THE RELATIONSHIP BETWEEN MULTIPLE INTELLIGENCES AND ATTITUDE TOWARD INDEPENDENT LEARNING IN A HIGH TRANSACTIONAL DISTANCE ENVIRONMENT

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by
Christine Mulhollen

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The thesis of Christine Mulhollen has been reviewed and approved* by the following:

Michael G. Moore  
Professor of Education  
Thesis Adviser  
Chair of Committee

Gary W. Kuhne  
Associate Professor of Education

Melody M. Thompson  
Assistant Professor of Education

Mindy L. Kornhaber  
Associate Professor of Education

Ian E. Baptiste  
Associate Professor of Education  
In Charge of Graduate Programs in Adult Education

*Signatures are on file in the Graduate School.
ABSTRACT

It has previously been theorized, but not verified, that higher degrees of transactional distance, and the engagement of a variety of the multiple intelligences, are each associated with higher levels of learner autonomy and independence. It therefore seemed likely that learners who have successfully progressed in a learning environment that had both a higher degree of transactional distance and which engaged a variety of the intelligences (as opposed to just one or two of the intelligences) would actually have higher levels of learner autonomy, and subsequently demonstrate this through positive attitudes toward independent learning. For these learners, it was believed that there may be a positive relationship between their strengths in one or more of the intelligences, and their attitude toward independent learning.

The Multiple Intelligences Developmental Assessment Scales (MIDAS) and Adult Attitudes Toward Independent Learning (AATILS) surveys were provided to a sample of adults who all had experienced similar high transactional distance learning environments which engaged a variety of the intelligences. Results demonstrated that these learners did demonstrate positive attitudes toward independent learning, and that interpersonal intelligence was predictive of attitude toward independent learning (p<0.001). These results were significant in that they supported previous theories regarding the relationship of autonomy and transactional distance (Moore, 1980, 1983, 1993, and Moore & Kearsley, 2005), as well as suggestions of a relationship between the engagement of a variety of the intelligences with autonomy (Chan, 2000; Diaz-Lefebvre, 1999; Walters, 1992; and Williams, 1995) and independence (Cornwell, 2001; and Mantzaris, 2001). The ability of interpersonal intelligence to predict attitudes toward
independent learning suggested a dynamic relationship may exist between interpersonal intelligence, dialogue, transactional distance, autonomy, independence, and interdependence.
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Chapter 1
Introduction

Transactional distance, learner attitudes, and multiple intelligences, have each been the subject of a variety of separate investigations. Transactional distance is the psychological gap in understanding between teacher and learner that learners experience in distance education (Moore & Kearsley, 2005). Some distance learning environments have higher transactional distance compared to others. It has been theorized, but not verified, that higher transactional distance learning environments require higher levels of learner autonomy (Moore, 1980, 1983, 1993, and Moore & Kearsley, 2005) and independence (Moore, 1973, 1983). It therefore seems possible that independent study programs, which are high in transactional distance, would necessitate higher levels of learner ability for independent learning.

Multiple intelligences theory states that there are a variety of intelligences (linguistic, logical-mathematical, spatial, bodily-kinesthetic, musical, interpersonal, intrapersonal, and naturalistic) (Gardner, 1983, 1993, 1999a, 2004a). Learners have differing strengths in each of these intelligences. The engagement of a variety of these intelligences while learning (as opposed to engagement of just one or two of the intelligences) has appeared to be associated with higher levels of learner autonomy (Chan, 2000; Diaz-Lefebvre, 1999a; Walters, 1992; and Williams, 1995) and independence (Cornwell, 2001; and Mantzaris, 2001).

Attitude is an affective reaction often associated with activity and evaluation (Webb, 1994). Attitudes in distance education have often been evaluated from the perspective of student satisfaction (Moore & Thompson, 1997, p22). Positive learner
attitudes have been found to be related to a variety of desired outcome measures in
distance education (e.g. Biner, Barone, Welsh, & Dean, 1997; Biner, Welsh, Barone,
Summers, & Dean, 1997; and Swan, 2001). Because of this relationship, further
investigation into attitudes as they relate to distance education, including attitudes toward
independent learning, appears to be warranted.

It has been theorized, but not verified, that a higher degree of transactional
distance, and the engagement of a variety of the intelligences, are both associated with
higher levels of learner autonomy. It would therefore seem likely that learners who have
successfully progressed in this type of distance learning context would actually have
higher levels of learner autonomy, and subsequently demonstrate this through positive
attitudes toward independent learning. For these learners, there may be a positive
relationship between their strengths in one or more of the intelligences, and their attitude
toward independent learning.

Conceptual Framework

This research involves the variables of adult attitudes toward independent
learning, and multiple intelligences. The relationship between the variables of adult
attitudes toward independent learning and multiple intelligences will be explored for
learners who have successfully progressed in a high transactional distance environment
which engages a variety of the intelligences. The distance education context of the senior
year of the physician assistant (PA) program at the Pennsylvania College of Technology
(PCT) fits this description.

The concept of independent study is seminal in the evolution of adult and distance
education. Before one of the principal divisions of the University Continuing Education
Association adopted the name in 1969 (Moore & Kearsley, 2005, p.27), it was defined by one of the leading thinkers in the field as independent study. “Independent study consists of various forms of teaching learning arrangements in which teachers and learners carry out their essential tasks and responsibilities apart from one another, communicating in a variety of ways, for the purposes of freeing internal learners from inappropriate class pacings or patterns, or providing external learners with opportunities to continue learning in their own environments, and developing in all learners the capacity to carry on self-directed learning, the ultimate maturity required of the educated person. Independent study programs offer learners varying degrees of freedom in the self-determination of goals and activities, and in starting, stopping and pacing individualized learning programs which are carried on to the greatest extent possible at the convenience of the learners” (Wedemeyer, 1981, p. 51). “Internal” refers to campus-based students, and “external” refers to off-campus learners. The senior Pennsylvania College of Technology (PCT) physician assistant (PA) students experience an external, field-based independent study program of learning which fits the above description.

It should be noted that the phrase “independent study” has a different meaning in this study than the phrase “independent learning”. Although “independent study” as defined above contains the concept of “independent learning”, “independent learning” is a phrase more specifically used in this study to describe the act of using personal energy and concentration toward the attainment of identified learning goals (Kole, 1987). Independent learning occurs through the identification and use of needed processes and resources which are required to meet the learning goals. “Independent learning” refers to learners using their personal energy and concentration so that they can learn on their own,
apart from a teacher. Wedemeyer (1971) advocated freedom and choice in distance
teaching and learning so that independent learning could be facilitated. Moore (1973,
1976), who later developed the theory of independent learning and teaching (and then
subsequently the theory of transactional distance), stated that independent learning and
teaching is an educational system in which the learner is autonomous and separated from
the teacher by both space and time. It is the attitudes toward “independent learning”
which will be investigated in this study. The act of “independent learning” can occur
within or outside of an “independent study” program.

In looking at the context in which the PCT PA students learn during their senior
year, both the degree of transactional distance and the engagement of the multiple
intelligences will be considered, as both relate to learner independence and autonomy.

In this study, learner independence and learner autonomy are defined as related,
but not identical, concepts. Learner “autonomy” refers to the capacity of the learner for
making decisions regarding their own learning and the ability to develop a personal
learning plan (Moore & Kearsley, 2005, p. 228). Learner “independence” refers to the
learner’s action, or mobilization, of concentration and personal energy toward the
attainment of the learning goals (Kole, 1987). Therefore, the difference between learner
autonomy and learner independence is that: Learner “autonomy” refers to the capacity
and ability to develop a personal learning plan, and learner “independence” refers to the
action or mobilization necessary to carry it out and accomplish the goals.

Adults with learner independence (or independent learners) are those who
demonstrate the act of using personal energy and concentration toward the attainment of
identified learning goals which occurs through the identification and use of needed
processes and resources that are required to meet the learning goals (Kole, 1987).

Although learner interdependence has been a recent topic of interest in adult education, learner independence and learner interdependence are not polar opposites. It is possible for learners to be independent and interdependent simultaneously (Franz, 2002; and Nah, 1999).

The importance of learner independence has been noted (Wedemeyer, 1981) and identified as something we should strive for as educators (Knowles, 1980; and Saba, 2000). Saba (2000) has stated that “first and foremost, distance education is about the student and her/his independence in learning” and that developing learner autonomy should be given primary consideration in the distance learning environment.

Attitude is an affective reaction often associated with activity and evaluation (Webb, 1994). Attitudes in distance education have often been evaluated from the perspective of student satisfaction (Moore & Thompson, 1997, p 22). Positive learner attitudes have been found to be related to a variety of desired outcome measures (e.g. Biner, Barone, Welsh, & Dean, 1997; Biner, Welsh, Barone, Summers, & Dean, 1997; and Swan, 2001). It would therefore appear reasonable that positive attitudes toward independent learning should be a desired goal, and worthy of further study.

This research involves investigating the relationship between the variables of adult attitudes toward independent learning and multiple intelligences. This investigation will be carried out with adults who have successfully progressed in the PCT PA distance learning context.

PCT PA students experience a field-based distance learning context which lasts for twelve months during their senior year. This distance education experience can be
considered a program of independent study because: (1) teachers and learners carry out their responsibilities and tasks apart from one another; (2) communication can occur between teachers and learners in a variety of ways; (3) these learners who are away from campus have the opportunity to continue learning in a field-based environment; (4) it develops the capacity of learners to carry on self-directed learning; and (5) it offers a certain degree of learner freedom in the self-determination of activities and pacing (Wedemeyer, 1981). In addition to describing the distance learning context as an independent study program, it will also be described based on the degree of transactional distance and the engagement of the multiple intelligences, as both relate to learner autonomy and independence.

“Transactional Distance” is the psychological gap in understanding between teacher and learner that learners experience in distance education (Moore, 1983; Moore & Kearsley, 2005, p.223). Some distance learning environments have higher “distance” compared to others. Structure and dialogue are variables that define the degree of transactional distance experienced. Moore (1993, p.26) has noted that “structure expresses the rigidity or flexibility fo the programme’s educational objectives, teaching strategies, and evaluation methods”. Moore (1993, p.24) also stated that “the term ‘dialogue’ is used to describe an interaction or series of interactions having positive qualities that other interactions might not have. A dialogue is purposeful, constructive and valued by each party.” Distance learning environments that are relatively high in structure and relatively low in dialogue between instructor and students are said to be relatively high in transactional distance. This description (higher structure and lower dialogue) is consistent with the learning environment that PCT PA students experience
during their distance education experiences. Success in distance learning environments high in transactional distance have been theorized to be associated with higher levels of learner autonomy (Moore, 1980, 1983, 1993, & Moore & Kearsley, 2005) and independence (Moore, 1973, 1983).

Multiple intelligences theory states that there are a variety of intelligences (linguistic, logical-mathematical, spatial, bodily-kinesthetic, musical, interpersonal, intrapersonal, and naturalistic) (Gardner, 1983, 1993, 1999a, 2004a). Learners have differing strengths in each of these intelligences. It has been suggested, but not proven, that the engagement of a variety of these intelligences while learning (as opposed to engagement of just one or two of the intelligences), is associated with higher levels of learner autonomy (Chan, 2000; Diaz-Lefebvre, 1999a; Walters, 1992; and Williams, 1995) and independence (Cornwell, 2001; and Mantzaris, 2001).

PCT PA students experience engagement of almost all of their intelligences in their field-based distance educational experiences. For example, these learners engage their linguistic intelligence by interacting with patients and other health care workers in the clinical setting. These learners also record the findings in a manner that is both comprehensive and succinct. Logical-mathematical intelligence is used when learners have to analyze patients’ symptoms, physical signs, and diagnostic studies to develop a differential diagnosis and treatment plan. Spatial intelligence is used when learners obtain a patient’s medical history and perform a physical exam. These learners then correlate that information with the patient’s body and organ systems in three dimensions to determine a cause for the ailment. Bodily-kinesthetic intelligence is used when learners actually perform a physical exam and use various physical assessment
maneuvers to evaluate the patient (i.e. performing a blood pressure, using an ophthalmoscope, etc.). Interpersonal intelligence is used when interacting with patients and other health care workers so that exchanges are both as pleasant as possible, and also efficient, so that patients’ problems can be dealt with efficiently and effectively. Intrapersonal intelligence is used by the learners as they need to be able to identify when they are practicing within their scope of practice or when they need help and need to consult with other care givers or refer. They need to monitor their own ability with each patient to determine if their progress through the problem to resolution is sufficient and an acceptable standard of care. Naturalistic intelligence is used as learners need to be able to categorize each patient’s signs and symptoms into disease categories so that further evaluation and confirmation of diagnosis is efficient and appropriate.

Since both a higher degree of transactional distance and the engagement of a variety of the intelligences have both been theorized to be associated with higher levels of learner autonomy and independence, then it would seem likely that learners who have successfully progressed in this type of learning context should actually have higher levels of learner autonomy and independence. Since PCT PA students experience this type of distance learning environment, it would suggest that students who successfully progressed in this environment would have higher levels of autonomy and independence.

