored by someone else (http://www.ncel.org/sdrs/areas/issues/students/learning/lr1metp.htm). Making plans for learning activities includes estimating time requirements, organizing materials, and scheduling procedures to complete an activity (Conti & Fellenz, 1993).

Monitoring requires maintaining an awareness of the strategies, tasks, processes, and goals of the learning task within the individual's abilities (Counter & Fellenz, 1993). It also relates to the ability to assess one's progress in the learning task.

Adjusting permits the learner to make changes in the learning process. An adjustment can also be a modification to one's approach to a learning task. Adjusting permits the learner to remain flexible during the learning process.

Metamotivation

Metamotivation is concerned with "one's knowing and understanding how or why one is motivated to participate or remain in a learning activity" (Conti & Kolody, 1999, p. 4) Metamotivation is the awareness and control over factors that stimulate and direct one's learning (Fellenz & Conti, 1993, p. 12). Metamotivation includes the strategies of Attention, Reward/Enjoyment, and Confidence.

Attention is defined as identifying and focusing on the

material to be learned (Kolody, 1997). Attention includes identifying distractions and implementing a plan to avoid those distractions.

Reward/Enjoyment is the second component of Metamotivation. It is the anticipation or recognition of the fun. For example, a learner is using the Reward and Enjoyment strategy if the learner recognizes the possible outcome of the learning activity to be personally relevant (Fellenz & Conti, 1989).

Confidence is the third component of Metamotivation. It relates directly to one's ability to learn. The belief that a learner can complete a task is an important factor in the motivation to learn (Fellenz & Conti, 1993, p. 16).

Memory

For the purpose of learning, memory is defined as the ability to store, recall, and process information (Korinek, 1997, p. 48). Memory activities include acquisition, storage, and retrieval processes. Memory strategies include Organization, Use of External Aids, and Memory Application (Paul & Fellenz, 1993).

Organization is the arrangement or processing of information so that the material will be better stored, retained, and retrieved. For example, chunking is an organization strategy used to put information into sets.

Memory Application reduce the number of categories to be remembered (Fellenz & Conti, 1993, p. 23). External Aids involves the use of remembrances, mental images, or other memories to facilitate planning or problem solving. The use of daily planners and date timers involves the use of remembrances, mental images, or other memories to plan, implement, and evaluate learning activities (Fellenz & Conti, 1993, p. 30).

Critical Thinking

The area of Critical Thinking was derived from Brookfield's (1987) critical thinking components. Brookfield's definition of critical thinking was "applied to real-life situations and is composed of (a) identifying and challenging assumptions; (b) challenging the importance of concepts; (c) imagining and exploring alternatives; and (d) reflective skepticism" (Fellenz & Conti, 1993, p. 30). Critical Thinking strategies are used to Test Assumptions, Generate Alternatives, and Conditional Acceptance (p. 30).

The strategy of Testing Assumptions relates to identifying, examining, and challenging assumptions in the learning process (Fellenz & Conti, 1993). "The process of challenging assumptions presumes the ability to identify these assumptions and the willingness to examine them" (p. 31). Generating Alternatives entails considering and

searching for alternative solutions or possibilities. This includes strategies such as brainstorming and ranking the alternatives (p. 33). Conditional Acceptance involves "advocating reflective skepticism to avoid absolutes or over simplifications." Examples of Conditional Acceptance strategies are questioning simple answers and speculating the consequences (Conti & Kolody, 1999, p. 8).

Resource Management

Resource Management is concerned with the effective use of learning resources (Fellenz & Conti, 1993). Resources may include sources of information such as books, magazines, libraries, computers, electronic media, or individuals. Resource Management strategies are Identification of Resources, Critical Use of Resources, and Use of Human Resources (p. 3).

Identification of Resources consists of identifying sources of needed information. The learner must determine the value of obtaining the resource versus the time, energy, and expenses incurred while securing (Conti & Kolody, 1999, p. 9). Critical Use of Resources involves ascertaining "the most appropriate resource rather than simply those that are readily available" (p. 9). Use of Human Resources consists of including others in the learning situations (p. 9).

Individual Differences

Learners differ intensely in what they do in learning and in their success in any particular learning situation (Ackerman, Sternberg, & Glasser, 1989, p. 13). "This is an observable problem today, as it has been for centuries" (p. 13). A huge part of the challenge is understanding what learners bring psychologically to their learning situation. Glaser (1967) traced the history of laboratory experimentation on learning and embraced a natural science viewpoint, "recommending that individual differences be conceptualized as limiting or boundary conditions on the laws of learning" (p. 13).

"The topic of learning and individual differences is central to a wide range and applied programs, from basic research in acquisition of information-processing skills to the design of tailored instructional programs for increasing student achievement" (Ackerman, Sternberg, & Glaser, 1989 p. ix). Included are theoretical and empirical issues as the association between cognitive abilities and learning, individual differences in the acquisition of knowledge during "child development, metacognitive strategies for learning in adults, and expression of abilities in both academic and everyday nonacademic environments" (p. ix).

An initial introduction into the topic of individual

differences was published in 1967, based on a conference held at the University of Pittsburgh in 1965 (Ackerman, Sternberg, & Glasser, 1989, p. ix). The edited volume based on that conference was edited by Gagne' (1985). Gagne' provided a novel with intriguing information about the topic of individual differences. Since the publication of the Gagne' book, a vast number of research programs in cognitive, developmental, differential, and instructional psychology have resulted in significant changes in the quality of inquiry in this area (Ackerman, Sternberg, & Glasser, 1989, p. ix).

The conference on learning and individual differences held almost 20 years ago at the Learning Research and Development Center (LRDC), University of Pittsburgh, brought together a number of inquiry of human learning, particularly those aware of the influence of differences in human characteristics (p. 1). The ideas presented at the LRDC conference stimulated the transition to a new era of research controlled by the paradigm of cognitive information processing (Ackerman, Sternberg, & Glasser, 1989, p. 1). One of the most notable developments since the conference has been the formulation of an information-processing view of learning and memory. This theory is still being developed. Although, most of its basic constructs are now well known

and widely accepted (p. 4). A few of the main contributors to this cognitive theory have been Atkinson and Shiffrin (1968), Anderson and Bower (1973), Anderson (1976), Norman and Rumelhart (1975), Tulving (1972), and Newell and Simon (1972) (p. 4).

Instrumented Learning

While researchers typically prefer to observe behavior directly, practical and ethical consideration sometimes compel self-reports by individuals (Leary, 1995, p. 53). Self-reports are individual "reports of how they behave" (p. 80). More specific, self-reports may provide affective, behavioral, or cognitive information about individuals (p. 52). In other words, individuals are asked to admit to behavior (Hagen, 1993, p. 142) or describe their state of mind (Rosnow & Rosenthal, 1996, p. 95). People "self-reporting" on themselves using instruments is a productive way of gathering "information no one else knows" about people (Baldwin, 2000, p. 3); indeed it may be the only way of getting the information (Baldwin, 2000; Critchfield, Tucker, & Vuchinich. 1998; Kurtzman, 2000). Therefore, self-reported data is needed to analyze important issues that may not otherwise be available (Critchfield et al., 1998, p. 436).

Self-reported information or data can often have a more

profound meaning to individuals than simply an awareness of their behavior. In other words, self-reported data does not "give the whole or the final picture. An individual's interpretation of his or her own activities is not a neutral verdict....that can be accepted at face value" (Saljo, 1997, p. 105). A self-description of behavior is often the beginning of a intense learning process (Blake & Mouton, 1972a, p. 114).

Self-reports are extremely important and essential to the process of instrumented learning. People using instruments to learn are involved in instrumented learning (Blake & Mouton, 1972a, p. 113). In particular, instrumented learning helps "adult learners attain a better understanding of themselves and how they learn" (Munday, D., 2002, p. 111). Usually, instrumented learning is a way of providing a self-description of a routine approach to a behavior (Blake & Mouton, 1972a, p. 114). After analyzing a behavior and comparing it to others, an individual can better translate theory into practice. When ineffective behavior is recognized, individuals are in a position to change what they are doing "so as to get rid of weaknesses and replace them with real strength" (p. 114). Moreover, instrumented learning can help individuals to apply their strengths for organizational success (Cole Associates, n.d.).

A learning instrument is a set of “tactical instructions that enable the learner to learn without a teacher" (Mouton & Blake, 1984, p. 60). More specific, it: (1) Provides a self-directed appraisal and interpreting process that actively involves the learner in the context of personal experience. (2) Encourages uncovering of individual preferences and emphasizes growth opportunities. (3) Simplifies complex issues to ensure understanding. (4) Nurtures self-awareness and behavioral comprehension for long-term performance improvement. (5) Creates a common, nonjudgmental communication for identifying and managing issues. (6) Increases appreciation of differences in others (Cole Associates, n.d.).

Simply put, learning instruments provide adult learners with metacognitive references for reflecting upon their experiences (Cole Associates, n.d.). Thus, the instrumented learning process is similar to the learning process of reflective practice. "Although reflective practice is most often associated with professional practice, this process can be applied to other types of learning situations" (Merriam & Caffarella, 1999, p. 232). As such, the instrumented learning process can be beneficial in both formal and informal learning situations.

Community Colleges

Community colleges make up one of the most important sectors of U.S. higher education because of the significant role they play in providing college access, post-secondary vocational training, and community development (Higher Education in the United States, 2002, p. 116). According to the American Association of Community Colleges, in 2002 there were 968 community colleges representing more than one-quarter of all higher educational institutions in the United States (Higher Education in the United States, 2002, p. 116). The latest reports indicate that during the year 2000, there were 11,752,786 million students enrolled at community colleges across the nation (Digest of Education Statistics, 2003, p. 211).

CHAPTER 3

METHODOLOGY

Instrument Development

This was a study to develop an indicator to identify Multiple Intelligence preferences of adult learners. In the instrument development process establishing construct validity, content validity, criterion-related validity, and reliability are essential.

The validity and reliability of any data collection instrument are two of the most important conditions when considering empirical research. Validity is the most important characteristic of a measuring instrument (Gay & Airasian, 2000, p. 161). It is "the extent to which an empirical measure adequately reflects the real meaning of the concept under consideration" (Babbie, 1989, p. 124).

Validity is concerned with what a test actually measures (Gall, Gall, & Borg, 1999, p. 526). "The core essence of validity is captured nicely by the word accuracy....Stated differently, a measuring instrument is valid to the extent that it measures what it purports to measure" (Huck & Corimer, 1996, p. 88). Research in

education is primarily concerned with the construct, content, and criterion-related validity of an instrument (Gall, Gall, & Borg, 1999, pp. 133-135). "Validity evidence should be studied carefully because the soundness of research results hinges on the validity of the measures used to generate them" (p. 133).

Reliability is the degree in which a test consistently measures what it purports to measure (Gay & Airasian, 2000, p. 169). Reliability of a test is improved when the scores obtained from the administration of the test are fundamentally the same scores when the test is re-administered. Reliability is represented by a numeric form, which is usually a coefficient.

This study utilized the traditional steps in instrument development to create a valid and reliable process for identifying a person's Multiple Intelligences. Construct validity for items was based on Howard Gardner's conceptualization of Multiple Intelligences. Using this concept, items were identified and tested for accuracy in measuring each of the separate intellingences in the concept. Once a pool of useable items was created, content validity was established by field testing these items with adult learners in classes in a community college. Criterion-related validity was addressed by correlating the items from

the field testing with an external measure. Finally, reliability was established by using the test-retest method.

Sample

The first step in selecting a sample is to define the population (Gay & Airsian, 2000, p. 122). A population is the group that is of interest to the researcher. It is the group to which the researcher would like the results of the study to be generalizable (Gay & Airasian, 2000, p. 122). A population is a body of people, things, or events which have at least one common trait (Gay, 1996, pp. 112-113). Since a population is often large, researchers extract a sample or subgroup from the population. This can then be used to make inferences about the larger population if in fact the sample is representative of the whole population (Shavelson, 1996).

The target population for this study was students attending Tulsa Community College (TCC) taking General Education classes during the Spring semester of 2004. "Selection of a sample is a very important step in conducting a research study" (Gay, 1996, p. 113). The four primary ways of selecting a representative sample are random sampling, stratified sampling, cluster sampling, and systematic sampling. The common steps of identification and definition of the population, determination of required sample size, and selection of the sample must be completed

regardless which sampling techniques are used (Gay, 1996, p. 123). Cluster sampling is "sampling in which groups, not individuals, are randomly selected. All members of a selected group have similar characteristics" (Gay, 1996, p. 119). A systematic sampling technique was used to select the sample for this study. The clusters consisted of classes from each of the four campuses at TCC.

The accessible target population for this study was students attending Tulsa Community College (TCC) at four Tulsa campuses. They were from the Northeast, Southeast, West, and the Metro campuses. Participants who were selected were taking General Education classes during the Spring semester of 2004. A community college was chosen because it is a good representation of the diverse Oklahoma population. Community colleges make up one of the most important sectors of U.S. higher education because of the significant role they play in providing college access, post-secondary vocational training, and community development (Higher Education in the United States, 2002, p. 116). According to the American Association of Community Colleges, in 2002 there were 968 community colleges representing more than one-quarter of all higher educational institutions in the United States (Higher Education in the United States, 2002, p. 116). The latest reports indicate that during the year

2000, there were 11,752,786 million students enrolled at community colleges across the nation (Digest of Education Statistics, 2003, p. 211).

There are six Tulsa Community College campuses in the Tulsa area. Only four of the six TCC campuses was selected for this study. One campus was not chosen because it was primarily for administration and professional development. The other campus was not chosen because it was also primarily administrative. Therefore, a representative sample of students from four of the six campuses participated in the survey. The total number of enrolled students taking General Education courses during the Spring semester was 10,319. This accounts for 23% of the total enrollment during the 2004 Spring semester (J. Worley, personal communication, March 24, 2005). The total enrollment of students attending classes at the four campuses was as follows: Metro Campus -- 7,446, Southeast Campus -- 7,028, Northeast Campus -- 4,743, and West Campus -- 2,527.

The next step was to select actual classes to participant in the study. It was determined the best representation of diverse students would be in the General Education courses. With the assistance of the Registrar for Tulsa Community College, a list of General Education classes was generated, and nine different General Education courses

from the four campuses were randomly selected. From those 9 courses, 26 classes were selected. There were 16 different instructors that taught those 26 classes. The instructors were contacted by electronic mail and telephone calls to schedule data collection. The total number of students participating in this study was 874.

Construct Validity

The most important type of validity is construct validity (Gay & Airasian, 2000, p. 167). It is the degree of which the test reflects the constructs it is intended to measure (p. 167). Construct validity deals with what an instrument actually measures (p. 167). It is broad and is concerned with characteristics or behaviors that impart performance on an assessment or instrument (p. 167). Construct validity evaluates the fundamental theory of the instrument. "A construct is a non-observable characteristic like intelligence" (Gay, 1996, p. 14).

For this study, it was important to establish construct validity to match the theoretical factors proposed by Gardner. In the initial process of establishing construct validity for the new instrument, Howard Gardner's Non-Profit organization Project Zero was contacted. The purpose of contacting Project Zero was to identify the Multiple Intelligence assessment instruments that they recognized as

valid. Project Zero identified two Multiple Intelligences instruments. They were the Midas by C. B. Shearer and Rogers Indicator of Multiple Intelligence developed by J. Keith Rogers.

The next step was to review the literature. A search was done in Psychology Journals, ERIC Journals, and Expanded Academic Journals. All journals were searched using the keyword phrase "Multiple Intelligences". During the search, journal articles and books with Multiple Intelligences in the subject were found. In total there were over 1,000 articles and books referenced. An Internet search using Google as the search engine was also conducted to find articles on Howard Gardner's Multiple Intelligences. There was also a search using Google to find articles, instruments, checklists, and inventories that use Howard Gardener's theory base of Multiple Intelligences.

Materials related to MI were also identified using personal sources. Nationally, contact was made with Project Zero, which is the organization where Howard Gardner, the author of Multiple Intelligences, serves as the Co-Director. The staff provided a list of books, journals, and web sites to add to the data base. Locally, Tulsa Public Schools Professional Development department was contacted to identify the Multiple Intelligences assessments used.

Several MI instruments were identified in these sources. These MI materials were compiled and reviewed to determine which instruments were congruent with Howard Gardner's theoretical foundation. There were a total of 17 different MI instruments identified. Each MI instrument referred to itself as either as an instrument, survey, inventory, assessment, or checklist.

After reviewing each of the MI instruments, it was decided to incorporate material from several instruments. Ten questions were selected to represent each of the nine Multiple Intelligences. These Multiple Intelligences are (1) Verbal/Linguistic Intelligence, used in reading, writing, listening and speaking; (2) Logical/Mathematical Intelligence, used in thinking logically and in solving mathematics equations; (3) Visual/Spatial Intelligence, used in arranging the physical environment; (4) Musical Intelligence, used in singing, listening, and appreciating music; (5) Body-Kinesthetic Intelligence, used in athletics and in different forms of movement or dancing; (6) Interpersonal Intelligence, used in relating to others; (7) Intra-personal Intelligence, used in understanding our-selves; (8) Naturalist Intelligence, used in understanding and appreciating nature; and (9) Existential Intelligence, used in relating to the spiritual existence. The first seven

were Gardner's original areas of Multiple Intelligences. Naturalistic Intelligence was added by Gardner in the mid-1990s, and Existential Intelligences was recently added as the ninth Multiple Intelligence (Sternberg, 1994, p. 281).

The first draft for the new MI Instrument contained a pool of 90 items. There were 10 items representing each of the 9 Multiple Intelligences. To comply with Howard Gardner's theoretical foundation on Multiple Intelligences, these 90 items were derived from instruments currently being used in the field that encompasses Howard Gardner's theoretical foundation (see Table 1), and these items were screened for compatibility with Gardner's writings. There was also some minor editing conducted on the items for grammar, single construct, and parallel form wordings.

Table 1: Pool of Items for Survey in MI

No.	Item
1	I enjoy making things with my hands.
2	It is important for me to see me role in the "big picture" of things.
3	I learn best interacting with others.
4	I am keenly aware of my moral beliefs.
5	I keep my things neat and orderly.
6	I easily pick up on patterns.
7	I enjoy categorizing things by common traits.
8	I enjoy reading all kinds of materials.
9	I can imagine ideas in my mind.
10	I learn by doing.

11	Studying history and ancient culture helps give me perspective.
12	I pay attention to social issues and causes.
13	I am willing to protest or sign a petition to right a wrong.
14	Things have to make sense to me or I am dissatisfied.
15	Remembering song lyrics is easy for me.
16	I spend a great deal of time outdoors.
17	Debates and public speaking are activities I like to participate in.
18	I am good at reading maps and blueprints.
19	Sitting stiff for long periods of time is difficult for me.
20	I enjoy discussing questions about life.
21	The more the merrier.
22	I learn best when I have an emotional attachment to the subject.
23	Step-by-step directions are a big help.
24	I focus in on noise and sounds.
25	Ecological issues are important to me.
26	Taking notes help me remember and understand.
27	Rearranging a room is fun to me.
28	I enjoy outdoor games and sports.
29	Religion is important to me.
30	Study groups are very productive for me.
31	Fairness is important to me.
32	Solving problems comes easily to me.
33	Moving to a beat is easy for me.
34	Hiking and camping are enjoyable activities.
35	I faithfully contact friends through letters and/or email.
36	I enjoy creating art using varied media.
37	I value non-verbal communication such as sign language.
38	I enjoy viewing art masterpieces.

39	I enjoy chat rooms.
40	My attitude effects how I learn.
41	I get easily frustrated with disorganized people.
42	I've always been interested in playing an instrument.
43	I enjoy working on a garden.
44	It is easy for me to explain my ideas to others.
45	I remember well using graphic organizers.
46	A fit body is important for a fit mind.
47	Relaxation and meditation exercises are rewarding.
48	Participating in politics is important.
49	Social justice issues concern me.
50	I can complete calculations quickly in my head.
51	The cadence of poetry intrigues me.
52	I believe preserving our National Parks is important.
53	I keep a journal.
54	Performance art can be very gratifying.
55	Arts and crafts are enjoyable pastimes.
56	I like visiting breathtaking sites in nature.
57	Television and radio talk shows are enjoyable.
58	Working alone can be just as productive as working in a group.
59	Puzzles requiring reasoning are fun.
60	I remember things by putting them in rhyme.
61	Putting things in hierarchies makes sense to me.
62	Word puzzles like crosswords and jumbles are fun.
63	Spreadsheets are great for making charts, graphs, and tables.
64	Expression through dance is beautiful.
65	I enjoy reading ancient and modern philosophers.
66	I am a "team player".
67	I need to know why I should do something before I agree to do it.

68	I can't begin an assignment until all my questions are answered.
69	Concentration is difficult while listening to a radio or television.
70	Animals are important in my life.
71	I write for pleasure.
72	Three dimensional puzzles bring me much enjoyment.
73	I like working with tools.
74	Learning new things is easier when I understand their value.
75	I dislike working alone.
76	When I believe in something, I will give it 100% effort to it.
77	Structure helps me be successful.
78	I enjoy many kinds of music.
79	My home has a recycling system in place.
80	I enjoy playing with words like puns, anagrams, and spoonerisms.
81	Music videos are very stimulating.
82	I live an active lifestyle.
83	I wonder if there are other forms of intelligent life in the universe.
84	Clubs and extracurricular activities are fun.
85	I like to be involved in causes that helps others.
86	I find working on computer spreadsheet or database rewarding.
87	Musicals are more interesting then dramatic plays.
88	I enjoy studying biology, botany and/or zoology.
89	Foreign languages interest me.
90	I can recall things in mental pictures.

Thus, construct validity deals with what the instrument actually measures. The construct validity for the new instrument was established by creating a pool of items that were directly related to the writings of Howard Gardner.

Instead of arbitrarily developing some items, various existing MI instruments were used. These instruments are being used in the field to informally to identify MI areas but have not had their validity and reliability systematically established. These items were then edited in order to be combined into a single Multiple Intelligences preference indicator.

Content Validity

Content validity represents the degree to which a measure embodies the range of meanings within the concept (Babbie, 1989, p.125). Content validity is the degree to which an instrument measures the precise content areas (Gay, 1996, p. 139). It is the extent to which an instrument represents the total body of theory from which the items could have been taken (Gall, Gall, & Borg, 1999, pp. 133-134). The content of an instrument is valid to the degree the participant's responses on that instrument are a representative sample of the items (p. 134).

To establish content validity for an instrument, the instrument must include items that represent the range of content that the test is designed to measure (Gall, Gall, & Borg, 1999, p. 526). To accomplish this, the 90 items in the pool of items were used in field tests with college students at Oklahoma State University and Northeastern State

University-Broken Arrow. These student assisted in the process of determining which items correctly discriminated respondents on the concepts. For the field testing, 90 items were fashioned into a survey format (see appendix A). A 5-point Likert-scale was used: 1 = Definitely Unlike Me, 2 = Unlike Me, 3 = Neutral, 4 = Like Me, and 5 = Definitely Like Me. The respondents were asked to rate each of the 90 items in the pool of items. A total score for each MI area was calculated by adding together the 10 items.

The new preference indicator was pilot tested with 8 students in graduate classes in the Human Resources and Adult Education program at Oklahoma State University. All were adults that worked in diverse occupational fields. These students provided feedback on the language, readability, and format of the preference indicator. There were three outcomes based upon the findings from this group. The first related to language. The students pointed out words and phrases that they found confusing. The second related to the indicator's format because students rated almost every item high. The last finding was on the amount of time it took to take the preference indicator. Although, the preference indicator could be completed in approximately 10 minutes, the students expressed a desire for a shorter preference indicator.

Based upon the feedback from the students, revisions were made in the wording of several items. It was also determined that the Likert-scale format was not a suitable format for this preference indicator. Therefore, the rating scale was abandoned and a ranking system was adopted. For this format, the 90 items in the pool of items were arranged in 10 blocks of 9 items with 1 item in the block representing each MI category (see Appendix B). For each block, the respondents were asked to rank the items according to how the item applied to them. The item most like them was ranked 1, and the least like them was ranked 9. The rankings for each MI area were summed, and the MI area with the lowest score, or sigma rank, was judged to be the preference MI area for the respondent.

The modified preference indicator with the ranking system was once again field tested with graduate students in two small classes in the Human Resources and Adult Education program. This group was made up of seven females and four males. Their average age was 40.7 and ranged from 28 to 57. The racial composition of the group was as follows: White--6; African American--3; Native American--1; and a combination of African American and Native American--1. For this group, the rank value of the 10 items in each MI area was summed to produce a score for each of the 9 MI areas. In

order to determine if each item was making a positive contribution to the total score, each of the items in the MI category was correlated with the total score for each MI category.

The rational for this procedure was based on the assumption that the total score represented the MI construct. For each item to contribute to the total score, participants should be responding to items in a similar fashion to their total score. Those who were strong in one MI area should rank those items high (as indicated by a low number), and those weak in a MI area should rank those items with a lower score (as indicated with a high number). The correlations for this process indicated that several of the items positively correlated with the total score and each had potential for the final preference indicator (See Table 2).

Table 2: Correlations of Individual Items to Total Score for Nine Multiple Intelligences Areas for 90-Item Form of Survey with Classroom Field-Test Group of 11

Bodily/Kinesthetic										
Item	Q1	Q18	Q26	Q34	Q42	Q50	Q58	Q66	Q74	Q82
Corr.	.38	.40	.35	.67	.10	.24	.81	-.23	.64	.76
Existential										
Item	Q2	Q10	Q27	Q35	Q43	Q51	Q59	Q67	Q75	Q83
Corr.	.24	.47	.51	.55	.25	.66	.46	.28	.40	.08
Interpersonal										
Item	Q3	Q11	Q19	Q36	Q44	Q52	Q60	Q68	Q76	Q84
Corr.	.74	.48	.45	.30	.55	.69	.42	.80	.30	.56
Intrapersonal										
Item	Q4	Q12	Q20	Q28	Q45	Q53	Q61	Q69	Q77	Q85
Corr.	-.38	.46	.45	.69	.42	.69	.82	.61	.35	.29
Logical										
Item	Q5	Q13	Q21	Q29	Q37	Q54	Q62	Q70	Q78	Q86
Corr.	.03	.50	.55	.02	.59	.63	.43	.25	.79	.61
Musical										
Item	Q6	Q14	Q22	Q30	Q38	Q46	Q63	Q71	Q79	Q87
Corr.	.34	.67	.82	.65	.70	.56	.31	.40	.82	-.50
Naturalistic										
Item	Q7	Q15	Q23	Q31	Q39	Q47	Q55	Q72	Q80	Q88
Corr.	.55	.52	.04	.67	.53	.41	.67	.73	.74	-.15
Verbal										
Item	Q8	Q16	Q24	Q32	Q40	Q48	Q56	Q64	Q81	Q89
Corr.	.39	.03	.35	.34	.60	.51	.80	.46	.08	.44
Visual										
Item	Q9	Q17	Q25	Q33	Q41	Q49	Q57	Q65	Q73	Q90
Corr.	.37	.08	.55	.54	-.31	.30	.25	.59	.02	0.58

Not all of the items showed potential for inclusion in the final preference indicator. In addition, the field testing resulted in the preference for a shorter preference indicator. Therefore, the number of items was reduced to 45. The five items with the highest correlations (see Table 2)

were selected for each of the nine Multiple Intellingences areas. For the new 45-item preference indicator, the item from each group that had the highest correlation was placed in the first grouping of Multiple Intelligence items, and this process was repeated for each of the five areas. Field testing with 19 students in graduate classes in Adult Education confirmed the retention of these 45 items (see Table 3).

Table 3: Correlations of Individual Items to Total Score for Nine Multiple Intelligences Areas for 45-Item Form of Survey with Classroom Field-Test Group of 19 with New Item Number and Original Item Number in Parentheses

Bodily/Kinesthetic					
Item	Q1 (58)	Q10 (82)	Q19 (67)	Q28 (74)	Q37 (18)
Corr.	0.52	0.57	0.53	0.78	0.52
Existential					
Item	Q2 (51)	Q11 (35)	Q20 (27)	Q29 (10)	Q38 (59)
Corr.	0.56	0.86	0.75	0.67	0.82
Interpersonal					
Item	Q3 (68)	Q12 (31)	Q21 (52)	Q30 (84)	Q39 (44)
Corr.	0.35	0.57	0.41	0.82	-0.15
Intrapersonal					
Item	Q4 (61)	Q13 (28)	Q22 (53)	Q31 (69)	Q40 (29)
Corr.	0.37	0.57	0.66	0.44	0.42
Logical					
Item	Q5 (78)	Q14 (54)	Q23 (86)	Q32 (37)	Q41 (21)
Corr.	0.62	0.71	0.47	0.64	0.32
Musical					
Item	Q6 (79)	Q15 (22)	Q24 (38)	Q33 (14)	Q42 (30)
Corr.	0.38	0.61	0.61	0.67	0.8
Naturalistic					
Item	Q7 (80)	Q16 (72)	Q25 (31)	Q34 (55)	Q43 (7)
Corr.	0.68	0.79	0.34	0.44	0.73
Verbal					
Item	Q8 (56)	Q17 (40)	Q26 (48)	Q35 (64)	Q44 (89)
Corr.	0.71	0.66	0.57	0.76	0.58
Visual					
Item	Q9 (65)	Q18 (90)	Q27 (25)	Q36 (33)	Q45 (9)
Corr.	0.34	0.43	0.44	0.67	0.7

The final 45-item version of the preference indicator consisted of the 5 items with the highest correlations for each of the 9 Multiple Intelligence areas (see Table 4). The items were placed in five groups, and each group is ranked separately by respondents who complete the preference

indicator. The items in the first group consisted of the items from each Multiple Intelligence area that had the highest correlation in the field testing. The second ranking group was made up of the items with the second highest correlation in the field testing for the Multiple Intelligence area. This logic of organization was followed for each of the five ranking groups. Thus, for each ranking group, the items for each Multiple Intelligence area competed with items of similar standing from the other Multiple Intelligence areas (see Table 5).

Table 4: Correlations of Items to Total Score for Items Retained for 45-Item Version of Preference Indicator

Order	Corr.	Item
Bodily/Kinesthetic		
1	.806	Activities such as arts and crafts are enjoyable pastimes.
2	.756	I live an active lifestyle.
3	.668	I enjoy outdoor games.
4	.637	I like working with tools.
5	.404	I learn by doing.
Spiritual/Existential		
1	.661	Meditation exercises are rewarding.
2	.553	Religion is important to me.
3	.509	I enjoy discussing questions about life.
4	.474	Studying history helps give me perspective.
5	.457	I like visiting breathtaking sites in nature.
Interpersonal		
1	.803	I am a "team player".
2	.744	I learn best interacting with others.
3	.686	Participating in politics is important.
4	.560	Things such as clubs and extracurricular activities are fun.
5	.547	I enjoy chat room.

Logic/Mathematical		
1	.793	Structure helps me be successful.
2	.632	I can complete calculations quickly in my head.
3	.607	I find working on computer spreadsheet or database rewarding.
4	.586	I get easily frustrated with disorganized people.
5	.545	Step-by-step directions are a big help.
Music		
1	.825	I enjoy many kinds of music.
2	.817	I focus in on sounds.
3	.703	I've always been interested in playing an instrument.
4	.674	Remembering song lyrics is easy for me.
5	.654	Moving to a beat is easy for me.
Naturalist		
1	.735	My home has a recycling system in place.
2	.728	Animals are important in my life.
3	.673	Hiking is an enjoyable activity.
4	.668	Putting things in hierarchies makes sense to me.
5	.553	I enjoy categorizing things by common traits.
Verbal/Linguistic		
1	.804	Word puzzles like crosswords and jumbles are fun.
2	.596	It is easy for me to explain my ideas to others.
3	.511	I keep a journal.
4	.460	I write for pleasure.
5	.438	Foreign languages interest me.
Intrapersonal		
1	.820	Working alone can be just as productive as working in a group.
2	.694	Fairness is important to me.
3	.686	Social justice issues concern me.
4	.608	I need to know why I should do something before I agree to do it.
5	.448	I learn best when I have an emotional attachment to the subject.
Visual/Spatial		
1	.593	Three dimensional puzzles bring me much enjoyment.
2	.583	I can recall things in mental pictures.
3	.555	Rearranging a room is fun to me.

4	.541	I enjoy creating art using varied media.
5	.373	I can imagine ideas in my mind.

Table 5: Final Order of 45-Item Version of Preference Indicator

No.	Item
1	Activities such as arts and crafts are enjoyable pastimes
2	Meditation exercises are rewarding
3	I am a "team player"
4	Working alone can often be more productive than working in a group
5	Structure helps me be successful
6	I enjoy many kinds of music
7	My home has a recycling system in place
8	Word puzzles like crosswords and jumbles are fun
9	I enjoy doing three dimensional puzzles
10	I live an active lifestyle
11	Questions about the meaning of life are important to me
12	I learn best interacting with others
13	Fairness is important to me
14	I can complete calculations quickly in my head
15	I focus in on sounds
16	Animals are important in my life
17	It is easy for me to explain verbally my ideas to others
18	I can recall things in mental pictures
19	I enjoy outdoor games
20	I enjoy discussing questions about life
21	Participating in politics is important
22	Social justice issues concern me
23	I find working on computer spreadsheet or database rewarding
24	I have always been interested in playing a musical instrument
25	Hiking is an enjoyable activity
26	I keep a journal
27	Re-arranging a room is fun to me
28	I like working with tools
29	Studying history helps give me perspective
30	Things such as clubs and extracurricular activities are fun
31	I need to know why I should learn something

	before I do it
32	I get easily frustrated with disorganized people
33	Remembering song lyrics is easy for me
34	Putting things in hierarchies makes sense to me
35	I write for pleasure
36	I enjoy creating art using varied media
37	I learn by doing
38	I like visiting breathtaking sites in nature
39	I enjoy discussions with family and friends
40	I learn best when I have an emotional attachment to the subject
41	Step-by-step directions are a big help
42	Moving to a beat is easy for me
43	I enjoy categorizing things by common traits
44	Foreign languages interest me
45	I can imagine ideas in my mind

The overall correlations for the individual items to total score were very high for the 45 items that were retained in the preference indicator (see Table 6). Over one-fourth (26.66%) of the items were above .70 or above. Nearly one-third (31.4%) of items were at the .6 level, and over half (57.77%) were above the .6 level. All but 7 items or 84.44% were at .50 or above. Only 1 item was below .40. Thus, even though in the calculations by the 45 items that were removed from the preference indicator, the remaining 45 items were highly correlated with the total score for the MI area, which represented the overall MI construct.

Table 6: Range of Correlations of Items to Total Score for Items Retained for 45-Item Version of Preference Indicator

Range	Frequency	Percent
.80 to .89	6	13.33
.70 to .79	6	13.33
.60 to .69	14	31.11
.50 to .59	12	26.67
.40 to .49	6	13.33
.30 to .39	1	2.22
Total	45	100.00

With only 45 items, it was possible to print the preference indicator of one sheet of paper by using both the front and back (see Appendix C). The items were divided into five sets of nine. Each item relates to one of the nine MI areas. In each set, the items were arranged in the same order relating to each MI area.

The MIS is fashioned with the directions printed first. The directions are printed at the beginning of the survey with general information about Multiple Intelligences and specific instructions on how to rank the items. Each set of nine items is set off in a box, and at the beginning of each set the directions are printed again. Each set of directions explain that each item has to be ranked from 1 to 9. Three sets of items are on the front side of the page, and there are two more sets on nine items on the back. After the last set of items, there is a warning statement which asks the respondent to go back and check the accuracy of their rankings. Finally, at the bottom there is space for demographic information. For the field testing, information

about gender, age, and race was gathered. In broader testing with the community college students, a place was added for participants to provide a name or nickname, telephone or cell numbers, and e-mail address. This information was needed only if the participants wanted their MI profiles after being scored.

Each of the five sets of items has the items arranged in the same order (see Table 4). Items 1, 10, 19, 28, and 37 relate to Bodily/Kinesthetic Intelligence. The five Bodily/Kinesthetic items are comprised of two different groups of items which measures athletics and physical dexterity. The athletics items measure involvement in or skill for physical movement. The dexterity items represent skill in manipulating objects with using the hands or using the body for learning, dancing, and acting.

Items 2, 11, 20, 29, and 38 relate to Existential/ Spiritual Intelligence. The five Existential items are comprised of two different groups of items which represent the enjoyment of meditation exercises, spirituality, and questions about life. The other items measure the enjoyment of studying history and breathtaking sites in nature.

Items 3, 12, 21, 30, and 39 relate to Interpersonal Intelligence. The five Interpersonal items are comprised of two different groups of items which represent the enjoyment in and skill for working with others and the interest of social persuasion of politics.

Items 4, 13, 22, 31, and 40 relate to Intrapersonal

Intelligence. The five Intrapersonal items are comprised of three different groups of items which represent awareness of and comfort with oneself, concern with social justice issues, and the need for an emotional attachment to a subject before learning.

Items 5, 14, 23, 32, and 41 relate to Logical/ Mathematical Intelligence. The five Logical/Mathematical items are comprised of two different groups of items which represent skill with math calculations and needing structure.

Items 6, 15, 24, 33, and 42, relate to Musical Intelligence. The five Musical Intelligence items are comprised of two different groups of items which represent the enjoyment of various kinds of music, focusing on sounds, and the ability to move to a beat.

Items 7, 16, 25, 34, and 43 relate to Naturalistic Intelligence. The five Naturalistic items are comprised of two different groups of items which represent the caring for animals, appreciation of nature, and putting things in hierarchies and categories.

Items 8, 17, 26, 35, and 44 relate to Verbal/Linguistic Intelligence. The five Verbal/Linguistic items are comprised of two different groups of items which represent the enjoyment of word puzzles and jumbles. Several items represent the interest in oral and written languages.

Finally, items 9, 18, 27, 36, and 45 relate to the Visual/Spatial Intelligence. These items are comprised of

spatial ability, working with objects, and artistic design. They include the enjoyment and ability of creating design.

This survey was field tested with a larger group of 149 students from Northeastern State University in Broken Arrow, Oklahoma. These students were enrolled the Special Education Program. This test group was 79.2% female and 20.8% male. The average age was 27.6 with a standard deviation of 9.3 and a median of 23. The racial makeup was as follows: African American–4.8%, Asian–.7%, Hispanic–1.4%, Native American–24.5%, White–66.7%, and Other–2%.

The 149 students were given the survey at the beginning of their class. The survey was administered by an Oklahoma State University doctoral student in the Human Resources and Adult Education Program. Before the survey was administered the instructions were given in a thorough and concise manner. The data from these students were scored and analyzed in the same manner as the previous field-test group. After the preference indicator were scored, correlations were computed for the relationship of each item in a MI area to the total scores for the area (see Table 7).

The correlations scores of all of the items (see Table 7) except two were at .300 or above. 57.7% of the items were at .500 or above, and 26.66% of the items were at .600 or above.

Table 7: Correlations of Individual Items to Total Score for Nine Multiple Intelligences Areas for 45-Item Form of Survey with Final Field-Test Group of 149

Bodily/Kinesthetic					
Item	Q1	Q10	Q19	Q28	Q37
Corr.	.380	.613	.556	.485	.616
Existential					
Item	Q2	Q11	Q20	Q29	Q38
Corr.	.519	.708	.569	.578	.516
Interpersonal					
Item	Q3	Q12	Q21	Q30	Q39
Corr.	.401	.565	.245	.626	.520
Intrapersonal					
Item	Q4	Q13	Q22	Q31	Q40
Corr.	.400	.534	.561	.487	.614
Logical					
Item	Q5	Q14	Q23	Q32	Q41
Corr.	.570	.480	.603	.670	.430
Musical					
Item	Q6	Q15	Q24	Q33	Q42
Corr.	.629	.458	.556	.613	.635
Naturalistic					
Item	Q7	Q16	Q25	Q34	Q43
Corr.	.451	.523	.364	.481	.565
Verbal					
Item	Q8	Q17	Q26	Q35	Q44
Corr.	.219	.308	.450	.828	.330
Visual					
Item	Q9	Q18	Q27	Q36	Q45
Corr.	.368	.554	.450	.409	.644

This entire process was designed to get the preference indicator ready for field testing with a large group. The first step was to reduce the number of items in the preference indicator from 90 items to 45 items because participants advised that the preference indicator was too long. There was at least 5 items in each of the nine groups that had high correlation scores, and some had low

correlations. Those items with low correlation scores were eliminated from the preference indicator. Thus, the top 5 items in each MI area were used for the 45 item preference indicator. With this, the preference indicator was ready for a larger field testing. The 45-item version of the preference indicator was field tested with a group of 149 adult students. Since the correlations of the individual items to the total score for the Multiple Intelligence area indicated that each of these items had potential for correctly identifying the Multiple Intelligence area, the preference indicator was prepared for a larger field testing with adult students at Tulsa Community College.

Procedure

Data were collected from community college students to establish the content validity of items for the new preference indicator. An Internal Review Board at Tulsa Community College (TCC) gave approval to collect data in November of 2003. The TCC Registrar's Office was contacted requesting information on the number of students, number of campuses, and demographic statistics on their student population. After gleaning all the information needed to develop a research strategy, it was determined that a sample of classes in General Education would be the best pool of diverse students. The General Education classes represent

the basic classes most students take their first year at a community college.

A representative from the Registrar's Office helped in selecting 11 General Education classes taught at all four TCC campuses during the 2004 Spring semester. Eleven classes were chosen for data collection because it was anticipated that the average class size of General Education courses at TCC was approximately 30 students. Consequently, data would be collected from approximately 350 participants. According to Gay (1987), a sample size of approximately 350 is an adequate sample size.

The least intrusive way of attaining assistance help from the Registrar's Office was to use a systematic sampling technique for identifying the classes. Systematic sampling is a process in which the desired items are selected from a list based on a set of interval (Gay, & Airasian, 2000, p. 131). For selecting classes for the study, the TCC Registration Computer system was used to display all of the General Education classes by their section and course number. The Registrar's representative used the computer system with a command to display every third class listed under General Education. Eleven classes were chosen during this selection process. The classes were (a) Introduction to Biology for non majors, (b) Nutrition, (c) Freshman English,

(d) American History--1492 to Civil War, (e) American History--Civil War to present, (f) College Algebra, (g) American Federal Government, (h) Introduction to Psychology, (i) Introduction to Computer Technology, and (j) Introduction to Sociology. The TCC Registrar's Office then provided a list of all the selected courses chosen. The list included the number of times that course was offered, the campus, the actual day and time that course was offered, and the instructors' name and contact information.

From this list of General Education courses, there was a need to further reduce the list of classes because of the multiple sections. Therefore, every third class on the list was selected for data collection. This brought the total to 26 classes for data collection. There were 26 classes selected, but there were several instructors that taught more than one class listed. Therefore, there were only 16 different instructors who were contacted.

Since there were four campuses, it was determined to schedule data collection at one campus per day. Each of the 16 instructors were e-mailed and called explaining the purpose of the research. A message was left with a contact number and e-mail address if the instructor was not reached. A follow-up call or e-mail was sent to all instructors that did not return the call or the e-mail within 72 hours. Each

instructor was contacted. The instructors were informed about the research project which included students at TCC. The instructors were also informed the research project was approved by the Vice President of Academic Affairs and the TCC Internal Review Board. After the initial introductions were made, an overview of the research was provided. Next, appointments were made to collect data in their classes on the day of the week specified for their campus.

The day of the week for collecting data on each campus was randomly selected. This was done by drawing from two boxes. One box contained the names of the four campuses, and the other contained the days of Monday through Thursday. For each of the four rounds, a campus site and day of the week were drawn. The results were as follows: Monday--the Metro campus, Tuesday--the Northeast campus, Wednesday--the Southeast campus, and Thursday--the West campus.

Local conditions required a few more minor adjustments in the data collection. One instructor advised that he only had Internet classes. So this class was then dropped from consideration. Another instructor had a scheduled exam on the day for data collection on his campus, so this class was also eliminated from consideration. However, that instructor taught another class on the list of selected classes, so the data collection was conducted in his other class.

The instructors who agreed to allow data to be collected in their classes indicated that the data would be collected either at the beginning of class or at the end. Because of the random selection of classes, there were some classes that met at the same time. Therefore, some data collection was conducted at the beginning of the class and some data were collected at the end of class.

The data collection process in each class was the same. Either at the beginning of class or the end, the instructors explained that their classes were participating in a Multiple Intelligences survey and encouraged everyone to participate. I introduced myself and explained to participants how their responses would assist in the research of this new MI preference indicator. The directions for completing the MI preference indicator were then read aloud to the class and the participants were asked if they had any questions. If there were no questions, the participants began completing the preference indicator. If there were questions, the questions were answered before the participants began completing the preference indicator.

In all of the classes, the MI preference indicator was completed in about 5 to 7 minutes. Once completed, the preference indicators were collected. The participants were informed if they wanted feedback on their personal MI scores

from the preference indicator to provide their e-mail addresses or a telephone number. There was an overwhelming request for results. Consequently, the preference indicators were scored, and a personal MI profile sheet was returned to each instructor the next week for each student who requested feedback.

At the Metro campus, six classes were surveyed on Monday with a total of 106 participants. At the Northeast campus, eight classes were surveyed on Tuesday with a total of 92 participants. At the Southeast campus, five classes were surveyed on Wednesday with a total 115 participants. Finally, at the West campus, five classes were surveyed on Thursday with a total of 90 participants. There were a total of 24 General Education classes surveyed. The number of participants surveyed during this week was 403. There were no night classes randomly selected in this group surveyed.

After the data were collected at all four campuses, it was input into an Excel file. Forty-eight participants either did not complete their surveys, or they did not fill them out correctly. Therefore, the total number of completed surveys entered into the Excel file was 355. When the data set was examined, it was discovered that the representation in some of the MI area was very low. It was therefore determined to go through the data collection process again

to get a larger sample.

Approximately two weeks later the Registrar at Tulsa Community College was contacted again to systematically select 10 different General Education classes. Eight classes at each campus were chosen to participate in this second round of data collection. The same process that was used to contact the initial 16 instructors was used for this round of data collection. Twenty-two instructors were identified and chosen to participate in the second round of data collection. Contact was never made with three instructors; consequently, this brought the total number of instructors to 19. In order to improve the representation of the sample, the days for data collection on each campus were changed in this round. The sequence was reversed, so the days for each campus were as follows: Monday–West campus, Tuesday--Southeast campus, Wednesday--Northeast campus, and Thursday--Metro campus.

Data were collected in 27 classes during the second round. Data were collected from 6 classes at the West campus with a total of 106 participants. In two other classes that were chosen for the West campus exams were being conducted; therefore, no data could be collected. Data were collected from 8 classes at the Northeast campus with a total of 112 participants; two of them were night classes. Out of the 8

classes selected for the Southeast campus, one class was watching a film, and exams were being conducted in two other classes. Therefore, data were collected from only five classes with a total of 100 participants. Finally, at the Metro campus, there were 8 classes surveyed with a total of 117 participants. Thus, data were collected from 432 participants in these 27 classes.

During the first round of data collection 48 preference indicators were either incomplete or inaccurate. Therefore, they had to be eliminated. During the second round, special attention was given to reading and explaining the directions. As a result, during the second round there were only three preference indicators that needed to be eliminated. With 355 from the first round and 432 from the second round, a total of 784 students from Tulsa Community College participated in the study.

CHAPTER 4

FINDINGS

Introduction

Once a form of a new Multiple Intelligences preference indicator was ready for field testing, data were collected from 874 Tulsa Community College (TCC) students. The students that participated were from systematically selected General Education classes during the Spring semester of 2004. The data were collected in several rounds. The purpose of the data collection was to aid in establishing content validity, criterion-related validity, and reliability for the new preference indicator.

The new preference indicator that was used in the field testing was named the Multiple Intelligence Survey (MIS). It consists of 45 items with 5 items for each of the areas of Multiple Intelligence conceptualized by Howard Gardner. These items were arranged in 5 blocks with one question from each of the MI categories, and the participants rank ordered the items based on how well the items applied to them. The statistics that were used to analyze the field test data were correlations, *t* tests, frequency distributions, and

factor analysis.

In the initial round of data collection, there were 355 participants. However, some of the MI areas experienced low responses. Therefore, a second round of data collection was conducted. In this round, there were 432 participants. This brought the total of participants to 787. The next round of data collection consisted of establishing criterion-related validity and reliability of the new preference indicator. Of these 132 responses, 87 responses were included in the total of 787 because they were collected at the time of the factor analysis. The 45 cases that were collected after the factor analysis was conducted were not included in the total number.