For the PCT PA learners who have been able to progress in this distance learning context, it is hypothesized that not only will they have positive attitudes toward independent learning, but there will also be a positive relationship between learners’ strengths in one or more of the intelligences and their attitudes toward independent learning. For example, perhaps strength in intrapersonal intelligence is positively related
to attitude toward independent learning. Or, perhaps learners who have stronger
linguistic intelligence will be found to have better attitudes toward independent learning.

Historical Perspectives

Independent Learning and Transactional Distance

Wedemeyer (1971, 1972, 1973, 1975, and 1981) acknowledged the importance of
nontraditional learning because it allowed adults to pursue lifelong learning opportunities
that traditional educational institutions did not provide to them. The autonomy, free
choice, and independence that nontraditional learning had to offer was recognized
(Wedemeyer, 1988). In exploring the differences between traditional and independent
learning, Wedemeyer (1981) recognized that the true difference was the ability to utilize
distance between teacher and learner to its full advantage. This included a new
understanding of learning that allowed for a separation of space and time between the
learner and teacher with the learner at the center of the process in a more active role. His
concept of learner independence suggested that this advantage be supported through non-
traditional learning strategies.

Moore (1973, 1976) took this concept of appreciating student independence a step
further and described a theory of independent learning and teaching. “Independent
Learning and Teaching is an educational system in which the learner is autonomous, and
separated from his teacher by space and time, so that communication is by print,
electronic, or other non-human medium” (Moore, 1973, p. 663). The three subsystems
described were that of learner, teacher, and communication method. He went on to state
that these independent learning and teaching subsystems had characteristics that
distinguished them from other types of educational activities. These characteristics included the “autonomous learner” and the concept of “distance teaching”.

Moore’s theory of transactional distance (Moore, 1980, 1983, 1993, and Moore & Kearsley, 2005) described the nature of the interaction that occurred for distance learners. The theory postulated that students experienced not only a geographical distance from the teacher, but also a psychological distance as well. It was the psychological and geographical distance that was believed to affect the relationship between the learner and the teacher and impart a “transactional distance”.

Variables within transactional distance theory include dialogue, structure, learner autonomy, and transactional distance. The degree of transactional distance can be modified through the manipulation of dialogue and structure. According to transactional distance theory, high dialogue and low structure results in low transactional distance, which is most compatible for adults with lower levels of autonomy and independence. In contrast, adults with high levels of autonomy and independence are able to flourish in environments with low dialogue and high structure which results in high transactional distance, or even with extreme transactional distance which is low in both dialogue and structure. Even though lower transactional distance has been positively related to student satisfaction (Schlegel, 2003; Williams, 2003), higher transactional distance is consistent with greater levels of autonomy (Moore, 1973).

Saba (2004b) emphasized that maximization of dialogue and minimization of structure (resulting in lower transactional distance) is not always desirable. On the other hand, Kanuka, Collett, and Caswell (2002) argue that low structure and high dialogue (resulting in lower transactional distance) should be pursued to promote higher levels of
learning. The explanation for these conflicting statements may rest with the concept that adults have differing capabilities for autonomous learning. Transactional distance theory recognizes that the idiosyncrasies and independence of distance learners are valuable aspects of the distance learning process. These aspects support the use of collaborative relationships between distance teachers and students.

Thompson, M. (1998) noted the importance of offering programs designed for learners with a variety of needs and characteristics. Baynton (1992) found that intelligence was a factor that learners identified as enabling control (and therefore autonomy). It would therefore seem logical then, that strengths in one or more of the intelligences may be associated with attitudes toward independent learning in a distance learning environment.

“If the distance learner is to succeed, we, as faculty, must do more than provide access to information. We need to truly understand that learner and design learning environments that facilitate learning” (Gibson, 1998, p. viii). Since individual student characteristics may play a significant role in the degree of autonomy that learners can exercise, it seems logical then that an improved understanding of learner characteristics, such as multiple intelligences, and the relationship of these characteristics to learner attitudes toward independent learning, would be significant to the field. Improved understanding of adult characteristics which are related to independence/autonomy and attitudes toward independent learning would add to the knowledge base of the field and may lead to improved practice in the distance educational setting.

Attitude in the Distance Setting
Attitude and satisfaction are related terms. Attitude is an affective reaction often associated with activity and evaluation (Webb, 1994). Attitudes in distance education have often been evaluated from the perspective of student satisfaction (Moore & Thompson, 1997). “Increasingly, researchers are focusing on effective methods for measuring learner attitudes and on strategies for increasing student satisfaction with distance education” (Moore & Thompson, 1997, p.22).

A significant theme that emerges in the literature on learner attitudes in distance education is related to student autonomy. Despite the fact that the amount of literature regarding topics related to autonomy or independence and attitudes is limited, the literature that is present in this area does support the importance of the relationship of autonomy/independence and satisfaction. For example, an important theme that emerges from some of the research was the relationship of learner attitudes to learner autonomy and control. Rangecroft, Gilroy, Long, & Tricker (1999) noted that the opportunity for flexible study was most associated with learner satisfaction. Richardson, Long, and Woodley (2003) noted that high ratings on student choice were found to be associated with higher satisfaction ratings. Choice has been noted to be related to control and independence (Garrison and Baynton, 1987). Also, the strongest predictor of satisfaction in a study done by Thurmond, Wambach, Conners, and Frey (2002) was variety in ways of assessment. Having variety in ways of assessment would seem to be related to student control and independence (Garrison & Baynton, 1987) and subsequently autonomy (Moore & Kearsley, 2005). These findings suggest that autonomy and independence are of primary concern in the distance learning environment. This is consistent with the writings of Saba (2000) who notes that learner independence and autonomy should be
given primary consideration in the distance learning environment. The importance of learner autonomy and independence in independent learning environments is significant and deserves much more attention and investigation, and further investigation is warranted. Overall, review of the distance education literature regarding learner attitudes supports the contention that perhaps there are certain variables which are related to learner independence/autonomy and attitudes in the distance environment.

Multiple Intelligences

Gardner (1983, 1993, & later revised 1999a, 2004a), who developed multiple intelligence theory, stated that individuals were born with varied intelligences, more than just the verbal/linguistic and logical/mathematical intelligences, which are typically evaluated by standard IQ tests. Gardner (1999, p.33) defines intelligence as “a biopsychological potential to process information that can be activated in a cultural setting to solve problems or create products that are of value in a culture”.

Gardner’s research has been based on both biological and social research. He spent a great deal of time working with and researching brain function by observing brain ability and dysfunction in adult brain injured patients. These observations, as well as educational research with gifted students and their learning abilities, provided the groundwork for his theory (Gardner, 1993). Before being called an intelligence, the ability needs to meet eight criteria: “identifiable core operation(s), evolutionary history and evolutionary plausibility, recognizable end-state and distinctive developmental trajectory, existence of savants, prodigies, and other individuals distinguished by the presence or absence of specific abilities, potential isolation by brain damage, support
from experimental psychological tasks, support from psychometric findings, susceptibility to encoding in a symbol system” (Gardner, 1993, p.62).

The individual intelligences identified were linguistic, logical-mathematical, spatial, musical, bodily-kinesthetic, interpersonal, intrapersonal (Gardner, 1983, 1993), and naturalistic intelligence (Gardner, 1999a). He believed that individuals were born with varied abilities in these intelligences. As children matured in their cultural context, certain intelligences would become more developed compared to other intelligences, depending on the surroundings and the relative cultural value placed on those intelligences. It was believed that individuals vary in their degrees of intelligence in each of these areas.

The behaviors, “end states” (Gardner & Hatch, 1989, p.5), or end results of an individuals use of these intelligences, is what manifests itself as the evidence or product of their underlying intelligences (Gardner, 1999a, 2004). For example, linguistic intelligence may manifest itself as skill in using language in written or verbal form, such as story telling or writing a book. Persons with exceptional linguistic intelligence include famous authors and journalists. Logical-mathematical intelligence consists of an individual’s ability to utilize science, logic, and mathematics. Individuals with this intelligence are good at evaluating cause and effect, and finding logical patterns. Those with highly developed logical-mathematical intelligence include engineers, mathematicians, and scientists. Bodily-kinesthetic intelligence is manifested in situations where individuals demonstrate ability to control or utilize their bodies to solve problems, perform tasks or maneuvers, or for purposes of expression. Examples of those with exceptional bodily-kinesthetic intelligence include famous athletes or accomplished
dancers. Spatial intelligence refers to the ability to appreciate an objects position in relation to other objects. Persons with this intelligence are able to visualize in their mind how an object would look from various viewpoints, and are able to determine position and location easily. Examples of individuals with highly developed spatial intelligence include navigators, surgeons, and sculptors. Musical intelligence refers to the ability to appreciate differences in pitch, tone rhythm, and lyrics. These individuals find it easy to hum a tune, to play and instrument, and to appreciate the rhythm of music. They are able to connect emotion and feeling to sound and song. Examples of those with highly developed musical intelligence are musicians and singers. Interpersonal intelligence is the ability to see and appreciate the emotions and plight of others. These individuals are able to interact effectively with others. They have the ability to analyze or predict the reactions of other people. Examples of those who excel in interpersonal intelligence include politicians and religious leaders. Intrapersonal intelligence refers to a person’s ability to be able to use self-reflection, and self-analysis, to understand their own feelings and thoughts. They are able to reflect upon, and evaluate, their own choices and actions (Gardner, 1993).

Naturalistic intelligence is the most recent intelligence identified by Gardner (Gardner, 1999a). It is the natural ability to analyze the environmental surroundings and identify differences in objects and categorize them. Those with naturalistic intelligence include gardeners, farmers, and hunters (Gardner, 1999a). Gardner noted that by recognizing naturalistic intelligence and adding it to the original list of seven intelligences, that it may be possible that there are even more intelligences that have yet to be identified (Gardner, 1999b).
Gardner believed that our society has traditionally valued linguistic and logical-mathematical intelligences more highly than other intelligences, and students who excelled with these intelligences were more likely to succeed in the educational system. Intelligence quotient testing, as part of the psychometric tradition, as well as other common forms of assessment in schools and in our society, was considered to be very biased in favor of these particular intelligences. True objective measurements of individuals multiple intelligences were believed to be extremely difficult, if not impossible. Even if such an objective measures were possible, Gardner believed that routine objective measurements of these intelligences was not desired or warranted. Shearer (1996) however did develop an instrument with Gardner’s support, which measures perceived multiple intelligences. MI theory, based on Gardner’s work in neuropsychology and development, is significant in that it provides educators a new lens in which to view intelligence and aid students in learning (Adult Multiple Intelligences: MI Basics, 2004).

Review of the literature regarding multiple intelligences as it pertains to adult learners revealed several themes. Probably the most interesting theme was that of a relationship between the incorporation of multiple intelligences theory into teaching and learning where incorporating multiple intelligences theory and providing student choices led to increased learner control (Kallenbach, 1999; Costanzo & Paxton, 1999; Coustan, 2001; and Mantzaris, 1999) and the development of independence (Mantzaris, 1999 and Cornwell, 2001) and learner autonomy (Williams, 1995; Chan 2000; Walters, 1992; and Diaz-Lefebvre, 1999a). These findings support those of Baynton (1992) who found that intelligence was a factor that learners identified as enabiling control (and therefore
autonomy). It was interesting how researchers (Coustan, 2001, and Quinones, 2001) incorporated MI theory with the philosophical teaching practices based on respected education leaders such as John Dewey (i.e. 1963) and Paulo Friere, (i.e. 1973). The fact that MI theory has been investigated in adult distance education, albeit in a limited fashion from mostly a software development perspective (Dara-Abrams, 2002; Krishnasamy, Peck Lee, & Palaniappan, 2003; and Kelly & Tangney, 2004) supports the contention that multiple intelligences may be significant to the practice of adult distance education. In addition, it was interesting how certain intelligences (i.e. spatial and interpersonal) were related to online learning in the Malaysian setting (Krishnasamy, Peck Lee, & Palaniappan, 2003). Research also found a connection between MI theory and outcome measures (such as self-efficacy and learner-knowledge acquisition) for adults (Chan, 2003; Maddox, 2002; Shore, 2001; and Tracey, 2001). It appeared that the application of multiple intelligences theory to adult teaching had positive effects on outcomes which appear related to attitude or satisfaction (Costanzo, 2001; Diaz-Lefebvre, 1999a; Krishnasamy, Peck Lee, & Palaniappan, 2003; and Paxton 2001). Overall, these research findings supported the contention that there may be a relationship between the variables of multiple intelligences strengths, autonomy/independence, and learner attitudes.

Research Questions

The formal research questions in this study are:

A. Do learners who successfully progress in a high transactional distance environment which engages a variety of intelligences demonstrate positive attitudes toward independent learning?
B. For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between one or more of the intelligences and attitude toward independent learning?

This question will result in eight sub-questions:

1. For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between linguistic intelligence and attitude toward independent learning?