Participants

The target population for this study were students attending Tulsa Community College (TCC) who were taking General Education classes during the Spring Semester of 2004. A stratified sample was used to select participants. The participants were from the Northeast, Southeast, West, and the Metro campuses.

From the 874 TCC students that participated in the study, over 68% were females while 50.9% of the U.S. population are females. The Oklahoma population statistics on gender parallel those of overall United States. Females

make up 50.9% of the state's population (U.S. Census, 2000). In 2000, Tulsa's Metropolitan Statistical Area population was 803,235. There were 409,650 females, and they made up 51% of the total population.

According to Tulsa Community College during the Spring semester of 2004, 71% of the entire student body were Caucasian. Additionally, Caucasian females represented 63% of the total student body (J. Worley, personal communications, March 24, 2005). Similarly, in the study over 68% of participants were females (see Table 8).

A cross-tabulation of gender and race demonstrated that 69.22% of the participants were Caucasian females. The 2004 U.S. Census reports that 75.1% of the U.S. population are Caucasian. In Oklahoma, the Caucasian population is 78% of the total population (Statistical abstract of Oklahoma, 2000).

The 874 TCC students that participated in the study are somewhat similar in racial composition to that of the United States and Oklahoma. Caucasians make up 66.7% of the participants in the study and are slightly less than the 75.19% of the U.S. population and the 78% of the state of Oklahoma.

While African Americans represent about 12.3% of the nation's population, 9.2% of Oklahoma's population are

African Americans. African Americans make up 9% of the total student body at Tulsa Community College (J. Worley, personal communication, March 24, 2005). The African American population is slightly larger in this study.

The population of Native Americans in Oklahoma in 2000 was 7.1% (http://www.odoc.state.ok.us). Tulsa Community College reports that 7% percent of its student body are Native Americans (J. Worley, personal communication, March 24, 2005). The Native American population is slightly larger in this study. The U.S. and state census population of race and gender is representative of the population used in the study.

Table 8: Frequency of Gender and Race for TCC Participants

Variable	Frequency	Percent
Gender		
Male	274	31.05
Female	596	68.05
Total	870	100.00
Race		
African American	132	15.02
Asian	23	2.7
Hispanic	30	3.5
Native American	72	8.3
White	578	66.70
Other	32	3.7
Total	867	100.00

The 2004 U.S. Census reports that 75.3% of the nation's population was 18 years of age or older. The state of Oklahoma reports that 75.1% of the population was 18 years

of age or older (http://www.odoc.state.ok.us). Tulsa Community College reports during the 2004 Spring semester, 38% of their students were 21 years of age or less (J. Worley, personal communication, March 24, 2005). This age group represented the highest number of students enrolled. The next highest group were those students that were between the ages of 22-31. They represented 36% of the total student body (J. Worley, personal communication, March 24, 2005).

Of those completing the survey, 858 provided their age (see Table 9). Almost 50% of the participants were 21 years of age or younger. There were 158 participants who were the mode age of 19 years old. The mean score was 25.59 years of age with a standard deviation of 8.59. The median age was 22 years old.

Table 9: Distribution of Age of TCC Participants

Ages	Number	Percent
16-19	229	27
20-22	238	28
23-29	182	21
30-28	209	24
Total	858	100

Factor Analysis

Once the data were collected, the first statistical analysis sought to check to see if the items in the Multiple Intelligences Survey (MIS) were congruent with Howard Gardner's underlying theory of Multiple Intelligences.

Therefore, a factor analysis was conducted. Factor analysis is a statistical method for researching the intercorrelations among a set of test scores to determine the number of factors or constructs needed to explain the intercorrelations (Ary, Jacobs, & Razavieh, 1996, p. 271). "It is a family of procedures for removing the redundancy from a set of correlated variables and representing the variables with a small set of 'derived' variables, or factors" (Kachigan, 1991, p. 237). Thus, factor analysis provides a method to reduce the data to form a set of related variables (Ary, Jacobs, & Razavieh, 1996, p. 271), and "in each case the subset of variables can be thought of as manifestations of an abstract underlying dimension--a factor" (Kachigan, 1991, p. 237). Factor analysis finds the groups of variables that are highly correlated with each other and are not directly observable (Ary, Jacobs, & Razavieh, 1996, p. 271).

MIS is based on the nine Multiple Intelligences categories conceptualized by Howard Gardner. These MI categories represented the abstract underlying dimensions of the preference indicator. Therefore, a factor analysis was conducted with the 874 MIS responses to confirm these factors. Since the sample size should preferably be 10 or more times as large as the number of variables in

multivariable research (Roscoe, 1975, p. 184), this sample was large enough to eliminate the concern of sampling error.

This analysis used a principal components factor analysis. A "principal-components analysis is a relatively straightforward method of transforming a given set of variables into a new set of composite variables or principal components that are orthogonal (uncorrelated) to each other" (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975, p. 470).

> In perhaps the most common variation of factor analysis, called principal components factor analysis, as many factors are initially extracted as there are variables....The first extracted factor typically accounts for the largest part of the total variance inherent in the data collection....Each succeeding factor accounts for less and less of the total variance. (Kachigan, 1991, p. 245)

Because of this feature, "principal components analysis is often used as a preliminary step to help decide the difficult question of how many factors...represent abstraction of the input variables" (p. 246).

45-Item Form of MIS

It was anticipated that the principal components analysis would reveal nine factors with eigenvalues of greater than 1.0. Eigenvalues refer to the variance existing in the variables (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975, p. 442), and an eigenvalue "corresponds to the equivalent number of variables which a factor represent....

One frequently used rule of thumb is to retain factors to the point where an additional factor would account for less variance than a typical variable; that is, less than one eigenvalue" (Kachigan, 1991, p. 246). Nine factors were expected to have eigenvalues greater than 1.0 because there are nine Multiple Intelligences categories. However, 16 possible factors had eignevalues greater than 1.0; these values were as follows: 3.43, 2.93, 2.78, 2.29, 2.04, 1.78, 1.65, 1.43, 1.40, 1.32, 1.28, 1.24, 1.13, 1.10, 1.08, 1.00. Since each item in the 45-item MIS could account on the average for 2.22% (100%/45 items = 2.22%) of the total variation in the instrument (Kachigan, 1991, p. 246), the first and strongest factor accounted for only 7.61% of the variance in the analysis, and the sixteenth factor only accounted for 2.22% of the variance. Since the differences between the factors were small and gradual, a scree plot, which graphs the eigenvalues and the factors in a curve and which shows the random error variance or the "rubble" at the tail of the curve (p. 246), was not helpful in identifying how many factors to retain from the analysis. To test all possibilities for meeting the MI construct criterion of nine factors, eight additional factor analyses were run. Each one held the number of factors fixed at between two and nine.

The 8-factor solution was determined to be the best

explanation of the data (see Table 10). The factors accounted for 40.74% of the variance with the following eigenvalues: Factor 1--3.43, Factor 2--2.93, Factor 3--2.78, Factor 4--2.29, Factor 5--2.04, Factor 6--1.78, Factor 7--1.65, and Factor 8--1.43. These items tentatively formed the following categories: Factor 1--Active (physical) Learning, Factor 2--Concrete Learning Involving Mental Processes, Factor 3--Abstract Mental Learning, Factor 4--Structure and Order, Factor 5--Nature, Factor 6--Dealing with Ideas, Factor 7--Dealing with People, and Factor 8--Introspection. However, these factors do not independently represent Gardner's MI categories. All of the factors are made up of a combination of items from different MI categories. The failure of the original principal components analysis and the eight follow-up analyses raised two important questions: (a) Is there an interaction among the MI categories conceptualized by Howard Gardner and (b) are the items in the Multiple Intelligences Survey correctly identifying a single MI category as conceptualized by Howard Gardner?

Table 10: 8-Factor Solution for Factor Analysis of 45-Item Version of Multiple Intelligences Survey

MI	Loading	Item
Factor 1		
Body	-0.674	19. I enjoy outdoor games.
Verbal	0.547	35. I write for pleasure.
Body	-0.544	1. I live an active lifestyle.
Inter	-0.467	3. I am a "team player".
Inter	-0.434	3. Things such as clubs and extracurricular activities are fun.
Body	-0.428	37. I learn by doing.
Factor 2		
Music	-0.492	33. Remembering song lyrics is easy for me.
Body	-0.445	1. Activities such as arts and crafts are enjoyable pastimes.
Inter	0.444	21. Participating in politics is important.
Music	-0.422	42. Moving to a beat is easy for me.
Visual	-0.413	36. I enjoy creating art using varied media.
Logic	0.406	14. I can complete calculations quickly in my head.
Music	-0.398	6. I enjoy many kinds of music.
Natural	0.395	34. Putting things in hierarchies makes sense to me.
Music	-0.387	24. I have always been interested in playing a musical instrument.
Intra	0.371	22. Social justice issues concern me.
Natural	0.32	43. I enjoy categorizing things by common traits.
Factor 3		
Visual	-0.616	9. I enjoy doing three dimensional puzzles.
Exist	0.454	2. I enjoy discussing questions about life.
Verbal	-0.448	8. Word puzzles like crosswords and jumbles are fun.
Exist	0.438	11. Questions about the meaning of life are important to me.
Logic	0.398	5. Structure helps me be successful.

Body	-0.385	28. I like working with tools.
Intra	0.346	4. I learn best when I have an emotional attachment to the subject.
Exist	0.305	2. Meditation exercises are rewarding.
Factor 4		
Exist	-0.478	29. Studying history helps give me perspective.
Visual	0.438	27. Re-arranging a room is fun to me.
Logic	0.427	32. I get easily frustrated with disorganized people.
Verbal	0.398	26. I keep a journal.
Logic	0.37	41. Step-by-step directions are a big help.
Logic	0.364	23. I find working on computer spreadsheet or database rewarding.
Factor 5		
Exist	-0.522	38. I like visiting breathtaking sites in nature.
Natural	-0.519	16. Animals are important in my life.
Natural	-0.485	25. Hiking is an enjoyable activity.
Factor 6		
Visual	-0.484	18. I can recall things in mental pictures.
Music	-0.422	45. I can imagine ideas in my mind.
Verbal	-0.327	17. It is easy for me to explain verbally my ideas to others.
Intra	0.313	13. Fairness is important to me.
Music	0.301	15. I focus in on sounds.
Inter	0.23	39. I enjoy discussions with family and friends.
Factor 7		
Intra	-0.374	4. Working alone can often be more productive than working in a group.
Inter	0.333	12. I learn best interacting with others.
Factor 8		
Natural	0.407	7. My home has a recycling system in place.
Intra	0.322	31. I need to know why I should learn something before I do it.

Verbal	0.286	44. Foreign languages interest me.

Individual MI Areas

Since the possible interaction of MI categories could not be investigated if the items in the MIS were not accurately measuring the concepts for which they were written, the question of the validity of the items was addressed first. Since each of the five items for each of the MI categories was designed to measure a single concept, a separate principal components factor analysis was conducted for each MI category using the responses of the 874 community college students to the five items in the category (see Table 11). Eight of the nine analyses revealed that the items were measuring more than one concept. Seven of these eight were measuring two concepts while one was measuring three concepts.

Table 11: Factor Analysis for Items in Each of the Multiple Intelligences Areas

Item	Factor 1	Factor 2	Factor 3
Body			
Item 19	0.756		
Item 10	0.645		
Item 28	0.595		
Item 37	0.58		
Item 1	-0.203		
Existential			
Item 11	0.835		
Item 20	0.811		

Item 2	0.395		
Item 38		0.81	
Item 29		0.674	
Interpersonal			
Item 3	0.752		
Item 12	0.705		
Item 30	0.696		
Item 21		0.772	
Item 39		-0.633	
Intrapersonal			
Item 13	0.618		
Item 22	0.573		
Item 40	0.53		
Item 4	0.448		
Item 31		0.781	
Logical			
Item 32	0.645		
Item 41	0.558		
Item 5	0.536		
Item 14		0.684	
Item 23		0.62	
Musical			
Item 24	0.676		
Item 33	0.62		
Item 6	0.611		
Item 42	0.589		
Item 15		0.755	
Naturalistic			
Item 43	0.703		
Item 34	0.676		
Item 25		0.643	
Item 16		0.632	
Item 7		0.538	
Verbal			
Item 35	0.815		
Item 26	0.811		
Item 17	0.104		
Item 8		0.765	
Item 44		0.685	
Visual			

Item 45	0.678		
Item 18	0.632		
Item 9	0.518		
Item 27		0.833	
Item 36			0.748

Although it is possible for each conceptual MI area to be made up of several constructs, it was the goal of this preference indicator development process to confine the items in each area to MIS to a single factor so that additional analyses could be conducted. Therefore, the factor analyses of the nine separate MI areas were used to reduce the MIS to three items for each MI category (see Table 12).

Table 12: Factor Analyses for Each Multiple Intelligences Area with Three Items

Loading	Item
Bodily/Kinesthetics	
0.817	19. I enjoy outdoor games.
0.694	10. I live an active lifestyle.
0.614	28. I like working with tools.
Existential	
0.853	11. Questions about the meaning of life are important to me.
0.83	20. I enjoy discussing questions about life.
0.411	2. Meditation exercises are rewarding.
Interpersonal	
0.756	3. I am a “team player”.
0.704	12. I learn best interacting with others.
0.694	30. Things such as clubs and extra-curricular activities are fun.
Intrapersonal	

0.708	22. Social justice issues concern me.
0.658	13. Fairness is important to me.
0.526	40. I learn best when I have an emotional attachment to the subject.
Logical	
0.719	5. Structure helps me be successful.
0.704	32. I get easily frustrated with disorganized people.
0.607	41. Step-by-step directions are a big help.
Musical	
0.706	6. I enjoy many kinds of music.
0.697	33. Remembering song lyrics is easy for me.
0.689	24. I have always been interested in playing a musical instrument.
Naturalistic	
0.749	16. Animals are important in my life.
0.746	25. Hiking is an enjoyable activity.
0.377	7. My home has a recycling system in place.
Verbal	
0.816	26. I keep a journal.
0.816	35. I write for pleasure.
0.224	44. Foreign languages interest me.
Visual	
0.745	18. I can recall things in mental pictures.
0.724	45. I can imagine ideas in my mind.
0.433	9. I enjoy doing three dimensional puzzles.

Bodily/Kinesthetic was the only MI category in which all five items loaded into a single factor; however, one of these items had a negative loading. The three items with the highest loadings were selected for the final version of MIS. The following MI categories had two factors: Existential, Interpersonal, Intrapersonal, Logical, Musical, and Naturalistic. Visual had three factors. For all of these except Naturalistic, the three highest loading items in Factor 1 were selected for inclusion in the final form of

MIS because the first factor explains the greatest amount of variance in the analysis (Kachigan, 1991, p. 245) and because the factor loadings "represent the degree to which each of the variables correlates with each of the factors....Those variables with the highest loadings on a factor will be the ones that provide the meaning and interpretation of the factor" (p. 243). For Naturalistic, the items in Factor 2 were selected for inclusion in the final form of MIS because it contained three items.

The process of selecting the three items with the highest loadings from a factor with at least three items in it produced strong factors for all MI categories except for Verbal Intelligence. The original principal components analysis with the five items had only two items with high loadings: Item 35--.815 and Item 26--.811. Therefore, three additional principal component factor analyses were conducted to determine which of the other items would combine most strongly with these two items. For each of these analyses, either Item 8, 17, or 44 was combined with Items 26 and 35 for the analysis. The analysis with Item 44 and the one with Item 17 each produced one factor, but the analysis with Item 8 (.224) produced two factors (see Table 13). Because the factor loading for Item 44 (.224) was slightly higher than the one for Item 17 (.108), Item 44 was

selected as the third item for the Verbal Intelligence category of MIS.

Table 13: Factor Analyses for Possible Three Items in Verbal Multiple Intelligences Area

Item	Factor 1	Factor 1	Factor 1	Factor 2
Item 26	0.816	0.821	0.826	
Item 35	0.816	0.827	0.828	
Item 44	0.224			
Item 17		0.108		
Item 8				0.998

Final Form of MIS

Thus, the process of factor analysis was used to confirm the construct validity of MIS. This data reduction procedure resulted in MIS being decreased from its 45-item, field-testing version to a 27-item preference indicator. Each of the nine MI categories contains three items that form a single abstract dimension, and these items are highly correlated with that dimension or factor as indicated by their factor loadings.

In addition, the factor analysis process contributed to establishing the content validity of the items in MIS. "Item validity is concerned with whether the test items are relevant to measurement of the intended content area" (Gay & Airasian, 2000, p. 163). The high factor loadings for the 27 items in the final version of MIS confirm that each item

contributes to explaining the factor. Moreover, each of the items are highly correlated with the total score for the three items in the MI category. For the 27 items, the correlations are as follows: .800 and over--1, .700 to .799--12, .600 to .699--9, and .500 to .599--5 (see Table 14).

Table 14: Correlation of Individual Items to Total Score for Nine Multiple Intelligences Areas for Final 27-Item Version of Multiple Intelligences Survey with 874 College Students

Bodily/Kinesthetics			
Item	Q10	Q19	Q28
Corr.	0.701	0.749	0.68
Existential			
Item	Q2	Q11	Q20
Corr.	0.576	0.82	0.747
Interpersonal			
Item	Q3	Q12	Q30
Corr.	0.731	0.698	0.725
Intrapersonal			
Item	Q13	Q22	Q40
Corr.	0.589	0.657	0.652
Logical			
Item	Q5	Q32	Q41
Corr.	0.666	0.726	0.637
Musical			
Item	Q6	Q24	Q33
Corr.	0.65	0.733	0.704
Naturalistic			
Item	Q7	Q16	Q25
Corr.	0.507	0.733	0.677
Verbal			
Item	Q26	Q35	Q44
Corr.	0.724	0.738	0.522
Visual			
Item	Q9	Q18	Q45
Corr.	0.554	0.701	0.679

Summary

Factor analysis was used to confirm the construct validity of the items of the Multiple Intelligences Survey and to establish construct validity for the items. Principal components factor analysis was used with the responses from

874 community college students. The first factor analysis failed to confirm the validity of the 45 items in the MIS. It not only had eight factors instead of the nine Multiple Intelligences areas conceptualized by Howard Gardner, but also each of the factors contained items from more than one MI category. Therefore additional analyses were conducted to eliminate poorly performing items. Separate factor analyses were conducted with the five items in each of the nine MI areas. This process resulted in the number of items in each MI area being reduced to three items that had high factor loadings and that correlated highly with the total score for all of the items in the MI category. Thus, the final form of the Multiple Intelligences Survey consists of 27 items with construct and content validity (see Table 15).

Table 15: Order of Items for Final 27-Item Version of Multiple Intelligences Survey

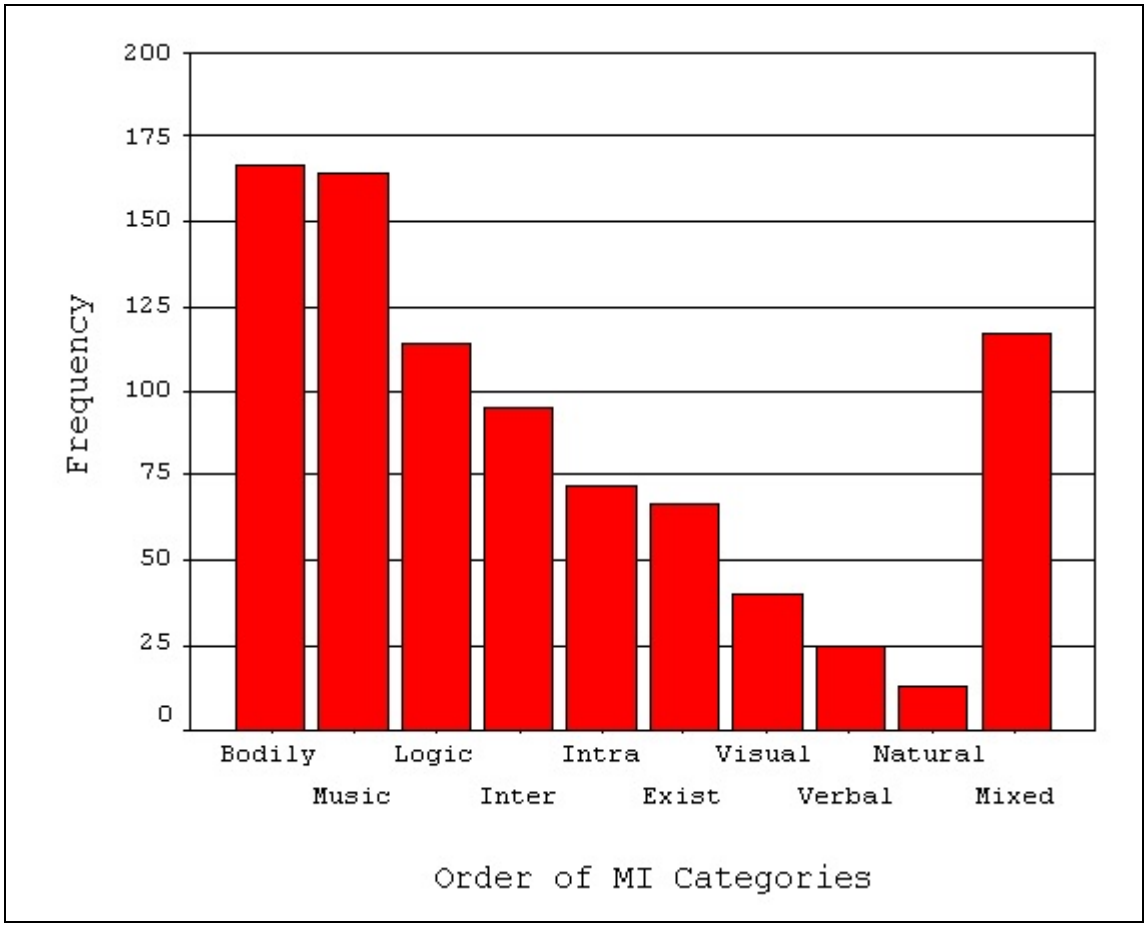
Item No.		MI	Item
Orig.	New		
Set 1			
10	1	Body	I live an active lifestyle.
2	2	Exist	Meditation exercises are rewarding.
3	3	Inter	I am a "team player".
13	4	Intra	Fairness is important to me.
5	5	Logic	Structure helps me be successful.
6	6	Music	I enjoy many kinds of music.
7	7	Natural	My home has a recycling system in place.
26	8	Verbal	I keep a journal.
9	9	Visual	I enjoy doing three dimensional puzzles.
Set 2			
19	10	Body	I enjoy outdoor games.
11	11	Exist	Questions about the meaning of life are important to me.
12	12	Inter	I learn best interacting with others.
22	13	Intra	Social justice issues concern me.
32	14	Logic	I get easily frustrated with disorganized people.
24	15	Music	I have always been interested in playing a musical instrument.
16	16	Natural	Animals are important in my life.
35	17	Verbal	I write for pleasure.
18	18	Visual	I can recall things in mental pictures.
Set 3			
28	19	Body	I like working with tools.
20	20	Exist	I enjoy discussing questions about life.
30	21	Inter	Things such as clubs and extracurricular activities are fun.
40	22	Intra	I learn best when I have an emotional attachment to the subject.
41	23	Logic	Step-by-step directions are a big help.
33	24	Music	Remembering song lyrics is easy for me.
25	25	Natural	Hiking is an enjoyable activity.
44	26	Verbal	Foreign languages interest me.
45	27	Visual	I can imagine ideas in my mind.

Multiple Intelligences Survey Scores

The final form of the Multiple Intelligences Survey

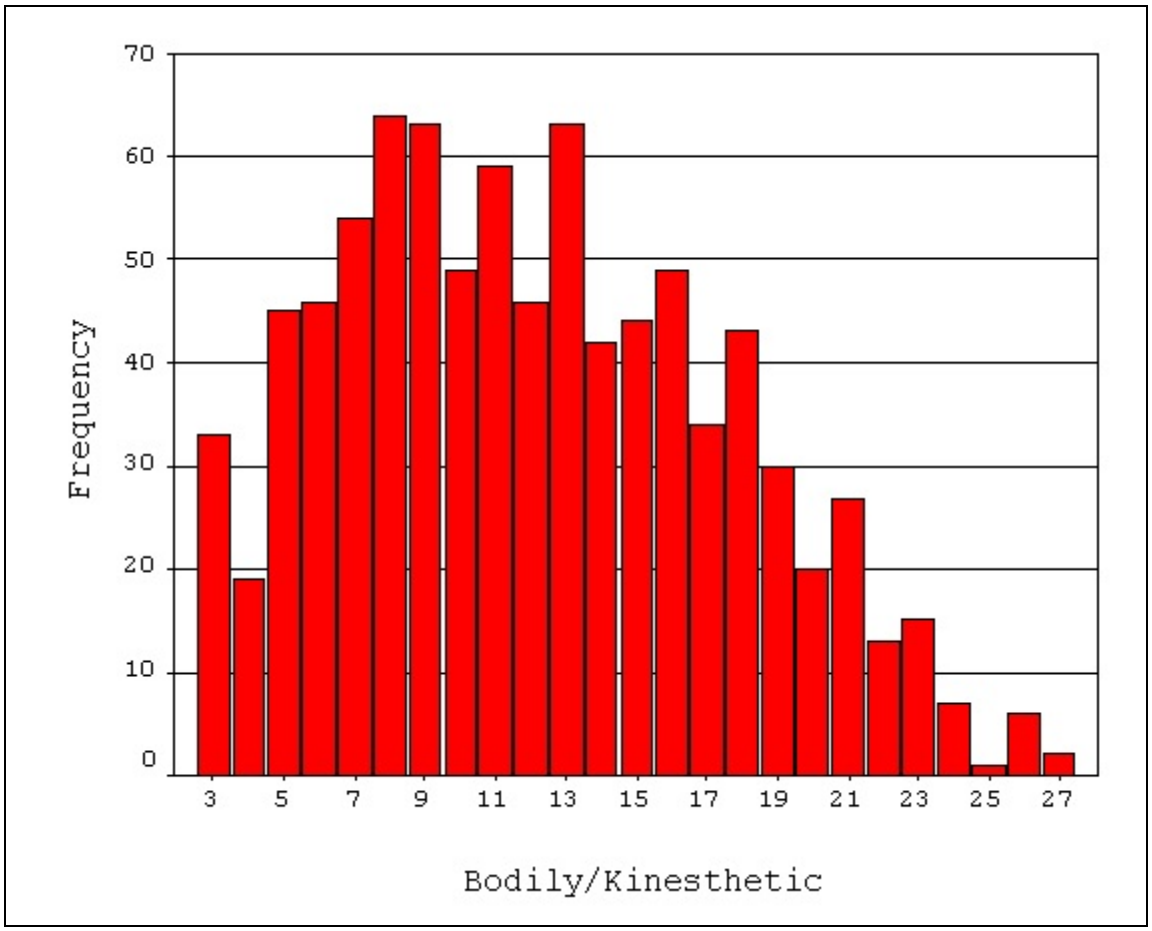
after the factor analyses was used for constructing a MI profile of the 874 Tulsa Community College students. The possible scores ranged from 3 to 27 with a midpoint of 15. This is because the participants ranked as a 1 the items that were the most like them. Scores were computed for each participant in each MI area by summing the ranking for each of the three items in each area. Low scores indicate support of a MI area while high scores indicate the MI area does not apply to the participant. The area with lowest score was identified as the person's preferred MI area. The MI preferred area for the 874 TCC students that participated in the study were distributed over the nine MI categories (see Figure 1). The MI preferences categories were distributed as follows: Bodily/Kinesthetics Intelligence--19%, Musical Intelligence–18%,Logical Mathematical Intelligence--13%, Interpersonal Intelligence–10%, Interpersonal--10.9%,Intrapersonal--8.2%, Existential--7.7%, Visual--4.6%, Verbal--2.9%, and Naturalistic--2.9%. Some (13.4%) of the participants had an equal high score in more than one MI area; these preferences were labeled as "mixed".

Figure 1: Distribution of Multiple Intelligences Categories for TCC Participants



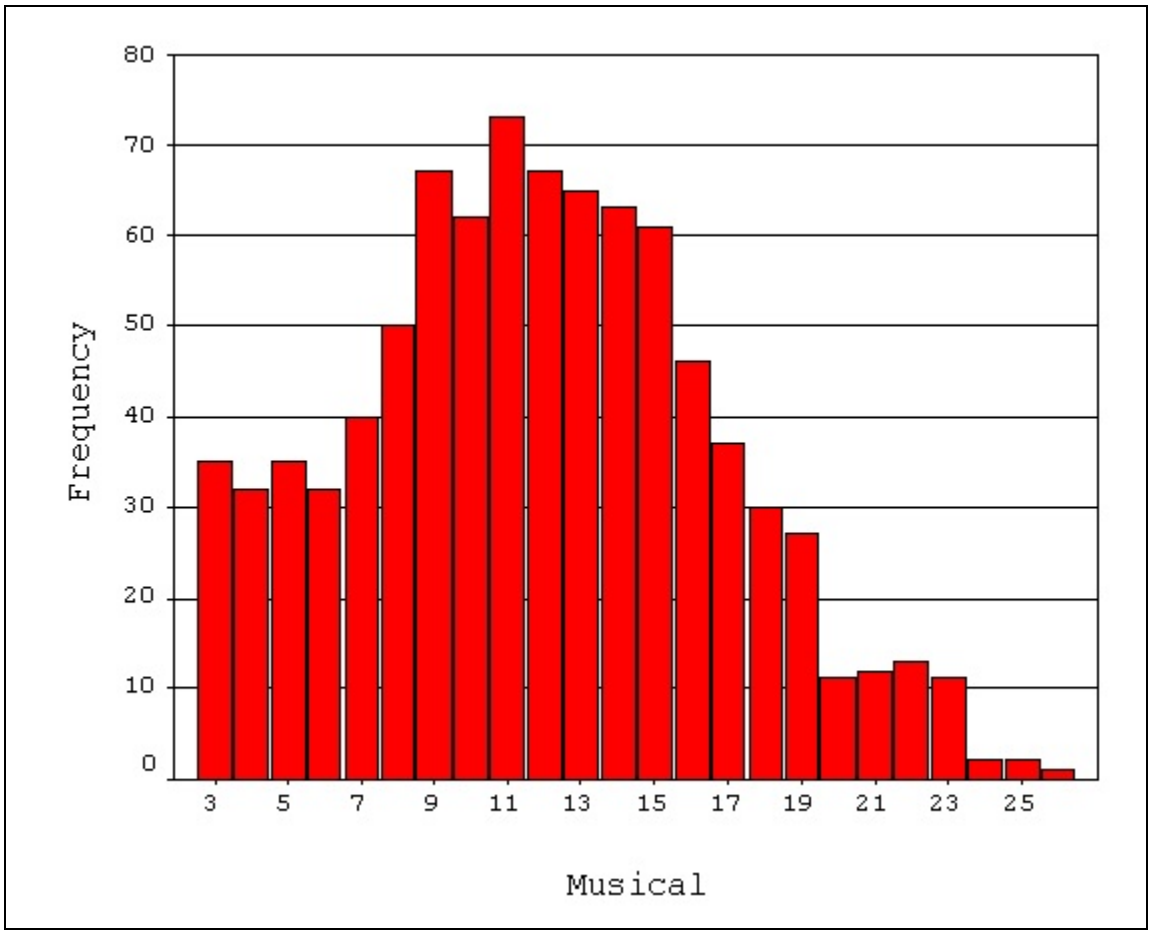
The most popular MI category ranked by participants was Bodily/Kinesthetics. Bodily/Kinesthetic Intelligence reflects a strength used in athletics and in different forms of movement or dancing. The scores ranged from 3 to 27. The distribution of scores was skewed toward the end of the range with the lowest number ranking (see Figure 2). The mean score was 12.13 with a standard deviation of 5.41. The median score was 12, and the mode score was 8.

Figure 2: Distribution of Bodily/Kinesthetic Scores for TCC Participants



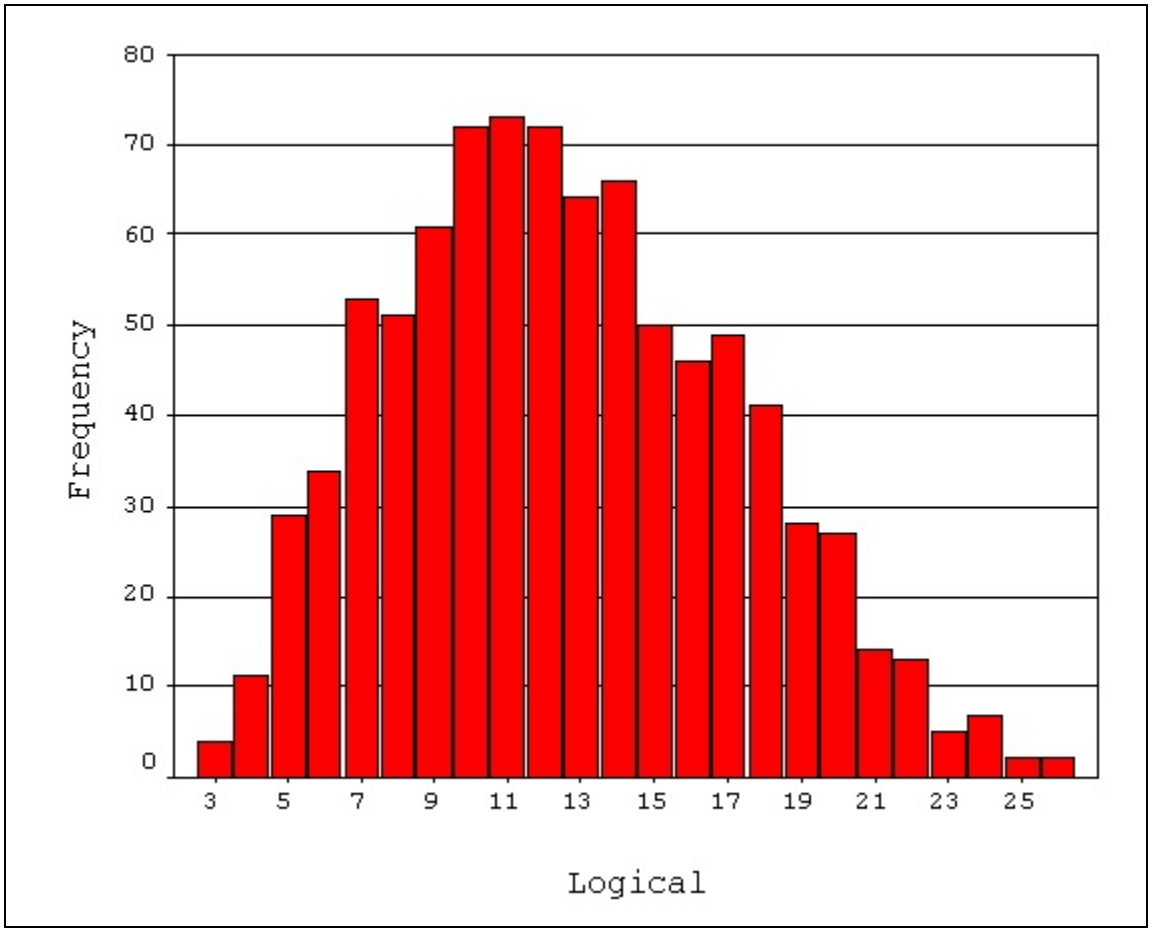
Musical was the second highest MI area ranked by the TCC students. Musical Intelligence reflects the understanding and appreciation of singing and listening to music. The scores ranged from 3 to 26. The distribution of scores was a bell-shaped curve that was skewed toward the end of the range with the lowest number ranking (see Figure 3). The mean score was 11.79 with a standard deviation of 4.85. The median score was 12, and the mode score was 11. The numbers for Bodily/Kinesthetics and Musical are almost the same, but Bodily/Kinesthetics was skewed more.

Figure 3: Distribution of Musical Scores for TCC Participants



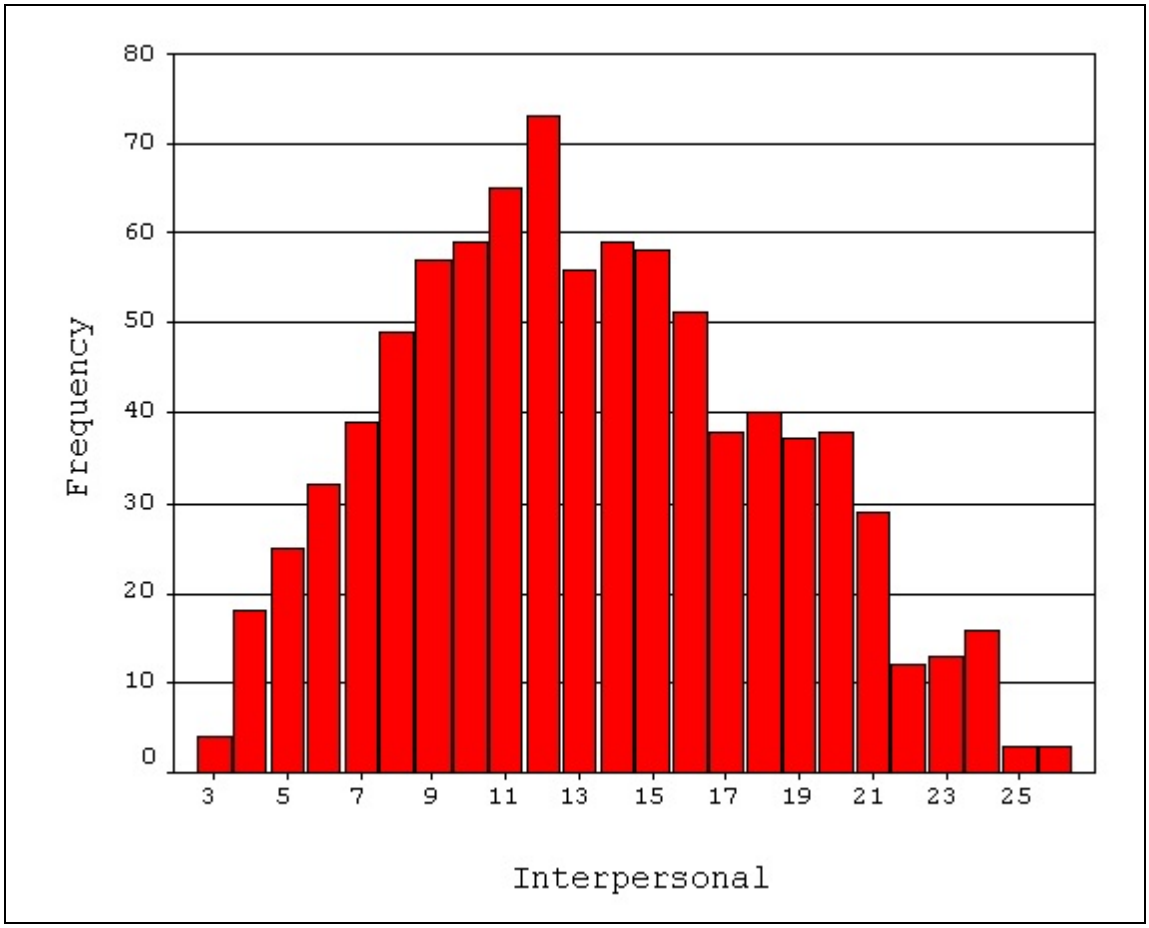
Logical/Mathematical was the third highest MI area ranked by the TCC students. Logical/Mathematical Intelligence reflects a strength used in thinking logically and in solving mathematics equations. The scores ranged from 3 to 26. The distribution of scores was a bell-shaped curve with a slight skew toward the end of the range with the lowest number ranking (see Figure 4). The mean score was 12.55 with a standard deviation of 4.61. The median score was 12, and the mode score was 11.

Figure 4: Distribution of Logical/Mathematical Scores for TCC Participants



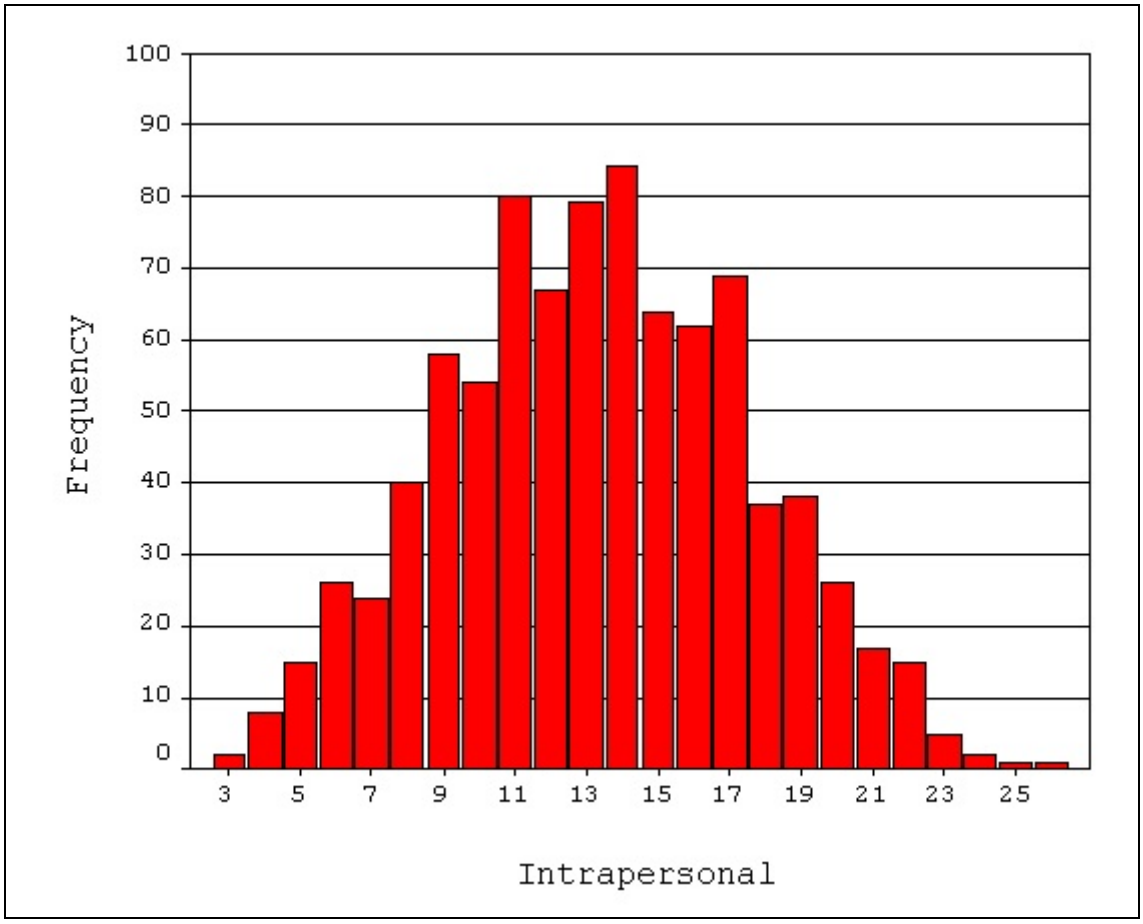
Interpersonal was the fourth highest MI area ranked by the TCC students. Interpersonal Intelligence reflect a strength used in relating to others. The scores ranged from 3 to 27. The distribution of scores was a bell-shaped curve with a slight skew towards the end of the range with the lowest number ranking (see Figure 5). The mean score was 13.20 with a standard deviation of 5.02. The median score was 13, and the mode score of 12.

Figure 5: Distribution of Interpersonal Scores for TCC Participants



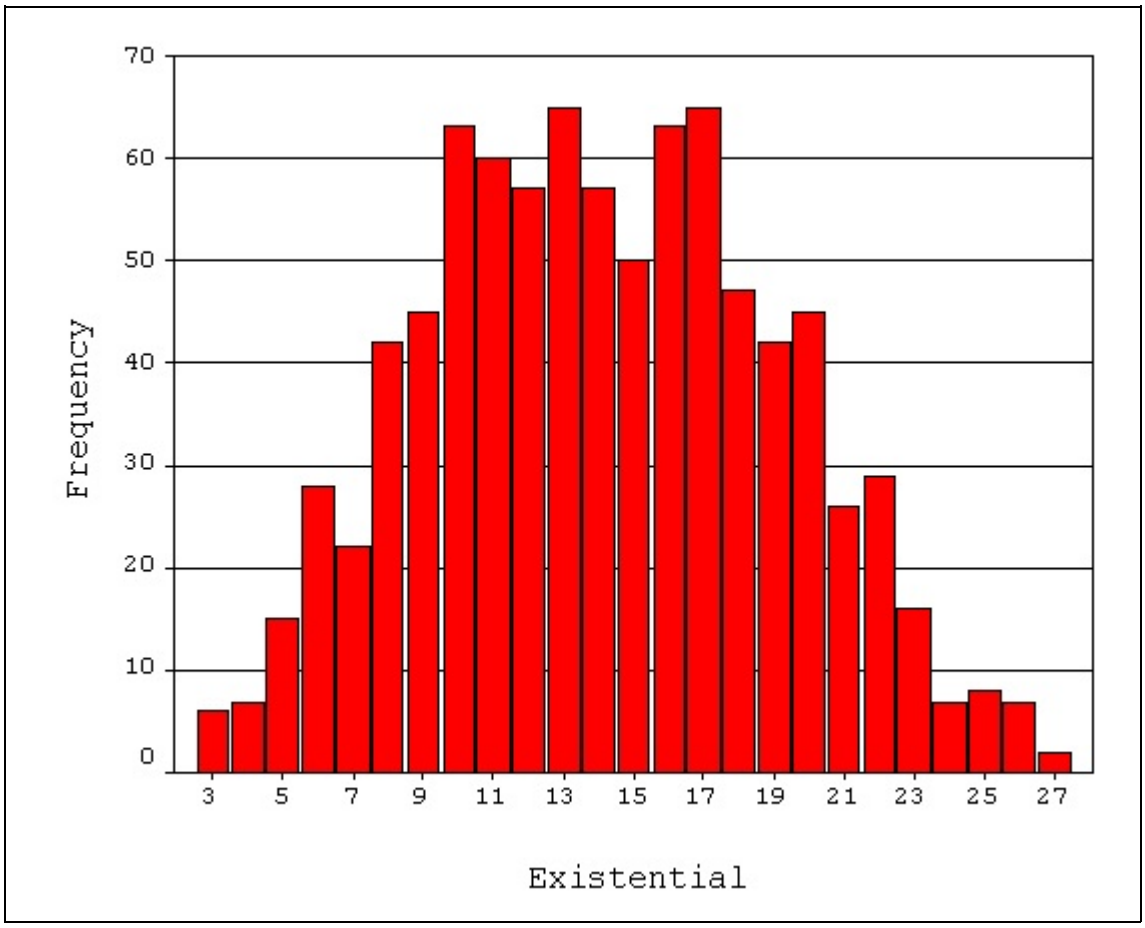
Intrapersonal was the fifth highest MI area ranked by the TCC students. Intrapersonal Intelligence reflects a strength used in understanding self. The scores ranged from 3 to 26. The distribution of scores was generally a bell-shaped curve (see Figure 6). The mean score was 13.32 with a standard deviation of 4.23. The median score was 13, and the mode score was 14.