2. For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between logical-mathematical intelligence and attitude toward independent learning?

3. For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between spatial intelligence and attitude toward independent learning?

4. For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between bodily-kinesthetic intelligence and attitude toward independent learning?

5. For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between musical intelligence and attitude toward independent learning?

6. For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between interpersonal intelligence and attitude toward independent learning?
7. For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between intrapersonal intelligence and attitude toward independent learning?

8. For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between naturalistic intelligence and attitude toward independent learning?

To answer the research questions, a survey was taken of a sample of adults who demonstrated successful progress in the PCT PA senior year (an independent study program with high transactional distance which engages a variety of the intelligences) regarding their attitudes toward independent learning using a survey instrument called the AATILS (Adult Attitudes Toward Independent Learning Scales). See appendix A. Data was also gathered about their multiple intelligences strengths using a survey instrument called the MIDAS (Multiple Intelligences Developmental Assessment Scales). See appendix C. It was expected that for adults who had successfully progressed in this program, they would, overall, have positive attitudes toward independent learning, and that a positive relationship would exist between learners’ strengths in one or more of the intelligences and their attitude toward independent learning. For example, for these adults who had successfully progressed in this particular distance learning context, perhaps the findings would show that greater strength in intrapersonal intelligence was associated with better attitudes toward independent learning.

Purpose and Significance of the Study

This research is significant for a number of reasons. One reason is that it will add to the knowledge base in the field of distance education and improve understanding
regarding learner attitudes toward independent learning for learners who have been able to successfully progress in a specific distance learning context. If learners who experience this distance learning environment are found to have positive attitudes toward independent learning, then this research could lend support to previous research that speculated on such a positive relationship between high transactional distance and learner autonomy and independence (Moore, 1973, 1980, 1983, 1993; and Moore & Kearsley, 2005). This research could also lend support to the observations of researchers who observed a positive relationship between the active engagement of a variety of the intelligences and learner autonomy and independence (Chan, 2000; Cornwell, 2001; Diaz-Lefebvre, 1999a; Mantzaris, 2001; Walters, 1992; and Williams, 1995).

Although this research is limited to adults who have demonstrated successful progression in the distance education component of the PCT PA program, this distance education experience is similar to those of other physician assistant programs. Therefore, the results of this research may be useful for other PA programs as well as PCT’s PA program. If a relationship between certain intelligences and attitudes toward independent learning exists, then this finding could be very important for these programs. This information could potentially be used in the future to develop learning methods which could improve attitudes toward independent learning. For example, if a positive relationship between one or more of the intelligences and attitudes toward independent learning exists, then perhaps more active engagement of those intelligences in this distance learning context could result in better attitudes toward independent learning. Therefore, this research could significantly contribute to the distance education literature and lead to a means of improving learner attitudes toward independent learning. This is
significant as positive attitudes have been found in a number of studies to be related to a number of positive distance learner outcomes (e.g. Biner, Barone, Welsh, & Dean, 1997; Biner, Welsh, Barone, Summers, & Dean, 1997; and Swan, 2001),

Limitations

The study was limited to a convenience sample of adults who had experienced similar independent learning experiences as a part of their physician assistant education at the Pennsylvania College of Technology. This made it impossible to generalize the results for adults in all settings. It was possible that the number of respondents in this study could have been small, which may have made it difficult to find statistical significance. Random assignment or true experimental design was not possible. The number of participants available to this researcher for this study was limited due to limited access to distance learning students. In addition it was not possible to have an experimental group or control group that was appropriate for this study for a true experimental design, as a control group of learners did not exist, and was not possible to create. This researcher also did not have access to enough distance learning courses and students to allow for finding groups of learners who could be categorized into experimental and control groups. A variety of adult characteristics in addition to multiple intelligences strengths resulted in a variety of confounding variables that could not be controlled. These characteristics and confounding variables included: age, socioeconomic status, family status, number of children, prior educational experience, prior work experience, personality, responsibilities outside of school, etc. Variables identified in prior research as being related to attitude were also not able to be controlled (i.e. performance levels, perceived learning, academic engagement, interaction, level of
learner autonomy and independence). The reliability and validity of the Adult Attitudes Toward Independent Learning Scales (AATILS) has had less rigorous evaluation than the Multiple Intelligences Developmental Assessment Scales (MIDAS).

**Definition of Terms**

**Attitude** – Attitude is an affective reaction often associated with activity and evaluation (Webb, 1994). Attitudes in distance education have often been evaluated from the perspective of student satisfaction (Moore & Thompson, 1997, p 22). For the purposes of this study, student attitude will be considered an ordinal variable which can be calculated through the summation of each student’s ratings for questions on an attitude survey instrument.

**Autonomy** – The definition of learner autonomy in this study is as follows: “The concept of learner autonomy is that learners have different capacities for making decisions regarding their own learning. The ability of a learner to develop a personal learning plan – the ability to find resources for study in one's own work or community environment, and the ability to decide for oneself when progress was satisfactory” (Moore & Kearsley, 2005, p.228). In addition, it should be noted that: “The degree to which these learner behaviors exist can be seen as an important dimension for the classification of distance education programs” (Moore & Kearsley, 2005, p.228).

**Dialogue** – The definition of dialogue in this study is as follows: “The term ‘dialogue’ is used to describe an interaction or series of interactions having positive qualities that other interactions might not have. A dialogue is purposeful, constructive and valued by each party. Each party in a dialogue is a respectful and active listener; each is a contributor, and builds on the contributions of the other party or parties. There
can be negative or neutral interactions; the term ‘dialogue’ is reserved for positive interactions, with value placed on the synergistic nature of the relationship of the parties involved. The direction of the dialogue in an educational relationship is towards the improved understanding of the student” (Moore, 1993, p. 24) Dialogue can be either written or spoken.

Distance education – Distance education is distinct and different than traditional educational experiences. Moore and Kearsley (2005, p.2) defined it as follows: “Distance education is planned learning that normally occurs in a different place from teaching, requiring special course design and instruction techniques, communication through various technologies, and special organizational and administrative arrangements”.

Independent learner – Kole (1987, p29) has defined the independent learner as follows: “An independent learner is a person who identifies: learning goals, and the processes and resources needed to reach those goals. The independent learner then mobilizes personal energy and concentration toward the attainment of the identified learning goals”.

Independent learning – The act of using personal energy and concentration toward the attainment of identified learning goals. Independent learning occurs through the identification and use of needed processes and resources which are required to meet the learning goals.

Independent study – Moore (1973) developed a theory of independent learning and teaching which provided a theoretical framework for independent study. He stated that: “Independent learning and teaching is an educational system in which the learner is
autonomous, and separated from his teacher by space and time, so that communication is by print, electronic, or other non-human medium” (Moore, 1973, p.663). This theoretical basis for independent study was based in part on Wedemeyer’s (1969) writings regarding the autonomous learner. Wedemeyer (1981, p.51) later stated that: “Independent study consists of various forms of teaching learning arrangements in which teachers and learners carry out their essential tasks and responsibilities apart from one another, communicating in a variety of ways, for the purposes of freeing internal learners from inappropriate class pacings or patterns, of providing external learners with opportunities to continue learning in their own environments, and developing in all learners the capacity to carry on self-directed learning, the ultimate maturity required of the educated person. Independent study programs offer learners varying degrees of freedom in the self-determination of goals and activities, and in starting, stopping and pacing individualized learning programs which are carried on to the greatest extent possible at the convenience of the learners.”

Intelligence – Gardner (1999, p34) has defined intelligence as “a biopsychological potential to process information that can be activated in a cultural setting to solve problems or create products that are of value in a culture”.

Interaction – Interaction can be considered from three different perspectives: types of interaction, message transmission, and interaction as social and psychological connection (Roblyer & Wiencke, 2003). Interaction as message transmission can be considered in terms of “a message source, a means of signal transmission, a destination or receiver, and extraneous “noise”, or interference with message communication” (Roblyer & Wiencke, 2003, p.80). Interaction can also be viewed in terms of its ability to develop

Positive attitudes toward independent learning - For the purposes of this study, positive attitudes toward independent learning will be defined as an average total score greater than 150, or an average score per question as greater than 3 on the AATILS survey.

Satisfaction – Satisfaction is “an individual’s perception that expected needs or conditions are met in a satisfactory way” (DeBourgh, 1998, p. 10). Satisfaction and dissatisfaction are on opposite poles of the same continuum and it “depends on a wide variety of external conditions and internal values” (Domer, Carswell, & Spreckelmeyer, 1983, p.1). When an individual’s perception of an experience is congruent with what that individual perceives the experience should be, then the individual is satisfied. However, when an individual’s perception of an experience is not congruent with what that individual perceives the experience should be, then that individual is dissatisfied (DeBourgh, 1998).
Structure – Moore and Kearsley (2005, p.226) have noted that “a course consists of such elements as: learning objectives, content themes, information presentations, case studies, pictorial and other illustrations, exercises, projects, and tests. Quality depends on how carefully these are composed, and how carefully structured”. These authors also noted that: “structure expresses the rigidity or flexibility of the programme’s educational objectives, teaching strategies, and evaluation methods. It describes the extent to which an education programme can accommodate or be responsive to each learner’s individual needs. As with dialogue, structure is a qualitative variable, and, as with dialogue, the extent of structure in a programme is determined largely by the nature of the communications media being employed, but also by the philosophy and emotional characteristics of teachers, the personalities and other characteristics of learners, and the constraints imposed by educational institutions” (Moore, 1993, p.26).

Successful progression – In this study, successful progression will refer to the lack of failure or withdrawal from the physician assistant program at the time of data collection for this research.

Transactional Distance – The following definition of this term will be used in this study: “Transactional Distance is the gap of understanding and communication between the teachers and learners caused by geographic distance that must be bridged through distinctive procedures in instructional design and the facilitation of interaction” (Moore & Kearsley, 2005, p.223).
Chapter 2

Review of Related Literature

The purpose of this study was to determine if learners who were able to successfully progress in a high transactional distance environment demonstrated positive attitudes toward independent learning, and whether a positive relationship between one or more of their intelligences and attitudes toward independent learning existed.

Higher transactional distance environments have been theorized to be associated with higher levels of learner autonomy (Moore, 1980, 1983, 1993, and Moore & Kearsley, 2005) and independence (Moore, 1973, 1983). In addition, engagement of a variety of intelligences while learning has appeared to be associated with greater levels of learner autonomy (Chan 2003; Diaz-Lefebvre, 1999a; Walters, 1992; and Williams, 1995) and independence (Cornwell, 2001; and Mantzaris, 2001). It therefore appeared reasonable to hypothesize that learners who were able to progress in an environment which had high transactional distance, and also engaged a variety of the intelligences, would have higher levels of autonomy and independence, and subsequently demonstrate positive attitudes toward independent learning.

The literature review included the following areas: Independent learning and transactional distance theory, multiple intelligences, and attitudes, in distance education.

Independent learning and transactional distance theory

Wedemeyer (1972, 1973, 1975, and 1981) asserted the importance of nontraditional learning because it allowed adults to pursue lifelong learning opportunities that traditional educational institutions did not provide to them. The autonomy, free choice, and independence that nontraditional learning had to offer was recognized
(Wedemeyer, 1988). In exploring the differences between traditional and independent learning, Wedemeyer (1981) claimed that a significant difference was the ability to utilize distance between teacher and learner to its full advantage. This included a new understanding of learning that allowed for a separation of space and time between the learner and teacher with the learner at the center of the process in a more active role. His concept of learner independence suggested that this advantage be supported through non-traditional learning strategies.

Moore (1973, 1976) took this concept of appreciating student independence a step further and described a theory of independent learning and teaching. “Independent Learning and Teaching is an educational system in which the learner is autonomous, and separated from his teacher by space and time, so that communication is by print, electronic, or other non-human medium” (Moore, 1973, p.663). The three subsystems described were that of learner, teacher, and communication method. He went on to state that these independent learning and teaching subsystems had characteristics that distinguished them from other types of educational activities. These characteristics included the “autonomous learner” and the concept of “distance teaching”.

Moore’s theory of transactional distance (Moore, 1980, 1983, 1993, and Moore & Kearsley, 2005) described the nature of the interaction that occurred for distance learners. The theory postulated that students experienced not only a geographical distance from the teacher, but also a psychological distance as well. It was the psychological and geographical distance that was believed to affect the relationship between the learner and the teacher and impart a “transactional distance”.
The two variables identified in this transactional distance were dialogue and structure. “Dialogue describes the extent to which, in any educational programme, learner and educator are able to respond to each other” and “structure is a measure of an educational programme’s responsiveness to learners’ individual needs. It expresses the extent to which educational objectives, teaching strategies and evaluation methods are prepared for, or can be adapted to, the objectives, strategies and evaluation methods of the learner” (Moore, 1983, p.157). Various combinations of more or less dialogue, along with more or less structure, resulted in four possibilities: less structure/less dialogue, more structure/less dialogue, more structure/more dialogue, and less structure/more dialogue. These combinations resulted in a linear model that described the transactional distance as being more distant to least distant. The theory related that the more a program is structured, and the less that dialogue occurs, the greater the transactional distance. It also stated that if there is more dialogue, there is less structure, as well as less transactional distance.