Figure 6: Distribution of Intrapersonal Scores for TCC Participants



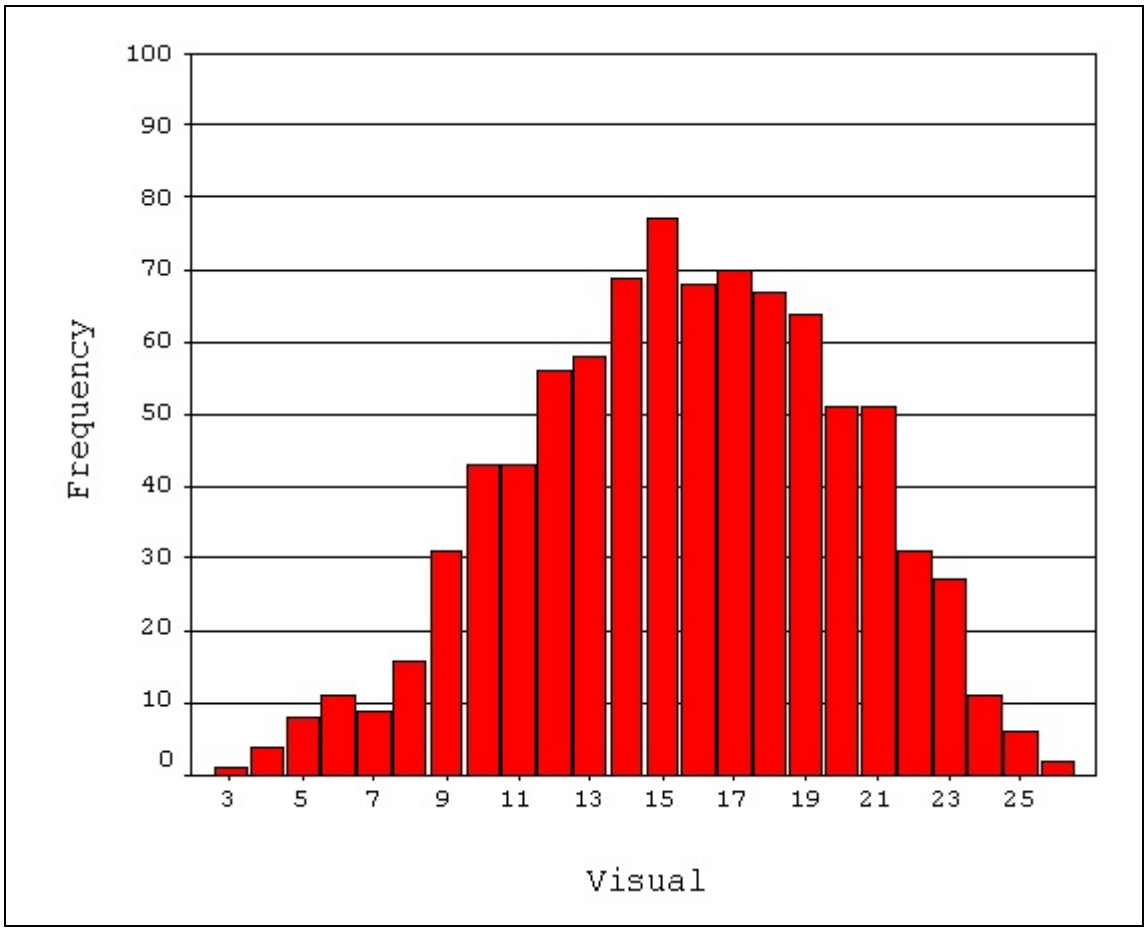
Existential was the sixth highest MI area ranked by the TCC students. Existential Intelligence reflects a strength used in relating to the spiritual existence. The scores ranged from 3 to 27. The distribution of scores was generally a bell-shaped curve (see Figure 7). The mean score was 14.15 with a standard deviation of 4.99. The median score was 14. There were multiple modes of 13 and 17.

Figure 7: Distribution of Existential Scores for TCC Participants



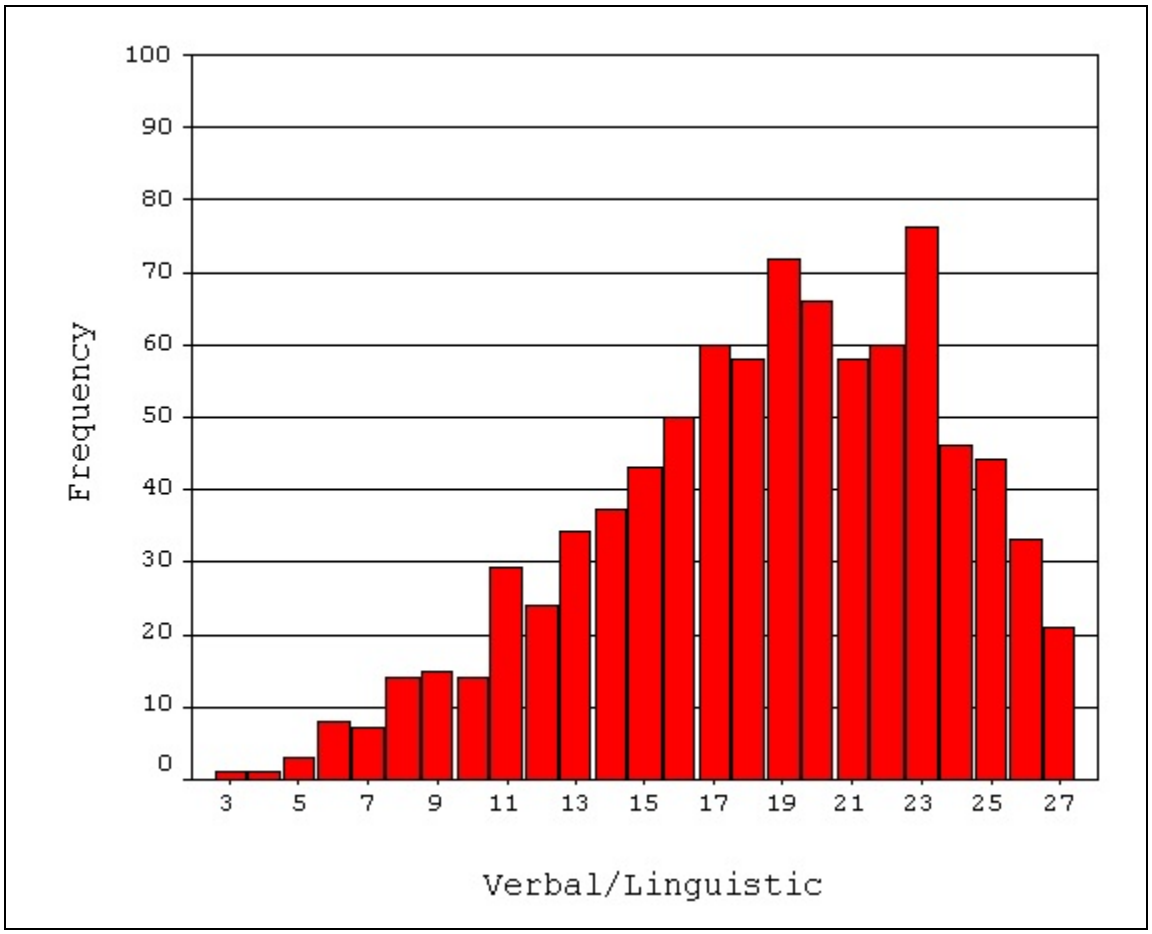
Spatial/Visual was the seventh highest MI area ranked by the TCC students. Spatial/Visual Intelligence reflects a strength used in arranging the physical environment. The scores ranged from 3 to 26. The distribution of scores was a bell-shaped curve skewed towards the end of the range with the highest number ranking (see Figure 8). The mean score was 15.57 with a standard deviation of 4.43. The median score was 16, and the mode score was 15.

Figure 8: Distribution of Spatial/Visual Scores for TCC Participants



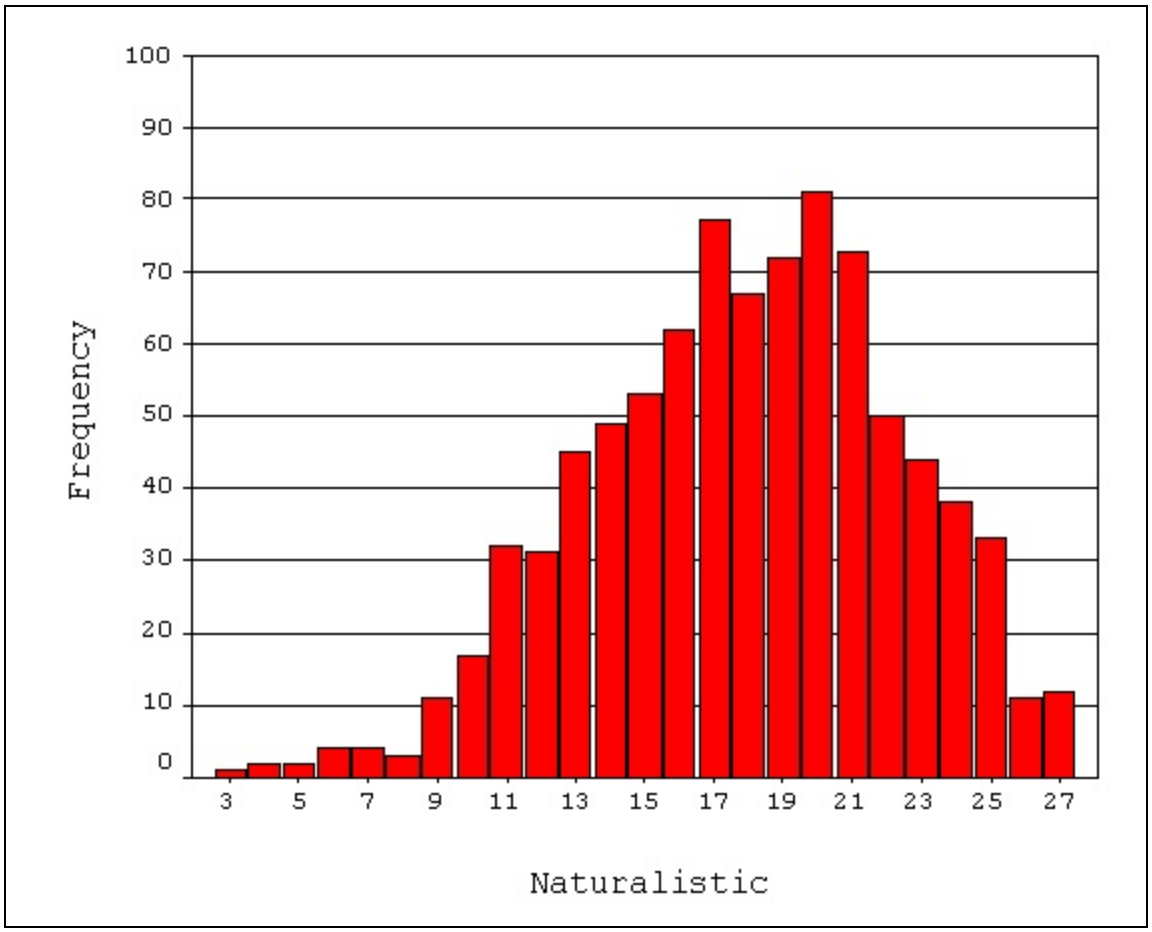
Verbal/Linguistic was the eighth highest MI area ranked by the TCC students. Verbal/Linguistic Intelligence reflects a strength used in reading, writing, listening, and speaking. The scores ranged from 3 to 27. The distribution of scores was a bell-shaped curve which was heavily skewed toward the end of the range with the highest number ranking (see Figure 9). The mean score was 18.52 with a standard deviation of 5.01. The median score was 19, and the mode score was 23.

Figure 9: Distribution of Verbal/Linguistic Scores for TCC Participants



Naturalistic was the lowest MI area ranked by the TCC students. Naturalistic Intelligence reflect an understanding and appreciation of nature. The scores ranged from 3 to 27. The distribution of scores was a bell-shaped curve which was heavily skewed toward the end of the range with the highest number ranking (see Figure 10). The mean score was 17.90 with a standard deviation of 4.45. The median score was 18, and the mode score was 20.

Figure 10: Distribution of Naturalistic Scores for TCC Participants



Relationship of Demographic Variables and MI

The relationship was examined between MI and the demographic variables of gender, age, and race. Gender was divided between male and female. Age was divided between those participants 21 and over and those under the age of 21. This division was made because about half of the sample was 21 years and under. This division also somewhat reflects the differences between traditional students and non-traditional students. Race was divided into White and Non-White. This division was made because over three-fourths of the sample was White. Because each variable could be divided into two groups, individual *t*-tests were run to analyze differences.

Using a criterion level of .05, several statistical differences were found (see Table 16). For gender, the statistical differences were found in the MI categories of Verbal, Existential, and Bodily/Kinesthetics. For age, the statistical differences were found in the MI categories of Existential, Musical, Interpersonal, Intrapersonal, and Visual. For race, the statistical differences were found in the MI categories of Naturalistic, Interpersonal, and Verbal.

Although, statistical differences were found for these items, there was no practical significant differences found.

Even if some facts are statistically significant, that does not mean that they have practical significance (Gay, & Airasian, 2000, p. 522). "If a result is statistically significant, it means only that the result probably did not occur by chance, and so one can generalize from the sample to the population that it represents" (Gall, Gall, & Borg, p. 167). Although, significant differences were found, researchers warn not to confuse statistical significance with practical significance. "A statistically significant result only means that it is likely to be generalizable beyond that sample, or in other words, that it is not a chance finding. Although generalizable, the obtained result might reflect such a small difference between groups that it has little practical significance" (p. 160). All of these findings were judged to lack practical significance. On a nine point ranking scale the ranges for those with significant differences were from .18 to .56 (see Table xx). Therefore, because the per item differences were so small, they were of no practical significance.

Table 16: t-Test for Demographic Variables by Multiple Intelligences Areas

Intelligences	t	df	p	Total	Difference Per Item
Gender					
Verbal	5.54	781	0	2.56	0.51
Existential	2.59	781	0.01	1.31	0.26
Bodily	2.43	781	0.02	1.22	0.24
Musical	1.61	781	0.11	0.87	0.17
Interpersonal	1.6	781	0.11	0.75	0.15
Naturalistic	1.6	781	0.11	0.69	0.14
Intrapersonal	1.17	781	0.24	0.51	0.1
Logical	0.76	781	0.45	0.37	0.07
Visual	0.54	781	0.59	0.24	0.05
Age					
Existential	4.8	785	0	2.22	0.44
Musical	4.06	785	0	2.01	0.4
Interpersonal	4.05	785	0	1.72	0.34
Intrapersonal	3.95	785	0	1.59	0.32
Visual	2.16	785	0.03	0.89	0.18
Logical	1.62	785	0.11	0.72	0.14
Bodily	0.49	785	0.62	0.23	0.05
Verbal	0.26	785	0.79	0.11	0.02
Naturalistic	0.05	785	0.96	0.02	0
Race					
Naturalistic	6.81	779	0	2.81	0.56
Interpersonal	2.8	779	0.01	1.27	0.25
Verbal	2.64	779	0.01	1.2	0.24
Intrapersonal	1.41	779	0.16	0.61	0.12
Bodily	1.37	779	0.17	0.67	0.13
Logical	0.95	779	0.34	0.45	0.09
Existential	0.73	779	0.46	0.36	0.07
Musical	0.68	779	0.5	0.36	0.07
Visual	0.47	779	0.64	0.2	0.04

In summary, the participants in this study were all students at Tulsa Community College taking General Education

classes during the Spring semester of 2004. The participants were asked to provide demographic data that were analyzed. The relationships with demographic data was examined. While some significant differences were found, the differences were very small and judged not to be practical differences.

Criterion-Related Validity

The lack of available valid and reliable instruments made it difficult to establish criterion-related validity for the Multiple Intelligences Survey. Although MIDAS has reported validity, the cost and restrictions on its used prevented it from being used in this study. Because of the limitation of comparison instruments, an exploratory criterion-related validity check was conducted. That is, the procedure was carried out with an instrument that did not have reported validity and reliability but that claims to identify Multiple Intelligences. This was done in the spirit of exploratory research which "tends to study many variables and their relationships in order to further understanding of the phenomena" (Borg & Gall, 1983, p. 31).

The Rogers Indicator of Multiple Intelligences, which was developed by J. Keith Rogers, was used for the exploratory criterion-related validity check. The RIMI is a 49 item instrument that is based on the original seven Multiple Intelligences described in Gardner's (1983) Frames

of Mind: The Theory of Multiple Intelligences. Participants respond to the frequency with which the statement applies to them using the following five-point Likert-type scale: 1–Rarely, 2–Occasionally, 3–Sometimes, 4–Usually, and 5–Almost Always.

Both the Multiple Intelligences Survey (MIS) and the Rogers Indicator of Multiple Intelligences (RIMI) were completed by 43 Tulsa community college students in a General Education lab class. The MIS uses a ranking system while the RIMI uses a rating system. A low score on the MIS indicates a preference for a MI while a high score on the RIMI indicates that the MI applies to the respondent.

Correlations between the MIS and RIMI scores were computed to determine the relationship between the two instruments. Since the instruments are scored in the opposite direction, a negative correlation indicates the instruments are measuring a similar concept. The correlations between the MIS and RIMI were moderate for Musical Intelligence and Bodily/Kinesthetic Intelligences, mild for Verbal Intelligence, and weak for the other Multiple Intelligences (see Table 17). Thus, this exploratory check was not successful in establishing the criterion-related validity for the new instrument.

Table 17: Correlations between MIS and RIMI by MI Area

MI Area	r	p
Musical	-0.508	0.001
Bodily/Kinesthetic	-0.477	0.001
Verbal	-0.306	0.046
Logical	-0.159	0.307
Interpersonal	-0.107	0.493
Intrapersonal	-0.043	0.785
Visual	0.038	0.811

Reliability

The reliability of the Multiple Intelligences Survey was established by the test-retest process. The test-retest process was employed with 70 General Education students at Tulsa Community College (TCC). The new MI preference indicator was administered to these students and then re-administered 2 weeks later. For an acceptable finding of reliability, a correlation of at least .7 should be obtained. Four of the nine MI areas exceeded the .7 level, four were slightly below it, and one was at .5 (see Table 18). All were statistically significant. Thus, almost half of the items are at or above the generally accepted level for reliability and about half are slightly below this level.

Table 18: Reliability Coefficients for MI Areas

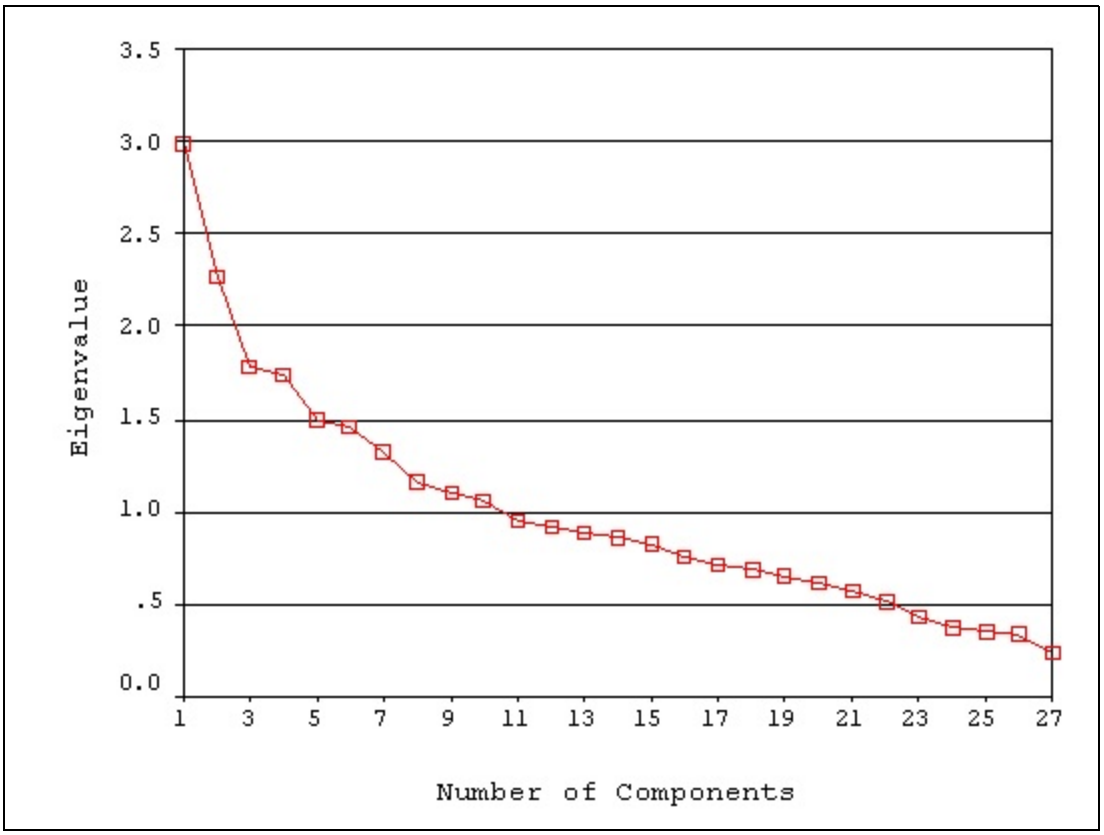
MI Area	r	p
Bodily/Kinesthetic	0.827	0
Verbal	0.754	0
Existential	0.734	0

Interpersonal	0.72	0
Intrapersonal	0.655	0
Naturalistic	0.638	0
Logical	0.594	0
Musical	0.587	0
Visual	0.5	0

Factor Analysis of 27-Item MIS

The final step in the analysis of the data from the 27-item version of the preference indicator was to conduct a factor analysis. The scree plot from the principal components analysis suggested that a 4-factor solution best explained the data (see Figure 10); the eigenvalues for these factors, which explained 32.54% of the variance in the analysis, were 2.99, 2.27, 1.78, and 1.74. Therefore, the four factors were rotated using the varimax rotation. "The rotation techniques redefine the factors in order to make sharper distinctions in the meaning of the factors" (Kachigan, 1991, p. 248). Varimax is a orthogonal technique which means that the factors are uncorrelated. It is so named because it maximizes the variance in the analysis, and it is the most widely used method of rotation (Nie et al., 1975, p. 485).

Figure 11: Scree Plot of the Principal Components Analysis of the 27-Item Version of the Multiple Intelligences Survey



The varimax rotation produced four interpretable factors (see Table 19). The first factor contains eight items. These included all three items from Existential Intelligence, two items from Naturalistic Intelligence, and one item from Bodily/Kinesthetic, Intrapersonal, and Verbal. The Existential and Verbal Intelligences had positive coefficients while the Naturalistic and Bodily/Kinesthetic had negative coefficients. The positive items from the Existential and Verbal Intelligences are conceptual and abstract. The negative items are concrete. Because of these opposite loadings, this factor was named Philosophical vs Physical.

The second factor contained six items. These included all three of the Interpersonal Intelligence items and two of the three Bodily/Kinesthetic Intelligence items. All of these had positive coefficients. One Naturalistic Intelligence item loaded negatively on the factor. Since these items collectively dealt with actively interacting in groups, this factor was named Social Activities.

The third factor contained nine items. All three Logical Intelligence items and two Intrapersonal Intelligence items had positive coefficients. All three Visual Intelligence items and one Verbal Intelligence items had negative coefficients. The Logical and Intrapersonal

Intelligence items include items in the affective domain such as fairness, success, help, frustration, and emotional attachment. The Visual and Verbal Intelligence items address cognitive activities such as recalling things, imagining, doing three dimensional puzzles, and learning a different language. Therefore, this factor was named Affective vs Cognitive.

The fourth factor contained four items. These included all four of the Musical Intelligence items and one Verbal Intelligence item. All of the items reflect a personal application of the item. Therefore, this factor was named Music and Me.

Table 19: Varimax Rotation of 4-Factor Solution for 27-Item Version of Multiple Intelligences Survey

Load	MI	Item
Factor 1: Philosophical vs Physical		
0.662	Exist	2. I enjoy discussing questions about life.
0.622	Exist	11. Questions about the meaning of life are important to me.
0.302	Exist	2. Meditation exercises are rewarding.
0.474	Intra	22. Social justice issues concern me.
0.447	Verbal	35. I write for pleasure.
-0.61	Natural	25. Hiking is an enjoyable activity.
-0.38	Natural	16. Animals are important in my life.
-0.47	Body	28 . I like working with tools .
Factor 2: Social Activity		
0.705	Inter	3. I am a "team player".
0.425	Inter	12. I learn best interacting with others.
0.549	Inter	3. Things such as clubs and extracurricular activities are fun.
0.53	Body	19. I enjoy outdoor games.
0.437	Body	1. I live an active lifestyle.
-0.38	Natural	7. My home has a recycling system in place.
Factor 3: Affective vs Cognitive		
0.532	Logic	41. Step-by-step directions are a big help.
0.412	Logic	5. Structure helps me be successful.
0.363	Logic	32. I get easily frustrated with disorganized people.
0.405	Intra	4. I learn best when I have an emotional attachment to the subject.
0.36	Intra	13. Fairness is important to me.
-0.57	Visual	45. I can imagine ideas in my mind.
-0.43	Visual	18. I can recall things in mental pictures.
-0.41	Visual	9. I enjoy doing three dimensional puzzles.
-0.33	Verbal	44. Foreign languages interest me.
Factor 4: Music and Me		
0.601	Music	33. Remembering song lyrics is easy for me.
0.559	Music	6. I enjoy many kinds of music.
0.551	Music	24. I have always been interested in playing a musical instrument.
0.363	Verbal	26. I keep a journal.

CHAPTER 5

SUMMARY, FINDINGS, AND RECOMMENDATIONS

Background

Educators acknowledge that a key to learning is to address individual differences among students. Howard Gardner of Harvard University and Project Zero has suggested that one way to address these differences and to make education more democratic and equitable is to redefine the concept of intelligence.

Intelligence traditionally has been defined in terms of Intellingence Quotient (IQ), which measures a narrow range of Verbal/Linguistic and Logical/Mathematical abilities. In 1983, Howard Gardner developed the theory of Multiple Intelligences to challenge this view of intelligence. His theory conceptualized intelligence as consisting of several distinct intelligences rather than a singular cognitive capacity. Multiple Intelligences celebrates the uniqueness and diversity of all students.

Howard Gardner's (1983) theory of Multiple Intelligences conceptualized intelligence as consisting of nine distinct intelligences rather than as a singular

cognitive capacity. These Multiple Intelligences are (1) Verbal/Linguistic Intelligence, used in reading, writing, listening and speaking; (2) Logical/Mathematical Intelligence, used in thinking logically and in solving mathematics equations; (3) Spatial/Visual Intelligence, used in arranging the physical environment; (4) Musical Intelligence, used in singing, listening, and appreciating music; (5) Bodily/Kinesthetics Intelligence, used in athletics and in different forms of movement or dancing; (6) Interpersonal Intelligence, used in relating to others; (7) Intrapersonal Intelligence, used in understanding oneself; (8) Naturalist Intelligence, used in understanding and appreciating nature; and (9) Existential Intelligence, used in relating to the spiritual existence, was recently added as the ninth Intelligence.

Summary of Findings

Educators at all levels have embraced the concept of Multiple Intelligences. This is especially so of classroom teachers in the public schools. Although Gardner has developed the theory, he left the development of tools to implement the theory to practitioner. Unfortunately, there is no valid and reliable tool that is easily available to practitioners. Instead, practitioners have been relying on a variety of checklists and locally developed instruments.

Therefore, the purpose of this study was to develop a valid and reliable preference indicator that practitioners could use to identify the Multiple Intelligences of their students.

This was accomplished by following the standard procedure for instrument development. This process involves first establishing the validity of the instrument and then its reliability. Validity is concerned with what an instrument or test actually measures. The three major types of validity are construct, content and criterion-related validity. Construct validity assesses the underlying theory of the instrument. Content validity refers to the sampling adequacy of the items in the instrument. Criterion-related validity compares the instrument's results with those of an external criterion. Once validity is established, the reliability of the instrument is addressed. Reliability is the degree to which an instrument consistently measures whatever it measure.

Construct validity was addressed by establishing a pool of items that were directly linked to Gardner's concept of Multiple Intelligences. A pool of 90 items were obtained by an extensive review of the literature and by contacting various agencies using existing instruments. Ten items were created for each of the nine Multiple Intelligences areas.

Several rounds of field-testing were conducted to improve the accuracy, wording, and discriminating power of the items. After each testing, individual items were correlated with the total score of all of the items in the category to determine their accuracy. Feedback sessions were also held with the testing groups to gain insights into improving the wording of the items. Though this process involved 179 participants, the pool was reduced to 45 items with 5 items in each of the 9 areas.

Content validity was addressed by field-testing the 45-item version of the preference indicator with community college students, The community college was selected as the site for this testing because community colleges are broad-based organizations that offer a representation sample of the learners in a community. Randomly-selected General Education classes in the Tulsa Community College system were used to obtain data from 874 respondents. This data were used to conduct descriptive statistics to examine the distribution of the Multiple Intelligences areas and factor analyses to test the groupings of the items in the preference indicator.

The first step in establishing content validity was to conduct a factor analysis of the items. This confirmatory factor analysis should have produced nine factors with the

items from each Multiple Intelligences area loading on a separate factor. The initial principal components factoring did not produce this result. Therefore, separate factor analyses were computed holding the factors at 9, 8, 7, and 6. The 8-factor solution provided the best explanation of the data. However, it did not match Gardner's theory either in the number of Multiple Intelligences areas or in the distribution of the items among the factors. This suggested that either the items were not measuring single construct or that the results were providing further clarity to the relationship of the areas within the theory.

To test the items in each area, nine separate factor analyses were conducted with each analysis using only the five items from one of the Multiple Intelligences areas. All of these analyses revealed that multiple constructs were included in the items in each area. However, all of the areas had at least three items that loaded onto a single factor, and that factor was usually the first one which explained the most variance in the items. Therefore, the 45-items were reduced to 27. Nine more factor analyses were conducted to confirm that the three items in each of the areas loaded on only one factor.

Using the 27-item preference indicator, it was discovered that the Multiple Intelligences areas are not

equally distributed in the population. The Multiple Intlliegences preferences were distributed as follows: Bodily/Kinesthetics Intelligence–19%, Musical Intelligence–18%, Logical/Mathematical Intelligence–13%, Interpersonal Intelligence–10.9%, Intrapersonal Intelligence-8.2%, Existential Intelligence-7.7%, Visual Intelligence-4.6%, Verbal Intelligence-2.9%, and Naturalistic Intelligence-2.9%, 13.4% had equal preferences in more than one area.

To identify if there was a relationship to Multiple Intelligences and demographic variables, t test were calculated for gender, age, or race. While some significant differences were found, they were judged to be too small to be a practical difference.

A factor analysis using the 27-item version of the preference indicator revealed that the nine Multiple Intelligences areas are not independent of each other. Instead, they group together as follows: Physical vs Philosophical, Emotional vs Analytical, Creative vs Cognitive, and Music and Me.

Criterion-related validity was established by comparing the results from the 27-item version of the preference indicator to scores on the Rogers Indicator of Multiple Intelligence for 43 community college students. This check

was exploratory because of the questionable validity of the Roger's instrument.

Reliability was tested by the test-retest method with 70 community college students. With a 2-week interval between testing, four of the Multiple Intelligences areas had reliability coefficients above the generally accepted criterion of .7, and four areas were slightly below it. One area had a reliability coefficient of .5.

Thus, the standard instrument development design was used with a large sample to create a 27-item preference indicator for measuring Gardner's concept of Multiple Intelligences. In addition to providing practitioners with a preference indicator that is valid and reliable, this research provided some insights for the first time concerning the distributions of the various Multiple Intelligences among a large population and found that Multiple Intelligences are not related to basic demographic variables. Most importantly, it discovered the nature of the relationship among the various Multiple Intelligences. This new preference indicator was named Multiple Intelligences Survey.

Conclusions

> A valid and reliable preference indicator, which is named Multiple Intellignece Survey (MIS), exists for identifying Multiple Intelligence preferences of adult learners.

Developing a valid and reliable preference indicator that identifies the Multiple Intelligences preferences of adult learners was completed. Initially, a pool of 90 items were identified and used in the study. The pool of 90 items were then reduced to 45. Later, after conducting the factor analysis, 27-items were identified and now form a indicator for identifying one's MI preferences. This preference indicator has been named the Multiple Intelligence Survey (MIS).

Howard Gardner first introduced Multiple Intelligences over 20 years ago. Gardner's theory provides a theoretical foundation for recognizing different abilities and talents. This theory acknowledges that while all students may not be verbally or mathematically gifted, students may have an expertise in other areas.

Although the nine Multiple Intelligences are anatomically separated from each other, Gardner advises that they rarely operate independently. Rather, the intelligences are used concurrently and typically compliment each other as individuals develop skills and solve problems (http://www.askeric.org/plweb-cgi/obtain.pl). Gardner believes that everyone has Multiple Intelligences, and there are opportunities to strengthen those intelligences. He

ascertains Multiple Intelligences is meant to empower and not to label (http://surfaquarium.com/MIinvent.htm).

Educators have realized that students have unique learning differences, and they have widely embraced Multiple Intelligences. They have reconsidered the "factory" approach to education (Reynolds & Miller, 2003, p. 35). Instead, they are encouraging their students to develop their own intelligence profiles. This individualized evaluation permits educators to make more informed decisions on what and how to teach various subjects.

Gardner encourages teachers to think of all the Multiple Intelligences as equally significant. This is in great contrast to traditional educational systems. Typically, a significant emphasis has been placed on the development and use of Verbal and Mathematical Intelligences (Gardner, 1983). Thus, the theory of Multiple Intelligences implies that educators should recognize and teach to a broader range of talents and skills.

One general held truth for many learning style theories has been the idea that a teacher's personal learning style is associated with the way they teach. Cultivating an environment where educators look beyond using their primary Multiple Intelligences preferences may create a more creative student.

Moreover, because diversity exists in the MI of the adult population, educators need to be equipped with the tools to understand and address all nine Multiple Intelligences. Arming educators with this new knowledge would compel them to use MI in planning for and teaching with all nine of the intelligences. In addition, students could be empowered and encouraged to become creative with their assignments.

With the recognition of MI by the teachers, student projects and assignments could become customized so that presentations corresponds to one or more of their MI preferences. For example, instead of a paper, students could present the results of their projects in the form of a video that incorporates linguistic (narrative), musical (background and rhythm), and spatial (pictures and charts) elements. These educational enhancements would seem to be more accessible to educators and students as the availability of the MIS instrument increases.

Multiple Intelligences has encouraged the reconsideration of standardized tests to determine intelligence. Educators have also began to use MI checklists, inventories, and surveys to identify their students MI preferences. There are many different kinds of MI checklists and inventories currently being used in the

field. These MI instruments typically represents themselves as a legitimate. However, almost none of the checklists or inventories currently in the field report validity or reliability statistics. So far, there is only one other MI instrument, the Midas, that has been developed that reports validity and reliability statistics. However, that instrument is not readily available to practitioners.

Therefore, for educators to become successful in teaching with MI in mind, they must have an accessible valid and reliable assessment tool. Assessing a student's learning preferences allows a wider range of students to successfully participate in classroom learning (Lazear, 1992). In addition, it can create a learning environment conducive to adult learning.

In conclusion, a result of the multi-stage process of research, a valid and reliable MI preference indicator now exists. This preference indicator should provide educators with a trail to follow as they seek to enhance their teaching by including the various areas. It could also provide students with additional learning options. MIS will be readily available for practitioner use. It is designed for easy and convenient use in the classroom. It is a 27-item preference indicator that can be completed in 5 to 7 minutes. MIS is formatted to be easy to read and follow.

The first page of the preference indicator is formatted with two sections of nine MI items with one item for each MI area. On the back is the last section of 9 items. After reading the instructions, it prompts the respondent to read the first section and rank each item as it relates to their learning preferences. Items are ranked in relation to the other items. A score of 1 indicates that items relate more to the person than a higher number. Those items that are ranked 9 are the items that are the least like the respondent.

Demographic Factors

> Multiple Intelligences are not influenced by age, race, or gender.

Within the field of racial and ethnic minority psychology, one of the recurring controversial themes is concerned with the assessment of intelligence (Valencia & Suzuki, 2001, p. xii). From the early work of Arthur Jensen, the question of "significant racial differences in intelligence scores" remains a thought provoking subject in the field of psychology (Valencia & Suzuki, 2001, p. xii). Despite the controversy, the continued use of intelligence tests has very real consequences for racial and ethnic minorities in this country (p. xii).

The Bell Curve, published in 1994, was written by Richard Herrnstein and Charles Murray. Their work was used

to explain the differences in intelligence in American Society. They proposed there are ethnic differences in cognitive ability. Their research reports Asians typically receive higher IQ scores than White Americans, primarily in the verbal intelligence areas. African-Americans usually earn IQ scores one full standard deviation below those of White Americans. The IQ difference between African-Americans and Whites remains at all levels of socioeconomic status.

Many of the statements referenced and conclusions reached by the authors are very controversial. Howard Gardner also references that The Bell Curve is unconventional (Jacoby & Glauberman, 1995). Gardner also believes that the authors are dangerously close to adopting the most extreme positions in the area of intelligence and genes.

With respect to Multiple Intelligences, Howard Gardner and Robert Sternberg believe that intelligence consists of several constructs. Sternberg's (1998) successful intelligence theory states that intelligence is comprised of three components: practical, analytical, and creative abilities. In addition, Gardner believes that everyone possess nine intelligences that are in constant interaction with one another.

Gardner believes the intelligences are utilized in

different combinations to complete a task. Gardner's data is from his clinical studies of patients with brain injuries. His observation is that selective damage to a brain area impairs only a specific ability or intelligence and leaves the other abilities unaffected (Gardner, 1983).

While it is common to relate intelligence to IQ, or intelligence quotient, one should understand that IQ is a social construct. It refers to the scores on psychometric intelligence tests, which are constructed to measure qualities that enable people to be successful within that specific culture (Jenson, 1998). Although intelligent behavior has different manifestations across and within cultures, it is intuitive to think that there may be underlying similarities in the brains of intelligent people.

Presently, theories of intelligence are divided into two camps: the psychometric and Multiple Intelligences approaches. Intelligence tests, such as the Wechsler tests, are typical psychometric instruments used to measure general intelligence, or g, for assessment and research purposes (Jenson, 1998). The g factor was first proposed by Charles Spearman who also developed factor analysis, a statistical tool that has uncovered correlations among people's performance on groups of test items (Jenson, 1998).

This suggests that g underlies groups of specific

abilities, as outlined in Spearman's two-factor theory of intelligence. Test items or tasks that involve a high degree of complexity have also been found to rely more heavily on g. One example is the Raven's Advanced Progressive Matrices. Thus, there is reason to believe that g is related to cognitive abilities although g is not a cognitive ability by itself.

Other researchers have since expanded on the concept of g. Cattell and Horn proposed that there are many types of g, including fluid (Gf) and crystallized (Gc) intelligences; Gf is nearly nonverbal and relatively culture-free mental efficiency while Gc refers to the skills and information obtained through acculturation. Carroll later superimposed a g factor, similar to Spearman's g, above the different types of general mental abilities, which also include Gf and Gc; the general abilities are in turn fashioned with specific abilities, such as general reasoning and induction that comes under Gf (Jensen, 1998).

The presence of different theories of intelligence is necessary to emphasize the view that intelligence is not a fixed and concrete entity which may be measured by culture and gender biased intelligence tests. Sternberg provides examples of people who demonstrate talent in just certain areas. In that sense, his approach to the field of

intelligence is somewhat like Howard Gardner's. However, he is far more concerned with helping people develop components of intelligence that will help them to perform well in whatever they chose to do (Sternberg, 1998).

Sternberg strongly believes that intelligence can be increased by study and practice. Quite a bit of his research focuses on such endeavors. Some of Sternberg's work focuses specifically on "street smarts" versus "school smarts." This observation is consistent with the work of Lev Vygotsky (Fosnot, 1996) who argues that the type of learning that goes on outside of school is distinctly different than the type of learning that goes on in school. While some students are talented in both informal and formal education, others are much more successful in one rather than the other. Consequently, teachers who are skillful in developing MI based activities can help students design projects that are consistent with their learning abilities and interests (Sternberg, 1998).

This research found some statistically significant differences in the relationship of Multiple Intelligences do and the basic demographic variables of age, race, and gender. However, these small differences were not practically significant differences. Therefore, teachers can expect these Multiple Intelligences to be distributed across

demographic variables.

Distribution of Intelligences

> The nine Multiple Intelligences are not equally distributed among adult learners.
>
> The various Multiple Intelligences are related in definitive ways.

Gardner's analysis of intelligence performance yielded a list of nine relatively autonomous intelligences. They are autonomous in that one cannot predict strength or weakness in one intellignece from strength or weakness in another (Torff, 2000 p. 146). However, according to Gardner, it is unnecessary and misleading to suggest the complete autonomy of intelligence (Torff, 2000).

According to Gardner, most intelligence tests focus mainly on linguistic and logical capabilities; traditionally, schools have nurtured these abilities or intelligences. Gardner's theory expands the concept of intelligence beyond what is measured on IQ tests, acknowledging performance in other domains. Gardner's expansive concept of intelligence is complementary to the idea that learners are unique individuals with different strengths and weaknesses (Garnder, 1983).

According to Torff (2000), Multiple Intelligence works by establishing a set of criteria for what constitutes an intelligence. Additional information experimental or

otherwise could have an impact on the resulting list of intelligences and the relation among them. However, this research found that all MI areas are not equally distributed among the population.

Robert Sternberg (1994) believes that Multiple Intelligences are relatively independent of each other. He reports that if one accepts this theory of MI, then conventional intelligence tests would be seen as limited because conventional intelligence tests focuses on Linguistic, Logical, Mathematical, and Spatial Intelligences but measure little or nothing of the other intelligences (p. 281). The findings of the 4-factor solution strongly support Sternberg's contention that the Multiple Intelligence areas are relatively independent even though some of the MI areas are related to each other.

Bodily/Kinesthetic was ranked the highest MI preferences with 19%. Musical Intelligences followed as a close second with 18 percent. Over 77% of the participants identified themselves as either Bodily, Musical, Logical, Interpersonal, Intrapersonal, or Existential.

Over 13% of participants identified themselves as "mixed". The axiom "knowledge is power" has been referenced in a multitude of situations. Utilizing this statement helps illustrate the usefulness of instructors gaining knowledge

about their students' MI strengths and weaknesses. This information could be useful in curriculum development, instructor awareness, and student empowerment.

Awareness is a fundamental component of learning how to learn. This quality is vital because "if you know how to learn, you can adapt and change no matter what technological, social, or economic permutations occur" (Naisbitt & Aburdene, 1985, p. 133). There is little question that:

> It pays to develop awareness and understanding of self as a learner. One can gain valuable insight into personal blocks to learning, to personal strengths and weaknesses, as well as personal preferences for the methods of learning and for learning environments. (Smith, 1982, pp. 21-22)

Over 77% of TCC students have a preference for Bodily, Musical, Logical, Interpersonal, Intrapersonal, or Existential Intelligences. This information provides instructors with a focus on which Multiple Intelligences teaching strategies that could be incorporate into their curricula. This information could be revolutionary by providing instructors with a focus on which MI strategies are the most typical. Instructors could design classes and groups based on MI strengths and weaknesses. Instructors could also assist students in understanding the value of broadening their MI learning preferences.

Using the learner-centered approach, instructors are

familiar with content knowledge in addition to having design flexibility for learners. The learner's individual needs and MI characteristics would take precedence over the presentation of facts and skills. The emphasis would be placed on showing the learners how to learn for understanding and critical thinking. The focus of this learner-centered model is on metacognition, which is understanding how individual students learn.

It has been well documented that students do not learn at the same pace. Some students are easy to teach and learn quickly. Some students may be slower to grasp certain concepts. The teacher-centered approach gives control for learning to the teacher. The teachers use their expertise in content areas to help students make connections. The effort to get to know how the students learns best and how they process information is secondary (Shaw, 2004).

In order to ensure that each student is actively involved in the learning process. They could be provided with an additional tool of assessment that could reduce costly time in ineffective activities and instruction. Gardner embraces the need to adapt those curricula as much as possible to the particular strengths and weaknesses of each student.

In addition to using an assessment instrument such as

the Multiple Intelligences Survey, educators can use the results of the factor analysis from the 27-item preference indicator to design and implement classroom instruction. Each of the four factors provides insights for working with diverse groups of learners. In Factor 1: Philosophical vs Physical, learners separated on their preference for using either conceptual or concrete approaches to learning. While the Philosophical group is content dealing with abstract concepts, the Physical group prefers situations that are real and tacit. While the Philosophical group enjoys writing for pleasure, the Physical group prefers to work with tools. Since the coefficients for the factor loadings for these two concepts have opposite signs, teachers can expect learners to be clearly divided on a preference in this area. The major Multiple Intelligences in this factor are Existential Intelligence and Naturalistic Intelligence. Although these were the last Multiple Intelligences added by Gardner, they make up the factor that accounts for explaining the most variance in the factor analysis. Even though Gardner has suggested that the Multiple Intelligences may be used to complement each other, this factor suggests that they are opposite processes for learners. Teachers should not expect to see learners favoring both processes. Learners who lean heavily on one of these Multiple Intelligences probably

will not use the other extensively.

Factor 2: Social Activities combines two Multiple Intelligences. The factor contains all three items for Interpersonal Intelligence and two of the three items for Bodily/Kinesthetic. Interacting with others is compatible with learning through the use of the body and its senses. Thus, teachers can expect learners who have a preference for one of these Multiple Intelligences to also be strong in the other area.

Factor 3: Affective vs Cognitive pits learning domains against each other. On the cognitive side, this factor contains all of the items from Visual Intelligence and reinforced it with one item from Verbal Intelligence. Learners in this area enjoy cerebral activities such as forming images in their mind, manipulating puzzles, and learning foreign languages. The affective domain side contained all of the Logical/Mathematical Intelligence items and two of the Intrapersonal Intelligence items. Although the stereotype image of the Logical/Mathematical Intelligence is on structured processes, the emotional words in the items were magnified when these items were combined with the Intrapersonal Intelligence items which also each contained references to emotions. As with Factor 1, the coefficients for the factor loadings that are high but

opposite of each other suggest that those operating out of one of the domains will not have a strong propensity to use the other.

Factor 4: Music and Me contained all three of the Music Intelligence items and one of the Verbal Intelligence items. The addition of the Verbal Intelligence item, which deals with keeping a journal, suggests that the use of the music is in personalizing it. While music has language and mathematical characteristics, music can serve as a learning factor when the learners are able to directly relate to it and apply it to themselves.

Thus, while each of the Multiple Intelligences has certain characteristics that make it unique, each of the nine Multiple Intelligences areas can be expected to interact with another of the areas in a synergistic way that creates a broader concept of learning. For those Multiple Intelligences in Factor 1 and Factor 3, these are like opposite poles of a magnet. Strength at one pole repels action at the other pole. For those Multiple Intelligences in Factor 2 and Factor 4, strength in one Multiple Intelligence is enhanced and further defined by another area. By being aware of these combinations, teachers can better identify ways to help learners. Moreover, by helping learners become aware of these combinations, teachers can

assist learners in the metacognitive process of becoming self-directed, lifelong learners.

Gardner attention has turned to educational interventions, and apparently as did others, because the number of educational interventions is indeed impressive. Many psychologists and educators are pleased that a promising theory of Intelligence is being recognized, acclaimed, and implemented (Reynolds & Miller, 2003, p. 35).

Multiple Intelligences was referenced as a psychological theory, not an educational one. However, the theory has a number of implications for educational practices. Initially, it is imperative to view the intelligences as means, not ends. The first order of business in education is the goal (or end state) that the culture or community thinks is important. Once this is specified, it becomes possible to analyze the intelligences that are typically involved and to design vehicles for curriculum and assessment that activate them as they serve the end state. For example, the ability to write distinctly is a valued skill, and whereas Linguistic Intelligence is in the forefront, writing also involves Logical/Mathematical, Interpersonal, and Intrapersonal Intelligences. An educational design should address all these Intelligences, not as goals themselves but as the pillars that support the

valued target skill, which is writing ability. In short, the sensible policy involves teaching through (not for) Multiple Intelligences (Torff, 2000, p. 349).

Second, MI calls for educators to provide multiple entry points to learning. This offer learners a variety of ways to approach subject matter. For example, learning history by reading a text may be effective for students strong in Linguistic Intelligences, but other students flourish when the curriculum is expanded to include activities that draw on other intelligences (e.g., drawing maps or writing plays). Providing multiple entry points produces a learning environment conducive for students with diverse profiles of intelligences.

Finally, MI asks educators to reconsider current approaches to education (in which groups of students engage in the same activity) and instead to place greater emphasis on individual-centered instruction. Specifically, it can be beneficial to customize individual designed "bridging activities" for students, especially those at risk for school failure. Bridging activities draw together intelligences in which the student is stronger with those that are weaker so that the weaker areas are strengthen through activity sustained by the stronger ones.

MI can inspire creative and effective vehicles for

curriculum development strategies. However, it is in assessment that the theory's most important educational implications lie. In essence, the theory encourages educators to reconsider the current extensive on standardized tests. These limit students by capturing too narrow a range of intelligences and working in a "decontextualized and single-administration manner" (Torff, 200, p. 349).

Moreover, since test scores are so highly prized, there is a focus in schools to boost scores by "teaching the test," often reducing education to mere memorization of target facts. MI encourages educators instead to turn to fair intelligence assessments that capture intellectual achievements in context and over time (Torff, 2000, p. 349). "The theory of multiple intelligences has proved to be enormously successful in capturing the attention both of the psychological public and of the public in general" (Reynolds & Miller, 2003, p. 35).

Additional information, experimental or otherwise, could have an impact on the resulting list of intelligences and the relationships that result. Now, the distribution found by this study can alert those using MI theory to the proportions of learners they can expect to find in each MI category. In addition, the results from the factor analysis

can provide them insight into how their categories relate to each other.