Transactional distance was also described as having a relationship with the degree of learner autonomy. Autonomous learners “are able to identify learning needs, when faced with problems to be solved, as well as skills they don’t have and information they are lacking” and they “know, or find, where and how and from what human and other resources they may gather the information they require, collect ideas, practice skills and achieve their goals. They then judge the appropriateness of their new skills, information and ideas, eventually deciding whether their goals have been achieved or can be abandoned” (Moore, 1983, p.163).
Moore (1986) noted that autonomous learners might not conform to traditional student norms in attaining their goals. The appreciation of “the idiosyncrasies and independence of learners as a valuable resource” in distance education has been identified (Moore & Kearsley, 2005, p.228). “The concept of learner autonomy is that learners have different capacities for making decisions regarding their own learning. The ability of a learner to develop a personal learning plan – the ability to find resources for study in one’s own work or community environment, and the ability to decide for oneself when progress was satisfactory, need not be conceived as extraneous” (Moore & Kearsley, 2005, p.228). Educational activities that have less dialogue are associated with higher student autonomy and greater transactional distance.

Moore (1973) described a relationship between independence, learner autonomy, and distance. “The more distant, the more independent, but simultaneously, the more distant, the greater the learner autonomy. The concept of independence therefore must be two-dimensional”. Moore (1983) diagrammed independent study in two dimensions. A block with grids that showed the field of individual learning represented this typology. It revealed the range of programs based on varying degrees of distance and autonomy.

The teaching-learning relationship of distance education that is conceptualized through the theory of transactional distance defines distance education in terms of course, instructional, and learner variables (Moore & Kearsley, 1996). It has been suggested that instead of relabeling the concepts of structure, dialogue, and autonomy, it would be more efficacious to do “more research of an empirical nature to identify the many variables that lie within structure, dialogue, and autonomy; and to explore them more thoroughly” (Moore & Kearsley, 2005, p.233).
Describing the transactional distance

Moore (1983) offered a typology of categories of distance education programs based on their degree of transactional distance. Various combinations of more or less dialogue, along with more or less structure, resulted in four program types, which range from most distant to least distant: low structure/low dialogue, high structure/low dialogue, high structure/high dialogue, and low structure/high dialogue. Table 1 demonstrates this typology of distance education programs based on their degree of transactional distance.

Table 1
Types of Distance Education Programs Based on Degree of Transactional Distance

<table>
<thead>
<tr>
<th>Degree of Transactional Distance</th>
<th>Type</th>
<th>Distance Education Program Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most distant</td>
<td>-D –S</td>
<td>Low dialogue, low structure</td>
</tr>
<tr>
<td></td>
<td>-D +S</td>
<td>Low dialogue, high structure</td>
</tr>
<tr>
<td>Least distant</td>
<td>+D +S</td>
<td>High dialogue, high structure</td>
</tr>
<tr>
<td></td>
<td>+D -S</td>
<td>High dialogue, low structure</td>
</tr>
</tbody>
</table>

(Moore, 1983)

A graphical representation of the types of distance education programs based on their degree of transactional distance is demonstrated in Figure 1.
For figure 1, structure is represented on the x axis and dialogue is represented on the y axis. “Programs that fall below the x-axis and represent low dialogue are more distant than those that are above the x-axis and represent higher levels of dialogue” (Braxton, 1999, p.6). Although transactional distance is a continuous variable (Moore & Kearsley, 2005, p.224), this typology does provide a means of categorizing distance learning experiences. The graphical representation of distance programs in figure 1 both
categorizes and demonstrates this continuum (Braxton, 1999). Braxton (1999, p.6) noted that “transactional distance is most influenced by dialogue and refined by structure”.

The theory of Transactional Distance was developed prior to the development of highly interactive communications technologies that allow for improved ability for dialogue in the distance education setting than was previously possible. In addition, these newer advanced technologies allow for a new type of dialogue not possible or practical when Transactional Distance Theory was initially developed. This newer form of dialogue made possible through these newer communication technologies is that of inter-learner dialogue (Moore, 1993). “Inter-learner dialogue occurs between learners and other learners, alone or in groups, with or without the real-time presence of an instructor. By audioconference, videoconference, and computer conference, groups can learn through interaction with other groups and within groups. There are enormously significant implications in this potential, in every process of teaching-learning. In particular, such dialogue by learners to learners within and between groups makes it possible for distance learners to share in the creation of knowledge” (Moore, 1993, p.32).

This revision as to what constitutes the variable of dialogue impacts the theory of transactional distance. Braxton (1999) believed that this theoretical revision required a refinement to Transactional Distance Theory so that an improved differentiation between the types of distance education programs could be realized. Braxton (1999) expanded the levels of both dialogue and structure so that each had three levels (low, medium, and high) instead of the original two levels (low and high). This resulted in nine categories of distance education programs which are shown in Table 2.
Table 2.

Dialogue and Structure: Refined Distance Education Typology

<table>
<thead>
<tr>
<th></th>
<th>-D</th>
<th>D</th>
<th>+D</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Structure</td>
<td>-S Low dialogue, low structure</td>
<td>Medium dialogue, low structure</td>
<td>High dialogue, low structure</td>
</tr>
<tr>
<td>Some Structure</td>
<td>S Low dialogue, Medium structure</td>
<td>Medium dialogue, medium structure</td>
<td>High dialogue medium structure</td>
</tr>
<tr>
<td>Highly Structured</td>
<td>+S Low dialogue, high structure</td>
<td>Medium dialogue, high structure</td>
<td>High dialogue, high structure</td>
</tr>
</tbody>
</table>

(Braxton, 1999)

Braxton (1999) provided the following definitions:

- Low dialogue (-D): one-way communication from teacher to student
- Medium dialogue (D): two-way communication between teacher and student
- High dialogue (+D): multi-way communication among students, and between teachers and students.
- Low structure (-S): Student driven, completely individualized course design
- Medium structure (S): course design which contains components that are not variable, as well as course design components that may be individualized
- High structure (+S): No individualization or variation in course content

A graphical representation of this refined typology of distance education programs is shown in Figure 2.
Independent learning experiences can therefore be categorized based on Moore’s (1983) typology and Braxton’s (1999) refinement.

Research involving the theory of transactional distance. A number of researchers have further refined and/or used the theory of transactional distance in their research. This has added to the knowledge base in the field of distance education, and contributed to the relevance and significance of this theory in contemporary educational practice.

Saba and Shearer (1994) developed another way, in additional to Moore’s (1976) typology, to conceptualize the theory of transactional distance. Using the theory of transactional distance and applying a systems dynamics model (Kelso, 1995; Banathy,
1992; and Roberts, Andersen, Deal, Garet, & Shaffer, 1983) they described another conceptual framework for the theory. The model essentially described feedback loops between structure, dialogue and transactional distance. The study postulated that as dialogue increased, transactional distance and structure decreased. It also postulated that as structure increased, dialogue decreased, and transactional distance increased. These assertions were consistent with Moore’s (1986).

Saba and Shearer (1994), in an effort to verify the model, evaluated the dialogue, structure, and transactional distance involving thirty learners in a telelesson. Results demonstrated the dynamic relationship between structure, dialogue, and transactional distance. They noted an increase in dialogue when structure decreased. They also observed increased transactional distance when structure was increased and dialogue was decreased. Increased dialogue decreased transactional distance, and increased structure increased transactional distance. Their findings verified their model. “If distance is truly a function of the responsiveness of an educational program to its students, then the quality and amount of transaction between the learner and the instructor regardless of their geographic proximity, becomes of utmost importance. The desired instructional strategy becomes maintaining a proper balance between dialogue and structure.” (Saba & Shearer, 1994, p.54).

A causal loop diagram between autonomy and structure has also been described (Saba, 2004a). Saba (2004a, p.1) stated that “transactional distance is a measure of the relationship between the teacher and learner in terms of requisite structure for the instructor or the instructional institution, and required autonomy by the learner in any instructional situation”. A negative feedback loop between autonomy and structure was
described. It was asserted that more required student autonomy should be associated with less structure between the learner and the instructor. This dynamic relationship was noted to be able to change over time. As students become more experienced and knowledgeable, they may become more autonomous, and as a result, require less structure. Research by Lee and Gibson (2003) supports this contention. They found that both distance instructors and students could aid in the development of learner autonomy through collaborative efforts to modify structure. The importance of continued research into the balance of dialogue and structure for various learners and subject matter has been noted (Saba, 2004b).

Lowell (2004) developed a survey instrument to measure transactional distance using the constructs of dialogue, structure, and learner independence. In addition, this instrument was also designed to measure context, fluency, and social presence. Despite the findings of other researchers (i.e. Saba & Shearer, 1994), Lowell (2004) was not able to verify the traditional construct of transactional distance. However, he was able to determine that dialogue, social presence, and fluency were significant predictors for perceived distance.

Braxton (1999) developed a tool to assist instructors in determining the level of transactional presence which may result from various options in course design. The complexities of transactional distance theory, with many variables within structure, dialogue, and autonomy yet to be investigated, suggest the possibility of only limited usefulness of this instrument.

Using the theoretical framework of transactional distance, Jung (2001, p.529) developed “a theoretical framework for pedagogical features of Web-based instruction”. 
Jung’s (2001) framework showed how teaching and learning in WBI are related to communication, teaching, and learning variables. He demonstrated how teaching and learning in WBI are associated with communication (dialogue), teaching (structure), and variables regarding learning. Like Chen (1997), Jung (2001) found that structure, dialogue, and autonomy were multifaceted concepts. The communication (dialogue) variables were found to consist of academic, collaborative, and interpersonal interaction. The teaching (structure) variables identified were content expandability, content adaptability, and visual layout. The learning variables identified were learner autonomy and collaboration.

Jung’s (2001) review of the WBI literature revealed that there was a discrepancy between distance education theory and WBI research. Only a small amount of this research was found to be based on distance education theory. It was noted that “we need WBI studies that discuss what is already known about learning and teaching at a distance and that examine teaching and learning experiences with different communication technologies. And also we need more rigorous data on pedagogical features of WBI to make a firm conclusion on pedagogical features of WBI” (Jung, 2001, p.532).

Kanuka, Collett, and Caswell (2002) used Moore’s theory of transactional distance to interpret their investigation of the instructional impact of integrating asynchronous text-based Internet communication into distance courses. Interviews of twelve instructors over a two year period were conducted. Several instructor roles and themes emerged from this qualitative research. The instructors noted the importance of providing increased flexibility in this environment, as well as the need to have a systematic structured approach. These instructors noted that balancing flexibility with
structure was essential. It was also noted that skill in facilitating interaction was necessary.

These course instructors were found to experience a great deal of tension between the constructs of structure, dialogue, and autonomy (Kanuka, Collett, & Caswell, 2002). The author’s (Kanuka, Collett, & Caswell, 2002) concluded that increased course flexibility (i.e. less structure) in distance education should be pursued in an effort to facilitate higher levels of student learning. However, it should be noted that this conclusion neglects consideration of the levels of learner autonomy.

Bunker, Gayol, Nti, and Reidell (1996) studied the effects of changes in structure on the duration and frequency of dialogue from each site involved in an international audioconference course. They found that their student group designated as less structured had relatively more dialogue. This was also consistent with Moore’s (1993) theory. However, in reviewing the study, it appeared that in the treatment group with supposedly less structure, certain important structural elements may have actually been present. By making one group in this study (Europeans) responsible for a team presentation, structure in this form, appeared to be present in this site and not to the other sites. Their finding that students from this site were involved in more dialogue suggested that certain types of structural characteristics that promote interaction may be associated with increased dialogue.

Vrasidas and McIssac (1999) investigated the nature of interaction in an online graduate course provided by a southwestern university. The investigation evaluated the student (n=8; after seven weeks, n=7, as one student dropped out) and instructor (n=1) perspectives of online interaction. Interviews, student work, and e-mails were evaluated.
Structure, class size, and feedback were identified as major factors which influence interaction online. It was noted that certain course structural characteristics promoted interactions, while other structural characteristics decreased interactions. Activities which were structured into the course which required discussion that was to be graded increased interaction. A lack of structural characteristics to facilitate interaction resulted in a lack of interaction with the asynchronous discussion activity. Another factor for the lack of interaction with the asynchronous discussion activities was the high work load, and the incorporation of face-to-face meetings within the course. Experience with computer mediated communications was also noted to affect online participation in discussions. Students who lacked experience with computer mediated communications were more comfortable with asynchronous, rather than synchronous, communications. Students expressed that the small class size limited their ability to engage in productive asynchronous discussion. Students also indicated that a lack of feedback from peers and the instructor was detrimental to the interaction process.