Adult Learning

Malcolm Knowles (1970) defined andragogy as a developing technology for adult learning. Androgogy uses a learner-centered approach to instruction. This approach is considered the hallmark of adult education. The principles of androgogy are also congruent with the MI theory. Multiple Intelligences celebrates individual differences and learner-centered instruction. This study provides insight on assessing those individual differences.

Finally, knowing that the nine MI are not equally distributed could serve as an additional catalyst in the adult education principles. The adult education principles of participation and exploring individual differences go hand in hand with identifying and incorporating MI preferences into learning situations. As Brookfield (1989) referenced, every student should have the opportunity to present their diverse experiences, abilities, personalities, and preferences. To ensure that each learner has the equal opportunity for success, educators must incorporate their individual differences.

Recommendations

Generalize MIS

The Multiple Intelligence Survey has been developed. However, the sample for this process contained a large number of White females. Therefore, the next step is to make MIS generalizable to the entire population. The research design that could be used to complete this process would be a quantitative, descriptive study.

The target population that would be used in this study would be adults enrolled in public community colleges in the United States of America. Such colleges are good representation of the diverse population in the United States. Community colleges make up one of the most important sectors of U.S. higher education because of the significant role they play in providing college access, post-secondary vocational training, and community development (Higher Education in the United States, 2002, p. 116). According to the American Association of Community Colleges, in 2002 there were 968 community colleges representing more than one-quarter of all higher educational institutions in the United States (p. 116). The latest reports indicate that during the year 2000, there were 11,752,786 million students enrolled at community colleges across the nation (Digest of Education Statistics, 2003, p. 211).

A stratified sampling could be used for this broader validation study. In this research, the United States would be divided into four regions. Because the population and number of community colleges differ in each region, a proportionate sampling would be taken from each region. The study would randomly select 10% of the community colleges in each region. From that list, 25 community colleges would be randomly selected to participate from each region. From the 100 community colleges, 100 students from each college would then be randomly selected to participate in the study. The participants for the study could be adult students enrolled in at least three hours in a General Education course.

In conclusion, this would be the process if the study were attempting to develop a valid and reliable instrument that could be generalized and used on a national basis. The process outlined would ensure that the instrument is valid, reliable, and generalizable to the United States population.

Developing a User-Friendly Instrument

The second recommendations is to take this new MI preference indicator and develop it into a more user-friendly format. The design and development procedure would reflect that of Assessing The Learning Strategies of AdultS (Atlas) (Conti & Kolody, 1999). User-friendly instruments are brief, easy to administer, and produce categorical data

(Conti, p. 43). This user-friendly instrument would identify dominant MI categories of adult learners.

New instruments have been developed to produce a quick instrument in areas with well-established summated-rating scales. These instruments have paved the way for developing the concepts that are being considered. The procedures would include using multivariate statistics. Cluster analysis would be used to form the groups for the new instrument. Discriminant analysis would provide relative information for including accurate items for the instrument (Conti, p. 43).

Using the cluster analysis approach is used to form the groups for the instrument, and discriminant analysis is used to determine the process that separated these groups. When instruments are used to place people into predetermined categories based on established concepts such as MI, then the logic of cluster analysis can be used to assist in instrument formation (Conti, 2002, p.45). When this is done, instead of creating just a shorter summated-rating scale, the new approach produces an instrument which has a totally different format and which rests on the multivariate techniques for providing a very limited number of highly precise items to correctly identify the concept under consideration (p. 44).

Developing a valid and reliable user-friendly instrument for MI assessment could be useful in assisting instructors. A quick user-friendly format for assessing MI could provide instructors with a tool to quickly identify each students MI preference. In addition, a quick user-friendly style MI instrument could provide students with the opportunity to articulate their own learning preferences.

Elements in the Learning Environment

Various studies could be conducted to investigate the relationship of MI to other factors affecting learning. These include the relationships between MI preferences and (a) academic achievements, (b) teacher-centered instruction verses learner-centered instruction, and (c) learning styles and educational philosophies. Understanding how MI relates to each of these principles would provide further insights into how to develop curricula, introduce learning activities, and allow for creativity. These would have the ultimate goal of ensuring students' success.

Identify Mixed Group

There should be research to look at the MI "mixed" group. The "mixed" group is the group of study participants that ranked at least two MI areas nearly the same score. This data would identify how MI relate to each other in terms of learning.

Final Thought

This research project set out to develop a preference indicator to help practitioners in implementing Gardner's (1983) concept. It succeeded in developing a valid and reliable 27-item preference indicator named the Multiple Intelligences Survey and referred to as MIS, which can be generalized to the adult learner population at Tulsa Community College. This preference indicator was developed for use in instrumented-learning situations rather than for psychological testing in clinical settings. In the process of developing this information, new knowledge was discovered about how the nine Multiple Intelligences are distributed among the population and about how the various Multiple Intelligences relate to each other. Equipped with this new preference indicator and this new knowledge, classroom teachers can effectively apply the concept of Multiple Intelligences to address individual differences to achieve a learner-centered classroom environment as envisioned by Knowles (1970) and to foster metacognition for lifelong learning in the spirit of Smith (1983).

REFERENCES

Ackerman, L. & Sternberg, R. & Glasser, R. (1989). Learning and individual differences: Advances in theory and research. W. H. Freeman and Company: New York, NY.

Allix, N. (2000). The theory of multiple inteligences: A case of the missing cognitive matter. (Research) Australian Council for educational research.

Armstrong, T. (1987). In Their Own Way: Discovering and Encouraging Your Child's Personal Learning Style. New York: Tarcher/Putnam.

Armstrong, T. (1993). 7 Kinds of Smart: Identifying and Developing Your Many Intelligences. New York: Plume.

Armstrong, T. (1994). "Multiple Intelligences: Seven Ways to Approach Curriculum." Educational Leadership 31 November 55.

Armstrong, T. (1994). Multiple Intelligences in the Classroom. Association for Supervision and Curriculum Development. Alexandria VA.

Ary, D., Jacobs, L. C., & Razavieh, A. (1996). Introduction to research in education. Fort Worth, TX: Harcourt Brace College Publishers.

Babbie, E. (1989). The practice of social research. (5th ed.). Belmont, CA: Wadsworth.

Baldwin, W. (2000). Information no one else knows: The value of self-report. In A. A. Stone, J. S. Turkan, C. A. Bachrach, J. B. Jobe, H. S. Kurtzman, & V. S. Cain (Eds.), The science of self-report: Implications for research and practice (pp. 3-7). Mahwah, NJ: Lawrence Erlbaum Associates.

Best, J. W. (1981). Research in education (4th ed.). Englewood Cliffs, NJ: Prentice-Hall, Inc.

Blake, R. R., & Mouton, J. S. (1962). The instrumented training laboratory. In I. R. Weschler & E. H. Schein (Eds.), Issues in human relations training. (pp. 61 - 76). Washington, D. C.: National Training Laboratories, National Education Association.

Blake, R. R., & Mouton, J. S. (1970). The Grid for sales excellence: Benchmarks for effective salesmanship. New York: McGraw-Hill.

Blake, R. R., & Mouton, J. S. (1972a). What is instrumented learning? Part I-Learning instruments. Industrial Training International, 7, (4), 113-116.

Blake, R. R., & Mouton, J. S. (1972b). What is instrumented learning? Part II-The advantage of instrumented learning. Industrial Training International, 7, (5), 149-1510.

Borg, W. R. & Gail, M. D. (1983). Educational research (4th ed.). White Plaines, NY: Longman, Inc.

Brookfield, S. D. (1989). Facilitating adult learning. In S. B. Merriam & P. M. Cunningham (Eds.), Handbook of adult and continuing education (pp. 377 - 390). San Francisco, CA: Jossey-Bass.

Brookfield, S. D. (1986). Understanding and facilitating adult learning. San Francisco, CA: Jossey-Bass.

Brooks, C. K. (1997). The Naturalistic Intelligence. The building toolroom online. Available from http://www.newhorizons.org/article_eightintel.html.

Bryant, M. (2002). Unpublished doctoral dissertation. Stillwater OK: Oklahoma State University.

Ceci. S. (1996). On intelligence... more or less. Cambridge, MA: Harvard University Press.

Checkley, K. (1997). "The First Seven. . . and the Eighth: A Conversation with Howard Gardner." Educational Leadership 55 September (pp. 8-13).

Cole Associates. (n.d.). Continuing professional education in transition, 1981-2000. International Journal of Lifelong Education, 20, (1/2), 16-30.

Conti, G. J. (1990). Identifying your teaching style. In M. Galbraith (Ed.), Adult learning methods: A guide for effective instruction (pp. 79 - 96). Malabar, FL: Kieger.

Conti, G. J. (1993). Using discriminant analysis in adult education. Parer presented at the 34th annual Adult Education Research Conference (AERC). University Park, Pennsylvania.

Conti, G. J. (1996). Using cluster analysis in adult education. Paper presented at the 37th annual Adult Education Research Conference (AERC). Tampa, FL.

Conti, G. J. & Kolody, R. C. (1995). The use of learning strategies: An international perspective. Proceedings of the 36th Annual Adult Education Research Conference pp. 77 - 82). Edmonton, Alberta, Canada: University of Alberta.

Conti, G. J. & Kolody, R. C. (1999). Guide for using Atlas. Stillwater, OK: Oklahoma State University.

Conti, G. J. & Kolody, R. C. (1999a). Development of an instrument for identifying groups of learners. Proceedings of the 39th Annual Adult Education Research Conference (pp. 109 - 114). San Antonio, TX: University of the Incarnate Word.

Conti, G. J. (2002). Constructing user-friendly instruments: The power of multivariant statistics (pp. 43-48). Proceedings of the Midwest Research to Practice Conference in Adult, Continuing, and Community Education. DeKalb, IL: Northern Illinois University.

Claxton, C., & Murrell, P. (1987). Learning Styles "Implications for Improving Educational Practices". Washington D.C., Association for the study of higher education.

Critchfield, T. S., Tucker, J. A., & Vuchinich, R. E. (1998). Self-report methods. In K. A. Lattal, & M. Perone (Eds.), Handbook of research methods in human operant behavior (pp. 435-470). New York: Plenum Press.

Cross, K. P. (1969). The role of the junior college in providing post-secondary education for all. Washington, D.C.: Office of Education, Government Printing Office.

Darkenwald, G. G., (1982). Field research and grounded theory. In Huey B. Long, R. Hiemstra and Associates, Changing approaches to studying adult education. San Francisco, CA: Jossey-Bass.

Darkenwald, G. G. & Merriam, S. B. (1982). Adult education: Foundations of practice. New York, NY: Harper & Row.

Dewey, J. (1966). Democracy and Education: An introduction to the philosophy of education. New York: The Free Press.

Digest of Education Statistics , (2002). 1965-2000 total fall enrollment in degree-granting institutions. U.S. Department of Education.

Dunn, R & Dunn, K (1999). The complete guide to the Learning Styles In service System. Boston, MA: Allyn and Bacon.

Dunn, R. & Dunn, K. (1978). Teaching students through their individual learning styles: A practical approach. Reston, VA: Reston Publishing Company, Inc.

Fellenz, R. A. & Conti, G. J. (1993). Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS): Manual. Bozeman, MT: Center for Adult Learning Research.

Fellenz, R. A. & Conti, G. J. (1989). Learning and reality: Reflections on trends in adult learning. Columbus: The Ohio State University (ERIC Clearinghouse on Adult, Career, and Vocational Training, Information Series No. 336.)

French, J. W., & Michael, W. B. (1968). The nature and meaning of validity and reliability. In N. E. Gronlund (Ed.), Readinqs in measurement and evaluation. New York: The Macmillan Company.

Gagne', R. (1962). Military training and principles of learning. American Psychologist, 17, 263-276.

Gagne', R. (1985). The Conditions of Learning (4th ed.). New York: Holt, Rinehart & Winston.

Gagne', R.(1987). Instructional Technology Foundations.

Hillsdale, NJ.: Lawrence Erlbaum Assoc.

Gall, J., Gall, M. & Borg, W. (1999). Applying educational research: A practical Guide. (4th ed.). New York, NY.: Longman, Inc.

Gardner, H. (1983). Frames of Mind: The Theory of Multiple Intelligences. New York: Basic Books.

Gardner, H. (1991). Intelligence in Seven Steps. In H. Gardner (Ed.), Creating the Future: Perspectives on Educational Change. London: Accelerated Learning Systems.

Gardner, H. (1992). The Theory in Practice. New York: Basic Books.

Gardner, H. (1993). Multiple Intelligences: The Theory in Practice. New York, NY: BasicBooks.

Gardner, H. (1993). Assessment in Context: The Alternative to Standardized Testing. In Multiple Intelligences: The Theory in Practice, (Ed.) Howard Gardner (pp. 161 -83). New York: Basic Books.

Gardner, H. (1993). Frames of Mind: The Theory or Multiple Intelligences, Tenth Anniversary (Ed.) New York: Basic Books.

Gardner, H. & Walters, J. (1993) "Questions and Answers about Multiple Intelligences Theory." In Multiple Intelligences: The Theory in Practice, (Ed.) Howard Gardner, (pp. 35-48). New York: Basic Books.

Gardner, H. (1995). Reflections on Multiple Intelligences: Myths and Messages. Phi Delta Kappan, 77(3), pp. 200 - 209.

Gardner, H. (1997). The first seven and the eighth. (interview with educator Howard Gardner)(Teaching for Multiple Intelligences)(Interview). Educational Leadership 55, 1997: article 13, p. 8.

Gardner, H. (1997). Multiple Intelligences as a partner in school improvement. Educational Leadership 55 1997: article 15, p. 20.

Gardner, H. (1997). Integrating learning styles and multiple

intelligences. Educational Leadership v55 1997: article 35 p. 22(6)

Gardner, H. (1997). A Multiple Intelligences Inventory, (evaluation of teaching approaches)(Teaching for Multiple Intelligences). Educational Leadership v55 1997: article 21, p. 47.

Gardner, H. (1999). Are there additional intelligences? The case for naturalist, spiritual, and existential intelligences. In J. Kane (Ed), Education, information and transformation (pp. 111 - 131). Englewood Cliffs, NJ: Prentice Hall.

Gardner, H. and Hatch, T. (1989). Multiple Intelligences go to school. Educational Researcher, 18 (8), pp. 4 - 10.

Gay, L. R. (1987). Educational research. Columbus, OH: Merrill Publishing Company.

Gay, L. R. (1992). Educational research: Competencies for analysis and application. New York: Macmillan Publishing Company.

Gay, L. R. (1996). Educational research competencies for analysis and application (5th ed.). Upper Saddle-River, NJ: Prentice-Hall.

Gay, L., & Airasian, P. (2000). Educational research: Competencies for analysis and application (6th ed.). Upper Saddle River, NJ: Prentice-Hall.

Ghost Bear, A. A. (2001). Adult learning on the Internet: Engaging the eBay auction process. Unpublished doctoral dissertation. Stillwater: Oklahoma State University.

Goodman, P. (1964). Compulsory mis-education. Far Hills, NJ: Horizon Press.

Guild P. B. & Garger, (1985). Where do the learning theories overlap? Education Leadership, 55 (September 1997): 35-38.

Guilford, J. (1967). The nature of intelligence. New York: McGraw-Hill.

Hatch, T. (1997) "Getting Specific About Multiple Intelligences." Educational Leadership. March On-line.

Available from UMI-Proquest Direct.

Hatch, T. & Gardner, H. (1986), "From Intelligence to Assessing Competences: A Pluralistic View of Intellect." Roeper Review 8, (3) (pp. 147-50).

Hays, P. (1995). Learning strategies and the learning disabled adult student. Unpublished doctoral dissertation. Bozeman, MT. Montana State University.

Herrnstein, R. J. & Murray, C., (1984). The Bell Curve. New York: The Free Press.

Hiemstra, R. & Sisco, B. (1990). Individualizing instruction. San Francisco, CA: Jossey-Bass.

Higher Education in the United States Encyclopedia, (2002). Community Colleges. Santa Barbara, CA: ABC-CLIO, Inc.

Houle, C. O. (1980). Continuing learning in the professions. San Francisco: Jossey-Bass.

Hughes, C. & Plomin, R. 2000. Individual differences in the understanding of mind: genes, non-shared environment and modularity. In P. Carruthers and A. Chamberlain (eds.), Evolution and the Human Mind: Modularity, Language and Meta-cognition (Cambridge: Cambridge University Press), 47-61.

Huck, S. W., & Cormier, W. H. (1996). Reading statistics and research. New York: Harper-Collins College Publications.

Huck, S. (2000). Reading Statistics and Research (3rd ed.). New York: Longman.

Jacoby, R. & Glauberman, N., eds, (1995). The Bell Curve Debate. Times Books.

James, C. B. (2000). Learning strategy preferences of high-school noncompleters. Unpublished doctoral dissertation. Stillwater: Oklahoma State University.

Jarvis, P. (1983). Adult and Continuing Education: Theory and practice. London: Croom Helm.

Jenson, A. R. (1998). The G Factor: The science of mental ability. Westport, CT: Praeger, 1998. 13.

Jung, C. (1927). The theory of psychological type. Princeton, NJ: Princeton University Press.

Kachigan, S. K. (1991). Multivariant statistical analysis: A conceptual introduction. (2nd ed.). New York: Radius Press.

Kazdin, A. E (2000). Encyclopedia of Psychology, V. 5, 2000 Torff, Bruce in Encyclopedia of Psychology.

Kerlinger, F. N. (1973). Foundations of behavioral research. New York: Holt, Rinehart and Winston.

Kerlinger, F. N., (1986). Foundations of behavioral research. (3rd ed.). Chicago: Holt, Rinehart and Wilson, Inc.

Kidd, J. R. (1973). How adults learn (2nd ed.). Chicago: Follett Publishing Co.

Kitazawa, S. (1991). The real world: Knowing the answers isn't enough. Adult Learning, 2(6), 31.

Klein, P. D. (2003) Rethinking the multiplicity of cognitive resources and curricular representations: alternatives to "learning styles" and "multiple intelligences." Journal of Curriculum Studies. 35 (1) (pp. 45-81).

Knowles, M. S. (1970). The modern practice of adult education, from pedagogy to androgogy. New York, NY: Follett Publishing Company.

Knowles, M. S. (1975). Self-directed learning: A guide for learning and teachers. Englewood Cliffs, NJ: Cambridge.

Knowles, M. S. (1980). The modern practice of adult education, from pedagogy to androgogy. New York, NY: Follertt Publishing Company.

Knowles, M. S. (1992). Applying principles of adult learning in conference presentations. Adult Learning, 4(1) pp. 11 - 14.

Knowles, M. S., Holton E. F. III, & Swanson, R. A. (1998). The adult learner. Houston, TX: Gulf.

Korinek, D. (1997). An investigation of learning strategies

utilized by Air Force officers. Unpublished doctoral dissertation. Bozeman, MT: Montana State University.

Kurtzman, H. S. (2000). Self-reporting of health behaviors and psychiatric symptoms. In A. A. Stone, J. S. Turkan, C. A. Bachrach, J. B. Jobe, H. S. Kurtzman, & V. S. Cain (Eds.), The science of self-report: Implications for research and practice (pp. 227-228). Mahwah, NJ: Lawrence Erlbaum Associates.

Lake, C. C. & Harper, P. C. (1987). Public Opinion Polling. Washington, D.C.: Island Press.

Leedy, P. D. (1997). Practical research: Planning and design (6th ed.). Upper Saddle, NJ: Merril, an imprint of Prentice Hall.

Lazear, D. (1991). Seven Ways of Knowing: Teaching for the Multiple Intelligences. Andover, MA: Skylight Publishing.

Lazear, D. (1994). Multiple Intelligence Approaches to Assessment: Solving the Assessment Conundrum, Tucson, AZ: Zephyr Press.

Leary, M. R. (1995). Introduction to behavioral research methods. (2nd ed.). Pacific Grove, CA: Brooks/ Cole.

Lennon, R. T. (1968). Assumptions underlying the use of content validity. In N. E. Gronlund (Ed.), Readings in measurement and evaluation. New York: The Macmillan Company.

Lively, S. A. (2001). Learning, growing, and aging: Lifelong learning in the Academy of Senior Professionals in Bethany, Oklahoma. Unpublished doctoral dissertation. Stillwater: Oklahoma State University

Long, H. B. (1992). Self-directed learning: Application and research. Norman, OK: Research Center for Continuing Professional and Higher Education at The University of Oklahoma.

McKeachie, W. (1994). Teaching Tips: A guidebook for the beginning college teacher (9th ed). Lexington, MA: Heath.

McKenna, R. J. (1991). The influences of personal and professional learning situations of real-life learning

strategy utilization by school administrators in Wyoming. Unpublished doctoral dissertation. Bozeman, MT: Montana State University.

Mehrens, W. A., & Lehman, I. J. (1973). Measurement and evaluation in education and psychology. Chicago, IL: Holt, Rinehart and Winston, Inc.

Meier, P. D. , Minirth, F. B., Wichern, F. B. & Ratcliff, D. E. (1991). Introduction to Psychology and Counseling: Christian Perspectives and Applications, (2nd Ed.) Grand Rapids, MI: Baker Book House.

Merriam, S. B., & Caffarella, R. S. (1999). Learning in adulthood. San Francisco, CA: Jossey-Bass.

Messick, S. (1976) (1996). The matter of style: manifestations of personality in cognition, learning, and teaching. Educational Psychologist, 29 (3), 121-136.

Mezirow, J. (1990). Fostering critical reflection in adulthood. San Francisco: Jossey-Bass.

Mezirow, J. (1991). Transformative dimensions of adult learning. San Francisco: Jossey-Bass.

Minton, H. L. (1916). "Commentary on "New Methods for the Diagnosis of the Intellectual Levels of Subnormals," by Alfred Benet and Theodore Simon (1905) and "The Uses of Intelligence Tests" by Lewis M. Terman (1916). Online. Available from http://www.yorku.ca/dept/psych/classics/Benet/comment.htm.

Morton, F. G. (1999). "An Exploratory Study of the Relationship Between Multiple Intelligences and the Preferred TEACHING Methods of Selected Youth Ministers." Ph.D. diss., New Orleans Baptist Theology Seminary.

Moustakas, C. E., & Perry, C. (1973). Learning to be free. Englewood Cliffs, NJ: Prentice Hall.

Mouton, J. S., & Blake, R. R. (1984). Principles and designs for enhanced learning. Training and Development Journal, 38, (12), 60-63.

Munday, D. R. (2002). Effects of learning strategy awareness

on learning, learners, and instructors. Unpublished doctoral dissertation, Oklahoma State University, Stillwater.

Munday, W. S. (2002). Identifying the impact of personal counseling regarding learning strategies of graduate level business students at Webster University McConnell AFB, Kansas. Unpublished doctoral dissertation, Oklahoma State University, Stillwater.

Naisbitt, J. & Aburdene, P.(1985). Re-inventing the corporation: Transforming your job and your company for the new information society. New York: Warner Books.

Nie, N. H., Hull, C. H, Jenkins, J. G., Steinbrenner, & K, Bent, D. H. (1975). Statistical package for the social sciences (2nd ed.). McGraw-Hill Book Company.

Norusis, M. J. (1988). SPSS/PC+ advanced statistics V2.0: for the IBMPC/XT/AT and PS/2. SPSS Europe B.V.

Paul L., & Fellenz, R. (1993). Memory. In R. Fellenz & G. Conti (Eds.), Self-knowledge Inventory of lifelong learning strategies (SKILLS): Manual. Bozeman, MT: Center for Adult Learning Research.

Plucker, J. A., Callahan, C. M., and Tomachin, E. M. (1996). "Wherefore Art Thou, Multiple Intelligences? Alternative Assessments for Identifying Talent in Ethnically Diverse and Low Income Students," Gifted Child Quarterly 40: 81-89.

Reynolds, W. E. & Miller, G. E. (Eds) (2003). Handbook of Psychology V. 7 Hoboken, NJ: John Wiley and Sons, Inc.

Rivera, D. B. (1996). "An Investigation into the Validity and Reliability of the Multiple Intelligences Inventory for Teachers" (Ph.D. diss., University of New Orleans).

Roeuche, J. E., & Roeuche S. D. (1993). Between a rock and a hard place: The at-risk student in the open-door college. Washington, D.C.: Community College Press.