Chen and Willits (1999) investigated the experiences with videoconferencing of one-hundred and twenty-one learners. A questionnaire was developed to investigate constructs of dialogue, structure, and learner autonomy. Results indicated that these three factors are rather complex and each of these constructs actually consisted of several dimensions. Subcategories of dialogue were in-class discussion, out of class face-to-face discussion, and out-of-class electronic discussion. Subcategories of structure included course organization and course delivery. Learner autonomy subcategories identified were those of independence and interdependence.
Chen & Willits (1999, p.54) found that “the more rigid the course delivery, the less frequent was the reported in-class discussion”. This finding was consistent with Moore’s theory. However, this study also found that “the more independent the students reported themselves to be, the more frequently they indicated in-class interaction” (Chen & Willits, 1999, p.54). This last finding was not consistent with previously stated assertions where it was postulated that less dialogue is associated with greater student independence and autonomy. The study appears to suggest that the opposite, that more dialogue may be associated with more student independence and autonomy. This finding was also consistent with Huang’s (2000) findings of a significant correlation between interaction and autonomy based on survey data.

Munro (1991) investigated the relationships between learner-teacher, dialogue, support, and independence, as well as how these factors influence dropout in the distance education setting. Analysis revealed that the learner-teacher relationship affects students’ intellectual and social integration, and subsequently influences dropout. In addition deficiencies in the areas of dialogue and support were also associated with attrition. This research appeared to support Moore’s transactional distance theory and the assertion that students with low autonomy require low transactional distance through more dialogue. When higher levels of dialogue are not present for these students, the incongruence results in dropout behavior. It was suggested that “presence at a distance can be enhanced by a dialogue-centered practice” (Munro, 1991, p.1).

Thompson (1998) investigated variables which could be considered within, or contributing to, autonomy. He used Baynton’s model of learner autonomy consisting of independence, support, and competence (see Baynton, 1992). In addition, he used an
additional model of autonomy related to the field of nursing. A positive correlation between competence and the nurse autonomy subscales of advocacy/activism for self and regard for others was found. This suggested that competence was related to nurse autonomy.

Cultural differences have also been shown to be a variable with autonomy. It has been found that decreasing transactional distance through higher interaction (dialogue) was effective in overcoming the decreased student autonomy resulting, at least in part, from cultural differences between the student and the teacher and institution (Walker Fernandez, 1999).

Portier and Wagemans (1995) recommended, in an effort to support learner independence, that learners should have their prior knowledge state analyzed. This would be done so that knowledge profiles could be generated. These knowledge profiles were believed to be useful in independent distance learning, especially since independent learners tend to be a very heterogeneous group. These profiles could be used so that more flexible learning environments could be utilized to support the learning process as well as for the purposes of providing instructional support. In this way, the authors believed that independent learning could be better supported. If one looks at this article through the lens of transactional distance theory, then it would appear that the authors are suggesting that a better understanding of learner characteristics that influence, or are within, the concept of autonomy is needed. This added information could aid educators in improving the distance learning process through modifications in dialogue and/or structure, affecting transactional distance.
Shin (2002, p.121) expanded on the theory of transactional distance and presented the concept of ‘transactional presence’ which she defined as “the degree to which a distance student perceived the availability of, and connectedness with, other parties involved in a given distance education setting”. A random sample of distance education students from the Korea National Open University (KNOU) was surveyed regarding their perceptions of transactional presence (Shin, 2003). Five-hundred and six of six-hundred survey instruments were returned and analyzed. Measurements of learning included students perceived learning achievement, satisfaction with the distance learning experience, and intent to persist with distance learning. A relationship between the three types of transactional presence (teacher, peer, and institution) and perceived achievement was only partially supported. The relationship between the three types of transactional presence and persistence was also only partially supported. However, the relationship between the three types of transactional presence and satisfaction was significant. It was concluded that the three types of transactional presence could be significant predictors of student learning success.

Institutional transactional presence was present for all three indicators of learning. Student-peer transactional presence was found to influence both satisfaction and intent-to-persist. Interestingly, no relationship was found between peer-student transactional presence and perceived learning achievement. Perceived learning achievement did appear to be significantly affected by teacher transactional presence. The author of this study suggested that providers of distance education experiences appreciate the effects of perceived transactional presence on student learning as they develop their courses.
Chen and Willits (1998) investigated the concepts of Moore’s Transactional Distance Theory which consist of dialogue, structure, learner autonomy, and transactional distance, on students learning. One-hundred and twenty-one students in twelve video courses were surveyed. The study used path analysis to examine these concepts. Results indicated that decreased transactional distance between student and teacher, and higher frequency of in class discussion, was associated with increased student perceptions of learning. In addition, prior subject matter knowledge and the physical presence of the instructor were found to increase discussion and decrease transactional distance. As class size increased, discussion decreased, and transactional distance increased, which was associated negatively with perceived learning outcomes. The study failed to relate structure or learner autonomy to transactional distance between teacher and students or to learning outcomes. This study was only able to partially support the complex relationships in transactional distance theory. However, this evidence shows that outcome measures are related to the theory of transactional distance, and that interaction directly affects learning outcomes.

**Transactional distance theory, independence, and control.** Garrison and Baynton (1987) explored student independence and introduced the concept of control. “Control is concerned with the opportunity and ability to influence, direct, and determine decisions related to the educational process” (Garrison & Baynton, 1987, p.5). “Control can be achieved only by striking a balance between independence and other basic elements (i.e., power and support) in the learning process through the process of two-way communication between teacher and student” (Garrison & Baynton, 1987, p.5). Control
by the teacher of what to learn, how and to what extent, is the obverse of Moore’s learner autonomy.

Garrison and Baynton (1987) suggested that control is at the center of the communication process between student, teacher, and content. These authors echo Moore in suggesting that “independence is the freedom to make choices without external influence or restriction” (Garrison & Baynton, 1987, p.6). They also noted that “communication is the means for the integration and balance of the components in the educational transaction: teacher, student, content, and control (independence, power, and support)” (Garrison & Baynton, 1987, p.11). It was asserted that the quality and the quantity of the communication process between the teacher and student influenced the degree of student control. These ideas appear to reflect Moore’s Theory of Independent Learning and Teaching (Moore, 1973, 1976) which identified the three subsystems of learner, teacher, and communication method. These ideas also seem to reflect the variables of dialogue, structure and autonomy described in transactional distance theory (Moore, 1980, 1983, 1993, and Moore & Kearsley, 2005). The idea of control appears to be an elaboration of Moore’s concept of autonomy.

A relationship between control (autonomy) and independence was also noted by Lyall and McNamara (2000). To further understand learner orientation, which was believed to influence which learning methods will be adopted by students (such as a deep approach or superficial approach to learning), the authors did an investigation to determine what factors influence the orientations of distance students. Qualitative methods were utilized to determine the factors which influenced distance student orientations in three groups of chemistry students studying at two Australian universities.
Of one-hundred and thirty-seven total students, fifty eight responded to the questionnaire and thirty-one volunteered for interviews. The major phenomena related to orientation were divided into the two main categories of independence and study environment. Independence was related to student choice. Therefore, their findings support the relationship of independence and control. This study supports the contention that student characteristics influence independence (or autonomy), and subsequently would affect the appropriate degree of transactional distance, which can be changed through the modification of dialogue and structure, and subsequently affect outcome measures. Baynton’s (1992) research also supports this contention as he found that students believed that teachers could promote student control (autonomy) by allowing for student choice and flexibility. In addition, Kirkwood (2003) suggested that effort should be made to better understand learners’ attitudes and preferences regarding the use of technologies in their studies in an effort to promote learner independence.

McLoughlin (2002) asserted that a process of learning support called scaffolding, which is based on social constructivism, needs to be evaluated for the context of online learning. Scaffolding is a form of course structure. The author conceptualized scaffolding for the distance learning setting and provided examples of how to provide this type of structure through constructivist inquiry. She suggested that successful scaffolding would result in independent performance (McLoughlin, 2002). In other words, she suggested that structure could be designed for the promotion of learner independence. She asserted that distance educators and designers need to provide structure consistent with independent learning abilities of students. It was suggested that providing course structure in the form of scaffolding would allow students to transition from a teacher-
centered to a student-centered learning environment, and allow students to gain more control, thereby developing their skills and abilities as they become more independent.

**Summary of transactional distance literature.** These research studies expand the body of knowledge in distance education and aid in identifying more research questions that need to be answered. Continued research is needed to improve understanding of the relationships between transactional distance, dialogue, structure, learner autonomy, and independence. The complex and dynamic relationships between these constructs that are the essential elements of transactional distance theory are just beginning to be understood. The research reviewed in this section has contributed to, and expanded, understanding of this theory.

The knowledge gleaned so far is valuable in assisting the researcher in understanding the relationships between these variables. This aids in providing a more informed foundation for better research through the observation or manipulation of these variables, while considering the factors of course content and student characteristics.

The idea of control (Garrison & Baynton 1987) is similar, if not essentially the same idea, as the concept of learner autonomy which Moore described many years earlier (Moore, 1973). The work of Garrison & Baynton (1987) supports the concepts of dialogue and autonomy in transactional distance theory. In addition, since Garrison and Baynton’s (1987) definition of control referred to the degree to which the learner was able to influence the tasks of assignments, learning methods, and communication during a learning activity, then this theory also supports Moore’s (1980, 1983, 1993, and Moore & Kearsley, 2005) concept of structure as well. Their research supports Moore’s theory of transactional distance (1980, 1983, 1993, and Moore & Kearsley, 2005) which describes
autonomy, dialogue, and structure as important variables in the distance education experience. Kirkwood’s (2003) research also supports Moore’s concept of autonomy, as he found that learners’ independence and autonomy was supported by having a range of media choices in their course.

By manipulating structure and dialogue, the transactional distance of a course can be modified. If transactional distance is viewed through the concept of transactional presence (Shin, 2002), and different types of transactional presence were related to perceived satisfaction, intent to persist, and achievement (Shin, 2003), then it may be possible to affect various outcome measures through the manipulation of the variables involved in transactional distance theory.

The conclusion that decreased structure should be pursued in an effort to promote higher levels of learning (Kanuka, Collett, & Caswell, 2002) is interesting. This conclusion, in the context of Saba’s (2004a) negative feedback loop between structure and autonomy, supports the notion that student autonomy should be facilitated, and that higher autonomy would require less structure and result in higher levels of learning. Other researchers have suggested that learner autonomy can be improved through modifications of dialogue and/or structure (Lee & Gibson, 2003; and McLoughlin, 2002).

Since the degree of learner autonomy can change over time (Saba, 2004a), it would seem logical to initially provide the decreased transactional distance necessary for these students with low autonomy, and then facilitate these students in transitioning to higher levels of autonomy and independence as time progresses. Initially, it would appear that instructors of students with low autonomy would need to incorporate certain structural characteristics (see Bunker, Gayol, Nti, & Reidell, 1996; Vrasidas & McIssac,
1999; and Chen & Willits, 1999) into their courses in an effort to promote interaction and dialogue. These types of structural modifications should be seen as distinct and different from other types of structural considerations (such as course objectives or reading assignments). Perhaps structural considerations that promote interaction and dialogue might best be termed “interaction facilitation methods”.

The findings of Chen and Willits (1999), Vrasidas & McIssac (1999), and Bunker, Gayol, Nti, and Reidell (1996) appear to support the contention that low autonomy learners require interaction facilitation methods for them to demonstrate the amount of interaction and dialogue that is desired or required. In contrast, high autonomy learners may not need interaction facilitation methods to demonstrate high levels of interaction and dialogue (see Chen & Willits, 1999). These ideas are further supported by the findings of Anderson (1999) who noted that learners uncomfortable with situations requiring higher levels of autonomy felt lonely and wanted more interaction with instructors.

As Saba (2000) has noted, autonomy should be given primary consideration in the distance setting. “First and foremost, distance education is about the student and her/his independence in learning” (Saba, 2000, p.1). In his opinion, therefore, it should be our responsibility as educators to promote and facilitate learner autonomy and independence. As Moore and Kearsley (2005) have noted, more empirical research is needed to investigate the variables that lie within dialogue, structure, and learner autonomy. Baynton (1992) identified intelligence as a factor that learners identified as enabling control (and therefore autonomy). In addition, Baynton (1992) also found that having positive attitudes toward learning were believed by learners to enable control (and
therefore autonomy) as well. Further research pursuing the relationship of intelligence and attitudes toward independent learning is therefore warranted.