Rosnow, R. L. & Rosenthal, R. (1996). Beginning behavioral research: A conceptual primer. (2nd ed.). Englewood Cliffs, NJ. Prentice Hall.

Rosnow, R. L., Skleder, A. A., Jaeger, M. E., & Rind, B.

Intelligence and the Epistemics of Interpersonal Acumen: Testing Some Implications of Gardner's Theory. Intelligence, 1994, 19(1), pp. 83-116.

Saljo, R. (1997). Self-report in educational research. In J. P. Keeves (Ed.), Educational research methodology, and measurement: An international handbook. (2nd ed.) (pp. 101-106). Tarrytown, NJ. Elsevier Science.

Schwartz, W. (1995). School dropouts: New information about an old problem. (Digest Number 109). New York, NY: ERIC Cleaqringhouse on Urban Education. (ERIC Document Reproduction Service No. EDO-UD-96-5).

Shaw, L. (2004). Learning strategies of youth in transitions to adulthood in the urban life-skills program of A Pocket Full Of Hope®. Unpublished doctoral dissertation. Stillwater OK: Oklahoma State University.

Shavelson, R. J. (1996). Statistical reasoning for the behavioral sciences. Boston, MA: Allyn & Bacon.

Shearer, C. B., and Jones, J. A. (1994). The Validation of the Hillside Assessment of Perceived Intelligences (HAPI): A Measure of Howard Gardners's Theory of Multiple Intelligence. Washington, D.C.: National Institute on Disability and Rehabilitation Research, 1994 (ED 372 077).

Shearer, C. B., & Jones, J. A. (1994). The Validation of the Hillside Assessment of Perceived Intelligences (HAPI): A Measure of Howard Gardner's Theory of Multiple Intelligences, paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA, 4-8 April 1994, ERIC, ED 312 077.

Shearer, C. B. (1996). The MIDAS: A Professional Manual. Kent, OH: MI Consulting and Research.

Smith, R. M. (1976). Learning how to learn in adult education. DeKalb, IL: University of Northern Illinois. (ERIC Clearinghouse in Career Education, Information Series No. 10 CE 007 702).

Smith, R. M. (1982). Learning how to learn: Applied theory for adults. Great Britain: Open University Press.

Smith, R. M. (1991). How people become effective learners,

Adult learning. 2 960, pp. 11 - 13.

Snyder, R. (1999). The relationship between learning styles/multiple intelligences and academic achievement of highschool students (Brief article). University of North Carolina Press.

Sperry, L. (1972). Learning performance & Individual Differences: Essays and Readings. Glenview, Ill. Scott, Foresman and Company.

Sprinthall, R. C. (1990). Basic statistical analysis. Englewood Cliff, NJ; Prentice Hall.

Sternberg, R. J. , Conway, B. E. , Ketron, J. L. , & Berstein, M. (1981). "People's Conceptions of Intelligence." Journal of Personality and Social Psychology 41: (pp. 37-55).

Sternberg, R. J. (1990). Real life vs. academic problem solving. In R. A. Fellenz & G. J. Conti (Eds.), Intelligence and adult learning. Bozeman, MT: Center for Adult Learning Research, Montana State University.

Sternberg, R. J. (Ed)(1994). Thinking and Problem Solving, Handbook of Perception and Cognition (2nd Ed) San Diego, CA: Academic Press

Sternberg, R. J. (1994). Commentary: Reforming school reform: comments on "multiple intelligences: the theory and practice. Teachers College Record. Vol. 95 (4) (pp. 561-569).

Tapp, S. (2002). Cultural Appreciation in Lifelong Learning: An instrument dentifying cultural appreciation. Unpublished doctoral dissertation. Stillwater OK: Oklahoma State University.

Teele, S. (1994). "The Relationship of Multiple Intelligences to the Instructional Process." Doctoral dissertation, University of California, Riverside.

Torff, B. & Gardner, H. (1999). The vertical mind: The case for multiple intelligences. In M. Anderson (Ed.). The development of intelligence. London: University College Press.

Tough, A. (1971). The adult's learning projects: A fresh

approach to theory and practice in adult learning. Toronto, Ontario: The Ontario Institute for Studies in Education.

Tough, A. (1978). Major learning efforts: Recent research and future directions. Adult Education, 28, 250-263. San Francisco: Jossey-Bass.

U.S. Department of Commerce, Bureau of the Census. (2000). Statistical Abstract of the United States, 2000. Washington D.C.: U.S. Government Printing Office.

U.S. Department of Education, National Center for Educational Statistics, The Condition of Education 2001, The NCES 2001-072, Washington, D.C.: U.S. Government Printing Office, 2001.

Vaughan, G. B. (1995). The community college story: A tale of American innovation. U.S.A.: American Association of Community Colleges.

Wiersma, W. (1995). Research methods in education. Needham Heights, MA: Allyn and Bacon.

Wiersma, W. (1995). Research methods in education.(6th ed.). Boston, MA: Allyn and Bacon.

Witkin, H. A. (1976). Cognitive style in academic performance and in teacher-student relations. In S. Messick (Ed.). Individually in learning (pp. 38-72). San Francisco, CA: Jossey-Bass.

APPENDIX

Multiple Intelligences Survey

Directions: People differ in their ways of learning and knowing. These are called Multiple Intelligences. Below is a list of 27 items in 3 sets that relate to each type of Multiple Intelligence. Some of these will apply to how you like to learn, and others will not.

Ranking: There are nine items in each group. For each group, **rank** the items according to how they apply to you. **Put a 1 next to the item that is *most* like you.** Put a 2 next to the item that is second most like you. Do this for each item until you have numbered every item with a number from 1 to 9. **The item *least* like you should be 9.** Do not use a number more that once in each group.

Rank each of the following 9 items from 1 to 9.

	1. I live an active lifestyle.
	2. Meditation exercises are rewarding.
	3. I am a "team player".
	4. Fairness is important to me.
	5. Structure helps me be successful.
	6. I enjoy many kinds of music.
	7. My home has a recycling system in place.
	8. I keep a journal.
	9. I enjoy doing three dimensional puzzles.

Rank each of the following 9 items from 1 to 9.

	10. I enjoy outdoor games.
	11. Questions about the meaning of life are important to me.
	12. I learn best interacting with others.
	13. Social justice issues concern me.
	14. I get easily frustrated with disorganized people.
	15. I have always been interested in playing a musical instrument.
	16. Animals are important in my life.
	17. I write for pleasure.
	18. I can recall things in mental pictures.

Rank each of the following 9 items from 1 to 9.

	19. I like working with tools.
	20. I enjoy discussing questions about life.
	21. Things such as clubs and extracurricular activities are fun.
	22. I learn best when I have an emotional attachment to the subject.
	23. Step-by-step directions are a big help.
	24. Remembering song lyrics is easy for me.
	25. Hiking is an enjoyable activity.
	26. Foreign languages interest me.
	27. I can imagine ideas in my mind.

Checking for Accuracy: Please go back and check the rankings that you entered for each of the five sets of statements. Each set should have one entry for each of the numbers 1 through 9 with no duplicates. Please correct any duplicates that you may have in any set.

About You...

The following information will help us better understand the information that you provide us.

Gender: ____Male ____Female

Age: ____

Race:

____African American
____Asian
____Hispanic
____Native American
____White
____Other

Thank You.

Multiple Intelligences Survey

Directions: People differ in their ways of learning and knowing. These are called Multiple Intelligences. Below is a list of 45 items in 5 sets that relate to each type of Multiple Intelligence. Some of these will apply to how you like to learn, and others will not.

Ranking: There are nine items in each group. For each group, **rank** the items according to how they apply to you. **Put a 1 next to the item that is *most* like you.** Put a 2 next to the item that is second most like you. Do this for each item until you have numbered every item with a number from 1 to 9. **The item *least* like you should be 9.** Do not use a number more that once in each group.

Rank each of the following 9 items from 1 to 9.

	1. Activities such as arts and crafts are enjoyable pastimes.
	2. Meditation exercises are rewarding.
	3. I am a "team player".
	4. Working alone can often be more productive than working in a group.
	5. Structure helps me be successful.
	6. I enjoy many kinds of music.
	7. My home has a recycling system in place.
	8. Word puzzles like crosswords and jumbles are fun.
	9. I enjoy doing three dimensional puzzles.

Rank each of the following 9 items from 1 to 9.

	10. I live an active lifestyle.
	11. Questions about the meaning of life are important to me.
	12. I learn best interacting with others.
	13. Fairness is important to me.
	14. I can complete calculations quickly in my head.
	15. I focus in on sounds.
	16. Animals are important in my life.
	17. It is easy for me to explain verbally my ideas to others.
	18. I can recall things in mental pictures.

Rank each of the following 9 items from 1 to 9.

	19. I enjoy outdoor games.
	20. I enjoy discussing questions about life.
	21. Participating in politics is important.
	22. Social justice issues concern me.
	23. I find working on computer spreadsheet or database rewarding.
	24. I have always been interested in playing a musical instrument.
	25. Hiking is an enjoyable activity.
	26. I keep a journal.
	27. Re-arranging a room is fun to me.

Rank each of the following 9 items from 1 to 9.

	28. I like working with tools.
	29. Studying history helps give me perspective.
	30. Things such as clubs and extracurricular activities are fun.
	31. I need to know why I should learn something before I do it.
	32. I get easily frustrated with disorganized people.
	33. Remembering song lyrics is easy for me.
	34. Putting things in hierarchies makes sense to me.
	35. I write for pleasure.
	36. I enjoy creating art using varied media.

Rank each of the following 9 items from 1 to 9.

	37. I learn by doing.
	38. I like visiting breathtaking sites in nature.
	39. I enjoy discussions with family and friends.
	40. I learn best when I have an emotional attachment to the subject.
	41. Step-by-step directions are a big help.
	42. Moving to a beat is easy for me.
	43. I enjoy categorizing things by common traits.
	44. Foreign languages interest me.
	45. I can imagine ideas in my mind.

Checking for Accuracy: Please go back and check the rankings that you entered for each of the five sets of statements. Each set should have one entry for each of the numbers 1 through 9 with no duplicates. Please correct any duplicates that you may have in any set.

About You...

The following information will help us better understand the information that you provide us.

Gender: ____Male ____Female

Age: ____

Race:

____African American
____Asian
____Hispanic
____Native American
____White
____Other

Thank You.

Multiple Intelligences Survey

Directions: People differ in their ways of learning and knowing. These are called Multiple Intelligences. Below is a list of 90 items based on his work. Some of these will apply to how you like to learn, and others will not.

Ranking: There are nine items in each group. For each group, **rank** the items according to how they apply to you. **Put a 1 next to the item that is *most* like you.** Put a 2 next to the item that is second most like you. Do this for each item until you have numbered every item with a number from 1 to 9. **The item *least* like you should be 9.** Do not use a number more that once in each group.

Rank each of the following 9 items from 1 to 9.

	1. I enjoy making things with my hands.
	2. It is important to see my role in the "big picture" of things.
	3. I learn best interacting with others.
	4. I am keenly aware of my moral beliefs.
	5. I keep my things neat and orderly.
	6. I easily pick up on patterns.
	7. I enjoy categorizing things by common traits.
	8. I enjoy reading all kinds of materials.
	9. I can imagine ideas in my mind.

Rank each of the following 9 items from 1 to 9.

	10. Studying history helps give me perspective.
	11. I pay attention to social issues.
	12. I am willing to protest or sign a petition to right a wrong.
	13. Things have to make sense to me or I am dissatisfied.
	14. Remembering song lyrics is easy for me.
	15. I spend a great deal of time outdoors.
	16. I like to participate in debates.
	17. I am good at reading maps.
	18. I learn by doing.

Rank each of the following 9 items from 1 to 9.

	19. The more the merrier.
	20. I learn best when I have an emotional attachment to the subject.
	21. Step-by-step directions are a big help.
	22. I focus in on sounds.

	23. Ecological issues are important to me.
	24. Taking notes helps me remember.
	25. Rearranging a room is fun to me.
	26. Sitting stiff for long periods of time is difficult for me.
	27. I enjoy discussing questions about life.

Rank each of the following 9 items from 1 to 9.

	28. Fairness is important to me.
	29. Solving problems comes easily to me.
	30. Moving to a beat is easy for me.
	31. Hiking is an enjoyable activity.
	32. I faithfully contact friends through means such as letters and/or e-mail.
	33. I enjoy creating art using varied media.
	34. I enjoy outdoor games.
	35. Religion is important to me.
	36. Study groups are very productive for me.

Rank each of the following 9 items from 1 to 9.

	37. I get easily frustrated with disorganized people.
	38. I've always been interested in playing an instrument.
	39. I enjoy working on a garden.
	40. It is easy for me to explain my ideas to others.
	41. I remember well using graphic organizers.
	42. I value non-verbal communication such as sign language.
	43. I enjoy viewing art masterpieces.
	44. I enjoy chat room.
	45. My attitude effects how I learn.

Rank each of the following 9 items from 1 to 9.

	46. The cadence of poetry intrigues me.
	47. I believe preserving our National Parks is important.
	48. I keep a journal.
	49. Performance art can be very gratifying.
	50. A fit body is important for a fit mind.
	51. Meditation exercises are rewarding.
	52. Participating in politics is important.
	53. Social justice issues concern me.
	54. I can complete calculations quickly in my head.

Rank each of the following 9 items from 1 to 9.

	55. Putting things in hierarchies makes sense to me.

	56. Word puzzles like crosswords and jumbles are fun.
	57. Spreadsheets are great for making things such as charts, graphs, and tables.
	58. Activities such as arts and crafts are enjoyable pastimes.
	59. I like visiting breathtaking sites in nature.
	60. Radio talk shows are enjoyable.
	61. Working alone can be just as productive as working in a group.
	62. Puzzles requiring reasoning are fun.
	63. I remember things by putting them in rhyme.

Rank each of the following 9 items from 1 to 9.

	64. I write for pleasure.
	65. Three dimensional puzzles bring me much enjoyment.
	66. Expression through dance is beautiful.
	67. I enjoy reading the works of philosophers.
	68. I am a "team player".
	69. I need to know why I should do something before I agree to do it.
	70. I can't begin an assignment until all my questions are answered.
	71. Concentration is difficult while listening to a radio or television.
	72. Animals are important in my life.

Rank each of the following 9 items from 1 to 9.

	73. Music videos are very stimulating.
	74. I like working with tools.
	75. Learning new things is easier when I understand their value.
	76. I dislike working alone.
	77. When I believe in something, I will give it 100% effort to it.
	78. Structure helps me be successful.
	79. I enjoy many kinds of music.
	80. My home has a recycling system in place.
	81. I enjoy playing with words like puns, anagrams, and spoonerisms.

Rank each of the following 9 items from 1 to 9.

	82. I live an active lifestyle.
	83. I wonder if there are other forms of intelligent life in the universe.
	84. Things such as clubs and extracurricular activities are fun.
	85. I like to be involved in causes that helps others.
	86. I find working on computer spreadsheet or database rewarding.
	87. Musicals are more interesting then dramatic plays.

	88. I enjoy studying biology, botany and/or zoology.
	89. Foreign languages interest me.
	90. I can recall things in mental pictures.

The following information will help us better understand the information that you provide us.

Gender: ____Male ____Female

Age: ____

Race:

____African American
____Asian
____Hispanic
____Native American
____White
____Other

Multiple Intelligences Survey

Directions: People differ in their ways of learning and knowing. Dr. Howard Gardner has suggested that there are at least nine different ways that people go about learning, and he calls these Multiple Intelligences. Below is a list of 90 items based on his work. Some of these will apply to how you like to learn, and others will not. Please rate **each** item based on how well the item applies to you. Use the following scale to rate each item:

Definitely Unlike Me	Unlike Me	Not Sure	Like Me	Definitely Like Me
1	2	3	4	5

1. I enjoy making things with my hands.	1 2 3 4 5
2. It is important to see me role in the "big picture" of things.	1 2 3 4 5
3. I learn best interacting with others.	1 2 3 4 5
4. I am keenly aware of my moral beliefs.	1 2 3 4 5
5. I keep my things neat and orderly.	1 2 3 4 5
6. I easily pick up on patterns.	1 2 3 4 5
7. I enjoy categorizing things by common traits.	1 2 3 4 5
8. I enjoy reading all kinds of materials.	1 2 3 4 5
9. I can imagine ideas in my mind.	1 2 3 4 5
10. I learn by doing.	1 2 3 4 5
11. Studying history and ancient culture helps give me perspective.	1 2 3 4 5
12. I pay attention to social issues and causes.	1 2 3 4 5
13. I am willing to protest or sign a petition to right a wrong.	1 2 3 4 5
14. Things have to make sense to me or I am dissatisfied.	1 2 3 4 5
15. Remembering song lyrics is easy for me.	1 2 3 4 5
16. I spend a great deal of time outdoors.	1 2 3 4 5
17. Debates and public speaking are activities I like to participate in.	1 2 3 4 5
18. I am good at reading maps and blueprints.	1 2 3 4 5
19. Sitting stiff for long periods of time is difficult for me.	1 2 3 4 5
20. I enjoy discussing questions about life.	1 2 3 4 5
21. The more the merrier.	1 2 3 4 5
22. I learn best when I have an emotional attachment to the subject.	1 2 3 4 5
23. Step-by-step directions are a big help.	1 2 3 4 5
24. I focus in on noise and sounds.	1 2 3 4 5
25. Ecological issues are important to me.	1 2 3 4 5
26. Taking notes helps me remember and understand.	1 2 3 4 5
27. Rearranging a room is fun to me.	1 2 3 4 5
28. I enjoy outdoor games and sports.	1 2 3 4 5

29. Religion is important to me.	1 2 3 4 5
30. Study groups are very productive for me.	1 2 3 4 5
31. Fairness is important to me.	1 2 3 4 5
32. Solving problems comes easily to me.	1 2 3 4 5
33. Moving to a beat is easy for me.	1 2 3 4 5
34. Hiking and camping are enjoyable activities.	1 2 3 4 5
35. I faithfully contact friends through letters and/or email.	1 2 3 4 5
36. I enjoy creating art using varied media.	1 2 3 4 5
37. I value non-verbal communication such as sign language.	1 2 3 4 5
38. I enjoy viewing art masterpieces.	1 2 3 4 5
39. I enjoy chat room.	1 2 3 4 5
40. My attitude effects how I learn.	1 2 3 4 5
41. I get easily frustrated with disorganized people.	1 2 3 4 5
42. I've always been interested in playing an instrument.	1 2 3 4 5
43. I enjoy working on a garden.	1 2 3 4 5
44. It is easy for me to explain my ideas to others.	1 2 3 4 5
45. I remember well using graphic organizers.	1 2 3 4 5
46. A fit body is important for a fit mind.	1 2 3 4 5
47. Relaxation and medication exercises are rewarding.	1 2 3 4 5
48. Participating in politics is important.	1 2 3 4 5
49. Social justice issues concern me.	1 2 3 4 5
50. I can complete calculations quickly in my head.	1 2 3 4 5
51. The cadence of poetry intrigues me.	1 2 3 4 5
52. I believe preserving our National Parks is important.	1 2 3 4 5
53. I keep a journal.	1 2 3 4 5
54. Performance art can be very gratifying.	1 2 3 4 5
55. Arts and crafts are enjoyable pastimes.	1 2 3 4 5
56. I like visiting breathtaking sites in nature.	1 2 3 4 5
57. Television and radio talk shows are enjoyable.	1 2 3 4 5
58. Working alone can be just as productive as working in a group.	1 2 3 4 5
59. Puzzles requiring reasoning are fun.	1 2 3 4 5
60. I remember things by putting them in rhyme.	1 2 3 4 5
61. Putting things in hierarchies makes sense to me.	1 2 3 4 5
62. Word puzzles like crosswords and jumbles are fun.	1 2 3 4 5
63. Spreadsheets are great for making charts, graphs, and tables.	1 2 3 4 5
64. Expression through dance is beautiful.	1 2 3 4 5
65. I enjoy reading ancient and modern philosophers.	1 2 3 4 5
66. I am a "team player".	1 2 3 4 5
67. I need to know why I should do something before I agree to do it.	1 2 3 4 5
68. I can't begin an assignment until all my questions are answered.	1 2 3 4 5
69. Concentration is difficult while listening to a radio or televison.	1 2 3 4 5
70. Animals are important in my life.	1 2 3 4 5
71. I write for pleasure.	1 2 3 4 5
72. Three dimensional puzzles bring me much enjoyment.	1 2 3 4 5

73. I like working with tools.	1	2	3	4	5
74. Learning new things is easier when I understand their value.	1	2	3	4	5
75. I dislike working alone.	1	2	3	4	5
76. When I believe in something, I will give it 100% effort to it.	1	2	3	4	5
77. Structures helps me be successful.	1	2	3	4	5
78. I enjoy many kinds of music.	1	2	3	4	5
79. My home has a recycling system in place.	1	2	3	4	5
80. I enjoy playing with words like puns, anagrams, and spoonerisms.	1	2	3	4	5
81. Music videos are very stimulating.	1	2	3	4	5
82. I live an active lifestyle.	1	2	3	4	5
83. I wonder if there are other forms of intelligent life in the universe.	1	2	3	4	5
84. Clubs and extracurricular activities are fun.	1	2	3	4	5
85. I like to be involved in causes that helps others.	1	2	3	4	5
86. I find working on computer spreadsheet or database rewarding.	1	2	3	4	5
87. Musical are more interesting then dramatic plays.	1	2	3	4	5
88. I enjoy studying biology, botany and/or zoology.	1	2	3	4	5
89. Foreign languages interest me.	1	2	3	4	5
90. I can recall things in mental pictures.	1	2	3	4	5

The following information will help us better understand the information that you provide us.

Gender:
____Male
____Female

Age: ____

Race:
____African American
____Asian
____Hispanic
____Native American
____White
____Other

Oklahoma State University
Institutional Review Board

Protocol Expires: 11/23/2004

Date: Monday, November 24, 2003 IRB Application No ED0458

Proposal Title: The Development of an Instrument to Identify Multiple Intelligence

Principal
Investigator(s):

Joyce A McClellan
766 North 24th Ave.
Tulsa, OK 74127

Gary J Conti
206 Willard
Stillwater, OK 74078

Reviewed and
Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

Dear PI :

Your IRB application referenced above has been approved for one calendar year. Please make note of the expiration date indicated above. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved projects are subject to monitoring by the IRB. If you have questions about the IRB procedures or need any assistance from the Board, please contact me in 415 Whitehurst (phone: 405-744-5700, colson@okstate.edu).

Sincerely,

Carol Olson

Carol Olson, Chair
Institutional Review Board

VITA

Joyce A. McClellan

Candidate for the Degree of Doctor of Education

Thesis: DEVELOPMENT OF AN INDICATOR TO IDENTIFY MULTIPLE INTELLIGENCES PREFERENCES OF ADULT LEARNERS

Major Field: Occupational and Adult Education

Education: Graduated from Booker T. Washington High School, Tulsa, Oklahoma; received Bachelor of Science degree in Business Administration from Lincoln University, Jefferson City, Missouri in July 1979; completed 12 credits hours at Northeastern State University, Tahlequah, Oklahoma, in the Industrial Management program in 1992; received Master of Human Relations degree from the University of Oklahoma, Norman, Oklahoma December 1999; received Doctor of Education from Oklahoma State University in May 2006.

Experience: Small Business Specialist at Tulsa Technology Center. Adjunct Professor at Langston University-OKC. Adjunct professor at Tulsa Community College spring semester 2002, fall semester 2002, and fall semester 2003. Career Counselor and Work Based Learning Coordinator at Tulsa Job Corps. While at Job Corps received an award for the Most Effective Staff. Education Director at the Salvation Army North Mabee Center from November 2002 through March 2003 and received an award for Community Involvement. Manager of the Statewide IDA program at Community Action Project from November 2000 to March 2002. Manager of the Voluntary Programs at the City of Tulsa from June 1999 to November 2000. Minority/Female Business Coordinator at the City of Tulsa from June 1994 to June 1999. While at the City of Tulsa received several awards from Mayor Susan Savage, area non-profit agencies, the Small Business Administration, The Greenwood Chamber of Commerce, and the Native American Business Development Council. Commodity Manager at American Airlines from 1987 to 1994 and received several awards from the Oklahoma Minority Supplier Development Council. Volunteer Instructor for Greenwood Chamber of Commerce, Tulsa Association of Enterprise Opportunity from 1998 to present. Advisory committee of a non-profit organization, A Pocket Full of Hope, that mentors high challenged youth and teens.