The most relevant and significant feature of transactional distance theory has been its ability to provide a framework in which to understand and further explore the essential variables of the distance education experience: autonomy, structure, and dialogue. Decisions as to what dialogue or structural modifications are necessary in a distance course should be based on factors such as course content and student autonomy, so that the changes in the distance education experience improve distance teaching and learning, and subsequently, outcome measures (i.e. Lee & Gibson, 2003). Since it appears that outcome measures have become even more important to distance education program survival and success (U.S. General Accounting Office, 2004), it becomes crucial that research continue exploring the variables within transactional distance theory to advance understanding. Dissemination and assimilation of this information is critical so that contemporary distance educators can become, and/or remain, competent providers of distance education.
Multiple Intelligences

Gardner’s theory of multiple intelligences (1983, 1993, 2004a) has asserted that people are born with multiple relatively autonomous intelligences. Intelligence was defined as “a biopsychological potential to process information that can be activated in a cultural setting to solve problems or create products that are of value in a culture” (Gardner, 1999, p.33). The individual intelligences identified were linguistic, logical-mathematical, spatial, musical, bodily-kinesthetic, interpersonal, and intrapersonal (Gardner, 1993). Gardner later identified an eighth, naturalistic intelligence (Gardner, 1999a). He believed that individuals were born with varied abilities in these intelligences. As children mature in their cultural context, certain intelligences become more developed compared to other intelligences, depending on the surroundings, experiences, and the relative cultural value placed on those intelligences.

Gardner’s research has been based on both biological and social research. He spent a great deal of time working with and researching brain function by observing brain ability and dysfunction in adult brain injured patients. These observations, as well as educational research with gifted students and their learning abilities, provided the groundwork for his theory (Gardner, 1993).

The behaviors, “end states” (Gardner & Hatch, 1989, p.5), or end result of the uses of these intelligences, is what manifests itself as the evidence or products of the underlying intelligences. For example:

- Linguistic intelligence refers to how an individual is able to utilize language skills in written or verbal form such as in telling a story. Skills utilizing various word forms,
and combination of words, to express meaning in an interesting and convincing way, describe this intelligence. Examples of those with high linguistic intelligence include poets, journalists, novelists, and eloquent public speakers.

• Logical-mathematical intelligence refers to the ability to carry out mathematical calculations, investigate problems scientifically, and analyze problems logically. Persons with highly developed logical-mathematical intelligence include scientists and mathematicians.

• Spatial intelligence refers to the ability to appreciate an objects position in relation to other objects in more than one dimension. Persons with this intelligence are able to visualize in their mind how an object would look from various viewpoints. They are able to determine position and location easily. Examples of individuals with highly developed spatial intelligence include navigators, surgeons, and sculptors.

• Musical intelligence refers to the ability to appreciate musical patterns and skill in the composition or performance of musical renditions.

• Bodily-kinesthetic intelligence refers to the ability to control or utilize ones whole body, or only parts of the body, to solve problems or perform tasks or maneuvers. These individuals can be very skilled in using their body for purposes of expression. Examples of bodily-kinesthetic intelligence include athletes and dancers.

• Interpersonal intelligence is the ability to see and appreciate the emotions and plight of others, as well as the motivations and needs of others. They have the ability to analyze and predict the reactions of other people. They are able to interact effectively with others. Examples of those who excel in interpersonal intelligence include politicians and religious leaders.
• Intrapersonal intelligence refers to the ability to use self-reflection and self-analysis to understand your own feelings and thoughts. Those with strengths in intrapersonal intelligence are able to analyze how they fit into the larger world. These individuals reflect upon, and evaluate, their own choices and actions. (Gardner, 1993)

• Naturalistic intelligence refers to the ability to identify differences between objects in the environment and categorize them. It is the natural ability to analyze the environmental surroundings. Those with naturalistic intelligence include gardeners, farmers, and hunters. (Gardner, 1999a)

Gardner noted that by recognizing the naturalistic intelligence and adding it to the original list of seven intelligences, that it may be possible that there are even more intelligences that have yet to be identified (Gardner, 1999d). Any additional intelligences would have to fit the eight intelligence criteria: “identifiable core operation(s); evolutionary history and evolutionary plausibility; recognizable end-state and distinctive developmental trajectory; existence of savants, prodigies, and other individuals distinguished by the presence or absence of specific abilities; potential isolation by brain damage; support from experimental psychological tasks; support from psychometric findings; susceptibility to encoding in a symbol system” (Gardner, 1993, p.62).

Gardner believed that our society has traditionally valued linguistic and logical-mathematical intelligences more highly than other intelligences, and students who excelled with these intelligences were more likely to succeed in the educational system. Intelligence quotient testing, as part of the psychometric tradition, as well as other common forms of assessment in schools and in our society, was considered to be very biased in favor of these particular intelligences. This theory, based on Gardner’s work in
neuropsychology and development, provides educators a new lens in which to view intelligence and aid students in learning (Adult Multiple Intelligences: MI Basics, 2004).

Krechevsky and Seidel (1998) identified four implications of MI theory to instruction. One way that they identified was that MI theory could be used for the individualization of educational practice. It was asserted that teachers, after becoming aware of their students strengths, weaknesses, and interests, could modify their educational practice for that individual particular student. A second way that MI could inform instruction that was identified was the idea that the teaching of subject matter could be accomplished in more than one way so that different intelligences could be engaged with the subject matter. A third way identified was project-based learning where students are able to draw on a variety of intelligences and intellectually enter into contact with the subject through a variety of entry points involving their different intelligences. Projects which involve solving problems or creating products allow students to demonstrate their intelligences. A fourth implication of MI theory to instruction identified was by infusing art into the curriculum. MI theory appreciates that learning through the arts involves problem solving and product creation just like the more traditional types of subject matter. Implications of MI theory for assessment included a variety of ideas: assessments should be contextualized; they should allow for a variety of ways to demonstrate understanding; they should track growth over time; and they should be a part of the process of learning. Tools to assess compatible with MI theory were noted to be: observation, documentation, performance, portfolios, and self-assessments. The importance of allowing students to make choices that could demonstrate their intelligence strengths was noted.
The adult multiple intelligences (AMI) study. The Adult Multiple Intelligences (AMI) study systematically investigated multiple intelligences (MI) theory in adult literacy education (Kallenbach & Viens, 2002). It “explored the application of Howard Gardner’s theory of multiple intelligences (MI) to adult learning and teaching” (Kallenbach, 1999, p.1). The ultimate goal of this research was to improve adult literacy practice. Four adult literacy field issues identified were: “a high incidence of learning difficulties among adult learners, low self-efficacy among adult literacy learners, the need to improve learner retention rates, limited professional development opportunities for adult literacy educators” (Kallenbach & Veins, 2002, p. vi). The research question for this study was: “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)” (Kallenbach & Veins, 2002, p.vi)? The study method was a qualitative approach examining the application of MI theory in real classrooms in various adult learning contexts, with different teachers and adult learner populations. Evaluation methods included qualitative interviews, teaching journals, and observations. The following paragraphs summarize researchers’ findings.

Kallenbach (1999) noted that teacher awareness of student diversity of intelligence strengths, and the ability to draw upon those strengths, was valuable in facilitating student learning. She also noted that offering multiple choices to students to allow for a variety of ways to engage with the material gave the students increased control in their learning.

Costanzo (2001) found that adult rural GED students appreciated having their intelligences valued. Students gained insight and confidence through the process of
examining their strongest intelligences. This new insight improved student willingness to participate in nontraditional learning methods. It was found that learning strategies inspired by MI theory had to be demonstrated repeatedly before students became comfortable using them. Drawing upon their strongest intelligences provided students the opportunity to approach problems in their own ways. These students preferred to have choices in how their knowledge was demonstrated. MI theory application was found to be beneficial with a variety of contents such as reading, writing, and mathematics. Costanzo (2001) utilized each individual’s multiple intelligence profile to aid in choosing the most appropriate learning exercise to utilize with that particular student. Student approaches to learning appeared to change and improve.

Costanzo (2001) found that the personal intelligences were particularly important in designing learning activities for adults. Real-life group projects inspired enthusiasm towards learning. Awareness of their multiple intelligences and communication through dialogue journals aided the students in further exploring their intelligences. Costanza (2001) also found that as a result of incorporating MI inspired activities into her class, adult enrollment increased and attendance improved. She also found that high risk students had either very high or very low scores in the personal intelligences, and that these particular students needed special attention. She noted the lessons inspired by multiple intelligence theory improved student-teacher relationships. She found that this theory improved her understanding of her own strengths and weaknesses.

Paxton (2001) found that both she and her students were initially resistant to learning approaches inspired by multiple intelligence theory. English for speakers of other languages (ESOL) student perceptions of the application of MI theory to learning
did improve after experiencing nontraditional learning opportunities. Their attitudes also improved with the facilitation of community building, trust, and the utilization of student projects.

Costanzo and Paxton (1999) both noted that project-based activities increased student control in the process of learning. This increased student control was associated with increased student engagement with the material.

Coustan (2001) focused her efforts on the application of MI theory in the ESOL classroom. Her interest in the writings of John Dewey (1963) and learning through praxis were consistent with MI theory application. Both Dewey (1963) and Gardner (2004a) believe that active student participation and “hands on” learning are valuable. In providing choices in the class, individual learning strengths were revealed, and students were able to participate more actively. Despite the observation that the learners’ had difficulty in understanding MI theory, it was observed that their metacognitive ability to reflect on their learning improved with repeated practice. Student progress improved with MI-based activities. Providing choices for learning activities to these adult ESOL students promoted student assertiveness in and outside of the classroom. Activity choices and a trusting classroom environment enabled students to take greater control in the classroom and go beyond their cultural norms.

Rocka’s (2001) research was based on adults participating in a community based literacy center which provided services to a multicultural and low income clientele. She found that MI theory application expanded a multi-sensory approach to the teaching of writing and reading. Its application also showed reading improvement in comprehension, retention, certain reading strategies, and reading interest. MI theory application and
providing student choices was found to increase interaction and make the class more student-centered.

Coustan and Rocka (1999) both noted the importance of realizing that applying MI theory did not mean abandoning other teaching methods that work. They noted that MI theory’s value was in how it helped them as teachers to view the student differently and how to enhance methods already utilized to improved student learning.

Mantzaris (1999), a counselor, noted that application of MI theory enhanced the discovery process involved with a career-choice class in that it expanded students’ ranges of choices and possibilities. Mantzaris (2001) found that MI theory broadened the students’ decision making regarding their career choices to include choices aligned with their individual intelligence strengths. Once they examined their career choices based upon their MI strengths, career options were in abundance. Several of these students filed applications to college and for federal financial aid. Application of MI theory increased student persistence, motivation, engagement, camaraderie, and respect for diversity. Teaching to intelligences other than linguistic resulted in a classroom where students became more independent as learners. The classroom became more learner-centered and students took more control in their learning.

Quinones (2001), a teacher who helps disadvantaged women towards developing personal and professional growth, had been using popular education for social action with some success. Her teaching was influenced by Paulo Freire (1997). She believed that the popular education learning environment should be nurturing and democratic where individuals are valued and have important insights from their previous knowledge and experiences. She incorporated the application of MI theory into her adult basic education
classroom. She found that incorporation of MI theory helped her in extending her teaching and improved her popular education practice. She found that MI inspired teaching encouraged and promoted student empowerment and collective action. It also promoted a democratic learning environment with more student power in the classroom. Providing information regarding individual multiple intelligences strengths and weaknesses promoted both respect and interdependence that fostered social action.

Cornwell (2001, p.8), who was involved with ABE, ESOL, GED, and ASE education, developed the following research question: “Will awareness of their own intelligence profiles help my students become more independent learners?” She had students define their own definition of the “independent learner”. An analysis of this information revealed that this teacher viewed adult learning from different perspectives than her students, as their definition of “independent learner” was different from her own. Rather then forcing students to accept her definition, she found that by honoring her students’ various perspectives, she was able to find a place to start where she could expand on their understanding. She found that MI based activities aided students in becoming the teachers ideal of the “independent learner”, even when the students did not value this ideal. This teacher found that individual multiple intelligence profiles were not helpful to her with her student population. She did find, however, that observing student behavior and student feedback did provide information about their intelligences that was useful.

Quinones and Cornwell (1999) both noted that the application of MI theory can aid students who are resistant to learning in demonstrating their knowledge without
threatening their sense of identity. Offering these students a variety of learning strategies allowed them to find their own path to learning.

Viens (1999), in describing how MI theory can better inform practice in the adult classroom, noted that “each intelligence has its own unique characteristics, tools, and processes: each represents a different way of thinking, solving problems, and learning; and each emphasized a particular type of product. Although each intelligence operates relatively independently, the brain has distinct mechanisms and operations for each intelligence and in reality they work in combination” (Viens, 1999). To “create more individualized or personalized education by more directly addressing students’ intellectual strengths in the curriculum” (Viens, 1999, p.2), the following were instituted: The provision of a variety of curricular options to provide students experience across the intelligences, the provision of choice for students among activities or “entry points”, the expansion of instructional media and strategies based upon multiple intelligences, the informal assessment of students’ multiple intelligences and sharing this information with students so that they can learn how they learn best, and the expansion of assessment options so that students could use their intelligence strengths to demonstrate their learning and achieve success.

Garner (1999), a teacher at a community college that actually recruits dropouts from area school districts for adult basic education and general education development (GED) preparation, also participated in the AMI study. Students who participate in this program at this community college are a mixture of both adults and teenage students. Students, as part of their educational experience, spent part of their time in the computer lab. It was noted that although many of these students had poor word processing skills,
they had advanced ability to do a multitude of tasks on the Internet. Jean (1999), another teacher participant in the AMI study, found that MI-informed teaching positively affected the attendance and progress of adult students with learning disabilities and/or attention deficit disorder. Their learning was facilitated with hands-on activities and providing activity choices to the students that utilize a variety of different multiple intelligence strengths.

Overall, the AMI study revealed two categories of teachers’ interpretation of MI applications: MI-inspired instruction, and MI reflections. “MI inspired instruction focused on classroom practices and materials, whereas the MI reflections focused on using MI to engage students in reflecting about their own strengths, weaknesses, interests, and preferences” (Kallenbach & Viens, 2002, p.vii). Efforts to apply MI theory to adult education settings resulted with high levels of student engagement. It allowed students to relate class activities and content to be learned to their experiences. Students could approach activities from their preferred and strongest intelligences. Activities designed to allow students choices in which types of activities they could participate in allowed the students to have a greater degree of control of their own learning. Student reflections regarding the multiple intelligence strengths assisted the students in building their self-confidence and in helping them in developing metacognitive skills so that they could know how they learn best.

This research (Kallenbach & Viens, 2002) showed that MI theory can be applied to adult education settings with an improvement in student learning. The implementation of MI theory in adult education practice requires that teachers become knowledgeable about MI theory and be willing to take risks in applying it by instituting a variety of
learning activities. It also requires that teachers help students develop their
metacognitive skills so that they can learn how they learn best. This study helped in
providing a foundation of MI practice in the adult education field which can serve other
practitioners.

It was interesting how students increased control over their learning was
associated with improved outcomes. Since control is a concept related to student
autonomy (Garrison & Baynton, 1987), the Adult Multiple Intelligences (AMI) study
demonstrated a relationship between autonomy and the multiple intelligences. More
research investigating this relationship could result in improved teaching and learning by
adult students in a variety of settings.

Additional research relating multiple intelligences and autonomy. Several authors
have identified a connection between multiple intelligences and learner autonomy
(Williams, 1995; Chan 2000; Walters, 1992; and Diaz-Lefebvre 1999a). Williams (1995,
p.2) noted that “when autonomous adults are faced with challenging tasks within a
nonstressful, collegial environment, they may have an optimal opportunity to learn”. An
argument was made that it is beneficial for teachers to use games to assist students in
learning content and concepts. To demonstrate, this author offered strategies for
conducting three games which were developed to promote active learning, thinking, and
collegial sharing in an adult education setting. One of the games was based on multiple
intelligences. Students were encouraged to think creatively and take risks. Playing
games was identified as a learning method, compatible with multiple intelligence theory.

Chan (2000), in discussing curriculum reform in Hong Kong, also noted a
connection between MI theory and student autonomy. It was noted that curriculum
development informed by MI theory could assist students in becoming autonomous and independent learners. Having students learn how to learn was noted to be an essential part of this curriculum reform. By having students become aware of their MI strengths and weaknesses, they could learn how to learn in a way that is best for their unique intellectual capacities. In addition to curriculum design changes to facilitate learning utilizing MI theory, assessment restructuring would also be needed. Suggested measures included student development of autonomous learning skills in which they could learn how to actively assess themselves. “The extent to which the multiple-intelligences perspective may inspire the present exercise of curriculum reform to achieve all-around development of autonomous learners who are also capable of lifelong learning remains a topic of great interest in future educational research” (Chan, 2000, p.200).

Walters (1992) challenged traditional forms of assessment in light of more contemporary beliefs of intelligence, such as that of multiple intelligences. He noted that the use of decontextualized paper-and-pencil tests and the resulting grades did little to support the self-esteem of the students who did not get the highest grade. In addition, this form of testing was noted to not allow the student to demonstrate their knowledge in a contextualized way that is more in keeping with work situations. It was asserted that a richly contextualized environment is needed where students are required to solve problems in order to truly assess learning. It was argued that performance assessment techniques should be devised in which students should be required to have authentic performances that draw directly on the skills that the student is trying to master. The belief that students should have the opportunity to practice and perform tasks repeatedly until mastery was completed was shared. A collection of materials from multiple
authentic performances could be developed and made into a portfolio where students
could demonstrate their learning over time. The importance of student reflection was
also noted as students should develop insights and become aware of their own learning
processes and learn how to learn, thereby developing competence in becoming lifelong
learners and subsequently, becoming more autonomous.

Diaz-Lefebvre (1999a) explored ways that MI theory could be applied to teaching
and learning at a community college. The belief that learning was unique for each
student was an underlying principle for the utilization of this theory in this setting. A
variety of choices for students to choose from was provided, as many of these students
were noted to not have a good fit with the traditional college teaching practice and
traditional paper-and-pencil forms of assessment. Instead of a linear, lecture, teacher
centered classroom, Diaz-Lefebvre developed a random access, exploratory, student
centered environment. The importance of a redefinition of intelligence(s) was identified
as significant in our rapidly changing world. Education has been undergoing a paradigm
shift from teacher-centered to student-centered education. Offering student choices
increased student motivation, enthusiasm, and participation. With the assumption that all
students are smart, the provision of multiple choices in demonstrating their intelligences
allowed alternatives to paper and pencil assessment. This transitioned the teacher from
an information transmitter to a facilitator, mediator and coach. Results of the pilot study
included: students want choices; students will take risks if the teacher models risk taking;
students become more motivated to spend more time out of class on the material; and
students demonstrate more creativity with this approach. Students initially found
freedom of choice scary, but many found the hands-on approach beneficial. It was noted
that options promoted student reflection instead of cramming for a written test. Student choice has been associated with control and related to autonomy (Garrison and Baynton, 1987), therefore this research also supports the contention that a relationship exists between MI theory and independence/autonomy. Diaz-Lefebvre (1999b) provided examples of the learning options that he used with his classes, as well as the assessment procedures that he utilized.

Research regarding multiple intelligences and outcomes for adult students. A variety of studies have investigated the relationship between multiple intelligences and adult student outcomes in the educational setting (Chan, 2003; Shore, 2001; and Tracey, 2001). Shore (2001) investigated the relationship between the use of multiple intelligences in the university English as a Foreign Language (EFL) classroom and self-efficacy. Significant positive correlations between the logical-mathematical and interpersonal intelligences, and reading self-efficacy were demonstrated. Strong positive correlations were found between interpersonal, intrapersonal, bodily-kinesthetic, and linguistic intelligences, and writing self-efficacy. Interpersonal and spatial intelligences were positively correlated with speaking self-efficacy. Analysis of the data supported the contention that multiple intelligences integration in the EFL classroom would affect self-efficacy.

Chan (2003) also noted a relationship between multiple intelligences and self-efficacy. Hong Kong teachers, overall, were found to report strengths in the personal intelligences, and weaknesses in the spatial and bodily-kinesthetic intelligences. Interestingly, self-efficacy in helping others was significantly predicted by interpersonal intelligences.
Tracey (2001) in an effort to test and validate an MI design model, developed and compared the outcomes from two courses, one of which used the MI design model. These courses were delivered to one-hundred and two full time employees of a residential care agency for developmentally disabled children and adults. Participants ranged in age from eighteen to sixty, with a mean age of thirty-seven years. Seventy percent were African-American and thirty percent were Caucasian, with education levels ranging from GED’s to masters degrees. Analysis of learner knowledge acquisition results demonstrated that the MI group scored significantly higher than the other group. It was concluded that this MI design model could be used by course designers to assist in the analysis of the learners and help in the creation of effective instructional strategies.

Since the consideration of cognitive ability with teaching methods has been shown to improve knowledge gains (Carter, 2002), it follows that learning would be best facilitated by teaching that promoted learning through the utilization of each learner’s unique combination of cognitive abilities. In fact, aptitude-treatment interaction (ATI) research (Cifuentes & Hughey, 2003) has shown that certain instructional methods were related to better learning outcomes based on multiple intelligence (MI) profile results. It may be possible that teachers could utilize MI profile information to develop teaching and learning strategies best suited for individual learners.

Distance education and multiple intelligences. It has been theorized that by appreciating the varied intelligences, and by applying pedagogical methods that consider these intelligences, more learners with varied multiple intelligences profiles could be better served in the distance education Internet-based arena (Osciak & Milheim, 2001). Internet-based technology creates pedagogical options that have never before been
possible in distance education (Osciak & Milheim, 2001). A variety of research, albeit in a limited fashion from a mostly software development perspective, has been pursued related to this (Dara-Abrams, 2002; Krishnasamy, Peck Lee, and Palaniappan, 2003; and Kelly & Tangney, 2004).

Dara-Abrams (2002) investigated the application of multiple intelligences theory to the online learning environment. A prototype approach to learning online through customized content presentation using learner characterization was based upon students strongest multiple intelligences and technical backgrounds. Customization was done through the use of adaptive multimedia and adaptive text presentation. It used an entry point framework, as well as the use of multiple subject matter representations. Gardner (2000) who described the entry point framework has noted that teachers can use multiple intelligences theory to introduce topics to learners through a variety of the intelligences. The entry points that Gardner (2000) has described include: narrative, numerical, existential/foundational, aesthetic, hands-on, interpersonal, and logical. Dara-Abrams (2002) performed content adaptation using page and explanation variants. The evaluation of this prototype was formative. It was suggested that prototype improvement through expanded application of MI could aid in the ability to offer a multi-intelligent hypermedia content presentation that was adaptive. It was believed that this would improve the ability of online education. It would not only be a method of learning that allows students to learn regardless of their schedule or geographic location, but it would also allow students to learn in the way that is most suited to their individual characteristics.

Krishnasamy, Peck Lee, and Palaniappan (2003) did a study which aided in the investigation of the effective design of computer-based distance education applications
which incorporated learning that addressed the multiple intelligences. Students from several schools in Malaysia completed multiple intelligences surveys to determine their strengths in the various intelligences. They also were surveyed to determine their attitudes towards electronic learning. Interestingly, these researchers found a correlation between spatial and interpersonal intelligences and preference for online learning. It was also noted that these students were more likely to use and benefit more from online learning. It should be pointed out that typically, spatial and interpersonal intelligences are not well employed in the traditional classroom setting. Perhaps online learning better engages these intelligences compared to traditional classroom-based learning. Their findings in these students were in contrast to those students with strengths in linguistic, logical/mathematical, bodily-kinesthetic, and intrapersonal intelligences. Interestingly, linguistic and logical/mathematical intelligences are frequently used in traditional classroom settings. They noted that the incorporation of multiple intelligences theory in distance learning strategies aided in providing alternatives in how students pursued their learning, and it also assisted with interaction and collaboration.

Kelly and Tangney (2004) evaluated the relationship between an adaptive tutoring system, the level of student choice, and performance measures. The tutoring system was based on the theory of multiple intelligences. This system was developed to dynamically identify student characteristics and adapt to these characteristics to provide an individualized, customized learning experience. Interestingly, analysis of learning gain between the three groups that were analyzed (one group having free choice, another having the adaptive least preferred method, and a third using the most preferred method) revealed no significant difference. Contrary to what would be expected, it was found that
learning gain was greatest for the least preferred version. It was found however, that students who were in the least preferred group increased their learning activity and were exposed to a wider range of resources in response to being initially provided with their least preferred method.

**Multiple Intelligences Assessment for Adults**

Shearer (1994) noted that multiple intelligence theory lacked a practical, reliable, and valid method in which these intelligences could be assessed. He developed the Hillside Assessment of Perceived Intelligences (HAPI) in response to this need. Investigations revealed this instrument to be reliable, but its validity was questionable. Its concurrent validity was supportive; however investigation into its construct validity delivered mixed results.

Shearer (1997) presented a paper at the Annual Meeting of the American Psychological Association entitled: Reliability, validity and utility of a multiple intelligences assessment for career planning. He reported the validity, reliability and utility data regarding the Multiple Intelligences Developmental Assessment Scales (MIDAS), which is a self administered instrument which reports information regarding an individual's multiple intelligences. It was also noted that it can be administered through structured interview. This test was noted to be appropriate for adolescents and adults, and that group administration is possible. In addition to examining the instruments validity, reliability, and utility data, another study which involved college students enrolled in a class involving career exploration was performed. Results of these investigations revealed that most students found that information learned from the MIDAS was beneficial. Many learned new information about their abilities and skills.
The MIDAS was therefore found to improve self-awareness regarding these skills and abilities. The MIDAS was also found to have adequate validity and reliability. It should be noted that a significant number of college students remained confused regarding their career path at the end of the career exploration course. These same students who appeared to have the least benefit from the course were also found to have low and flat MI profiles. It was noted that low and flat MI profiles could reflect a lack of intellectual and personal maturity. They also were found to have low intrapersonal scores.

Recent research for the further development and validation of the multiple intelligences assessment was undertaken by Shearer (2002). “The Multiple Intelligences Development Assessment Scales (MIDAS) was validated through studies involving nearly 3,000 middle school students, approximately 70 high school students, groups of adult and college students, and 400 employed adults” (Shearer, 2002, p.1). In addition, how MI profiles might be used in the classroom setting was investigated. Findings included that teachers who know their MI profile information can become aware of their own weaknesses and aid in their ability to empathize with struggling students. Students also found the MI profile information to be not only informative, but encouraging as well. It was noted that competence in intrapersonal intelligence was improved with knowledge of MI profile information. This information is also helpful in providing a basis for developing individualized education. More recent research (Shearer, 2004) has also supported and extended the validity of the MIDAS.

Another MI assessment instrument has also been researched regarding its validity and reliability. This was done by Martin (2003) who investigated the viability of using multiple intelligences theory as a means for identifying a diversity of knowledge in
business students. She also investigated whether this information assisted in the identification of self or others as knowledge sources. The Multiple Intelligence Preference Inventory was evaluated in this study and was found to be both reliable and valid. Study results also indicated that this information was associated with the identification of self and others as knowledge sources. It was hoped that further research regarding this inventory would be pursued in an effort to promote the recognition, respect, and subsequent workplace benefit of knowledge diversity.

**Summary of multiple intelligences literature.** In reviewing the literature on multiple intelligences as it pertains to adult learners, several common themes emerge. The most interesting theme, and one that directly relates to adult learning and transactional distance theory, is that of the ability of multiple intelligences theory to facilitate the development of learner autonomy. A variety of researchers noted how offering choices in the ways in which students learn and demonstrate their learning allowed for more learner control (Kallenbach, 1999; Coustan, 2001), independence (Mantzaris, 1999; Cornwell, 2001), and autonomy (Chan, 2000; Walters, 1992). Providing a variety of choices to students based on multiple intelligences theory allowed learners to have the opportunity to draw upon their strongest intelligences and approach problems in a unique way. Increased choices were found to be associated with increased learner motivation, enthusiasm, and participation (Diaz-Lefebvre, 1999a). Providing choice allowed students to have more control. Increased learner control was associated with the development of autonomy. Increased control was also noted to improve engagement with learning (Costanzo and Paxton, 1999). “The extent to which the multiple intelligences perspective may inspire the present exercise of curriculum reform
to achieve all-around development of autonomous learners who are also capable of lifelong learning remains a topic of great interest in future educational research” (Chan, 2000, p.200).

Another theme that emerged was how multiple intelligences theory is compatible with adult education practice. Coustan (2001) was able to integrate MI theory into her John Dewey (i.e. 1963) inspired teaching practice where she used hands-on MMI-inspired learning activities so that students could learn through praxis. Walters (1992) also noted how MI theory was helpful in providing a contextualized environment where students are required to solve problems and assessments can be based on authentic performances. Fogerty (1996) and Krechevsky and Seidel (1998) also noted how hands-on activities and problem-based learning were more student-centered and allowed for more authentic learning. Quinones (2001) used MI theory to assist her with her popular education practice influenced by Paulo Freire (1973).

Another interesting finding was that MI theory and adult distance education have been connected, albeit mostly through means of instructional design and Internet technology. Much of this research involved the development of software to provide customization of learning based on multiple intelligences. One of the most interesting findings from this research was the finding of a correlation between spatial and interpersonal intelligences and online learning, and that incorporation of MI theory into distance learning strategies assisted with interaction and collaboration (Krishnasamy, Peck Lee, & Palaniappan, 2003).

Lastly, MI theory has been found to be related to outcome measures such as self-efficacy and learner-knowledge acquisition, in adult students (i.e. Shore, 2001; Tracey,
2001; and Maddox, 2002). These findings support the contention that there may be a relationship between the multiple intelligences and other outcome measures (such as attitudes), in the adult distance education setting.

In review, the literature does support a relationship between multiple intelligences and transactional distance theory, as incorporation of MI theory into teaching and learning has been found to facilitate the development of learner autonomy (Chan, 2000; Walters, 1992) and independence (Mantzaris, 1999; Cornwell, 2001), which are significant to Transactional Distance Theory. In addition, since MI theory has been found to be related to outcome measures (i.e. Shore, 2001; Tracey, 2001; and Maddox, 2002), this literature supports the idea that MI’s may be related to other outcome measures, such as learner attitudes.
Attitudes and Distance Education

Attitude and satisfaction are related terms. “Increasingly, researchers are focusing on effective methods for measuring learner attitudes and on strategies for increasing student satisfaction with distance education” (Moore & Thompson, 1997, p.22). In reviewing the literature related to this, a number of themes emerged.

Attitudes and Independence/Autonomy. An important theme that emerged from some of the research was the relationship of learner attitudes to learner autonomy and control. Rangecroft, Gilroy, Long, & Tricker (1999) noted that the opportunity for flexible study was most associated with learner satisfaction. They sought to re-design a template used in service industries for use with distance education to evaluate student satisfaction. A questionnaire was subsequently developed, and students from four different distance courses from two different institutions were surveyed. Results indicated, that from increasing to decreasing order of importance, students identified the following as important to course satisfaction: opportunities for flexible study, access to tutors, personal development, professional development, broadening of their experience, extent of tutorial support, ease of communication with institution, relevance to their work, level of individual student support, appropriate support services, contact with others in their field, and ease of registration. It was interesting that access to tutors (or student-teacher interaction) was second in importance for course satisfaction only to opportunities for flexible study. The importance of opportunities for flexible study for learner satisfaction suggests that independence and autonomy were of primary importance in the distance learning environment. This is consistent with the writings of
Saba (2000) where he notes that learner autonomy and independence are of primary concern in the distance learning environment.

Richardson, Long, and Woodley (2003) noted that high ratings on student choice were found to be associated with higher satisfaction ratings. They investigated survey results from hearing impaired students, and students without any declared disability. These researchers utilized two questionnaires. One questionnaire related to course experience, and the other related to academic engagement. Two-hundred and thirty-eight students with a hearing loss and one-hundred and sixty-six students without a disability provided usable responses. Students with hearing loss were found to be significantly older than the students without any declared disability. Otherwise the two groups are similar in terms of gender, number of credits achieved, previous qualifications, academic discipline, current academic workload, and current level of study. Both student groups demonstrated positive ratings on general satisfaction with no significant differences between groups. Older students tended to give higher satisfaction ratings compared to younger students. Higher satisfaction ratings were associated with higher ratings on institutional affiliation, learning from materials, appropriate assessment, good materials, and student choice. In addition, the research revealed that a close relationship existed between perceptions of academic quality and academic engagement. It was concluded that academic engagement is an important factor in student perceptions of academic quality. Academic engagement appeared to be influenced by student age, faculty, previous qualifications, and hearing status. Perceived academic quality appeared to be influenced by previous qualifications, hearing status, and gender. General satisfaction was found to be influenced most directly from age, academic engagement, and perceived
academic quality. The authors suggested that improved teaching should be actualized through improving student experience. The association of high ratings on student choice and high satisfaction ratings is significant as choice has been noted to be related to control and independence (Garrison and Baynton, 1987). These findings appear to support the importance of learner autonomy and independence on learner satisfaction.

The strongest predictor of satisfaction in a study done by Thurmond, Wambach, Conners, and Frey (2002) was variety in ways of assessment. Thurmond, Wambach, Conners, and Frey (2002) using an input-environment-outcome model, evaluated learner attitudes in the online environment controlling for learner characteristics. A survey instrument was developed. Items selected as input variables included: computer skills, knowledge of electronic communications technology, number of Web courses taken, age, and distance from main campus. Environmental variables chosen were related to student-teacher interaction, peer interaction, collaborative learning, and engagement in active learning, timely feedback, amount of time on task, and assessment. The outcome variable analyzed was learner satisfaction. One-hundred and twenty students were surveyed. Student satisfaction was highly correlated with items relating to timely feedback, variety in ways of assessment, and knowing the instructor. Regression analysis found that the student characteristics identified did not influence student satisfaction. The strongest predictor of satisfaction was having a variety of learning assessment methods. Interestingly, students more likely to participate in groups were found to tend to be less satisfied. It was suggested that a reason for this negative relationship may be related to the difficulty experienced in working as a team in an electronic medium. Timely feedback was also found to be a strong predictor of student satisfaction. In this
study, computer skills, number of Web courses taken, knowledge on use of electronic communications technology, distance from main campus, and age, did not help predict student satisfaction. However, when the input variables were controlled, environmental variables were predictive of satisfaction. This indicated that what happened during the online course, not student characteristics, effected student satisfaction. Several study limitations were identified including the fact that only a few student characteristics were evaluated.

It was very interesting that in this study the strongest predictor of satisfaction was having variety in ways of assessment. Having variety in ways of assessment appears to allow learners the ability to more freely exert their powers of learning as autonomous learners as described by Moore (1973). Garrison & Baynton’s (1987) idea of control and independence, which adds to and supports Moore’s theory of autonomy, therefore also supports this assertion. These findings suggest that autonomy and independence are of primary concern in the distance learning environment. This is consistent with the writings of Saba (2000) who notes that learner independence and autonomy should be given primary consideration in the distance learning environment.

Unfortunately, research investigating the relationship between variables of autonomy or independence and attitudes, is minimal. The importance of learner autonomy and independence in distance education environments is significant and deserves much more attention and investigation. Further investigation into the relationship between learner autonomy and attitudes is greatly warranted.

**Attitudes and Interaction.** The area that was most prolific with research was that of the relationship of interaction and satisfaction. This is significant as interaction is an
aspect of dialogue (which is a component of transactional distance theory). Fulford and Zhang (1993) found that increased perceptions of interaction were associated with increased satisfaction.

Of the various types of interactions investigated, student-teacher interaction appeared to be most associated with student satisfaction and was found repeatedly (i.e. Biner, Barone, Welsh, & Dean, 1997; Biner, Dean & Mellinger, 1994; Rangecroft, Gilroy, Long, & Tricker, 1999; Schlegel, 2003; Swan, 2001; Thurmond, Wambach, Conners & Frey, 2002; and Woods & Ebersole, 2003). A certain type of student-teacher interaction, that of timely feedback, appeared to be very influential for satisfaction (Biner, Barone, Welsh, & Dean, 1997; Biner, Dean, & Mellinger, 1994; St. Pierre & Olsen, 1991; Thurmond, Wambach, Conners, & Frey, 2002; and Williams, 2003).

In addition to student-teacher interaction, student-student interaction was also found to be repeatedly associated with learner satisfaction (Biner, Welsh, Barone, Summers, & Dean, 1997; Rangecroft, Gilroy, Long, & Tricker, 1999; Schlegel, 2003; Shin, 2003; Swan, 2001; and Woods & Ebersole, 2003). Woods and Ebersole (2003) found that distance learners sense of community was associated with satisfaction. Shin (2003) found that perceptions of peer transactional presence were associated with student satisfaction. Gunawardena and Zittle (1997) found that the strongest predictor of satisfaction in their study was learners’ perceptions of social presence. Webb (1994) found that planned small group interaction using a facilitator resulted in more positive attitudes towards distance education.

Interaction between the learners and the institution was found to predict all measures of success in distance learning identified in her study, including satisfaction.
Interaction between students and support personnel (Biner, Dean, & Mellinger, 1994; Rangcroft, Gilroy, Long, & Tricker, 1999), students perceptions of institutional affiliation (Richardson, Long, & Woodley, 2003), and students sense of institutional transactional presence (Shin, 2003) have all been associated with student satisfaction.

Another positive relationship identified was between learner satisfaction and performance levels (Biner, Barone, Welsh, & Dean, 1997). Swan (2001) found a high correlation between satisfaction and perceived learning. Academic engagement was found to influence satisfaction (Richardson, Long, & Woodley, 2003). Satisfied students were found to perform better academically (Biner, Welsh, Barone, Summers, & Dean, 1997).

Other factors found to be related to learner satisfaction included: personal and professional development, broadening of experience, relevance to work (Rangecroft, Gilroy, Long, & Tricker, 1999) age, appropriate assessment, perceived academic quality (Richardson, Long, & Woodley, 2003); learner readiness (Gunawardena & Duphone, 2000); instructional technology, course management (Biner, Dean, & Mellinger, 1994); motivation, opportunity to apply experiential learning and knowledge, relevance of course content and satisfaction with a prior distance course (St. Pierre & Olsen, 1991).

In reviewing this material, an interesting finding was that of repeated investigations indicating a relationship between interaction and satisfaction in the distance setting. Since interaction is an aspect of dialogue, this research suggests that some students may be more satisfied in distance educational situations with higher dialogue and lower transactional distance. Since low transactional distance has been associated with lower autonomy, then it makes one wonder if the majority of the students
in these studies had lower levels of autonomy. Alternatively, perhaps only some of the students in these studies had lower levels of autonomy, which resulted in them being less satisfied in high transactional distance environments. In addition, perhaps learners with higher levels of autonomy would be satisfied in any degree of transactional distance. No studies were found that categorized learners as having either high or low levels of autonomy and then subsequently determining the satisfaction for each group based on degree of transactional distance.

**Traditional versus distance education.** There is a large amount of research which compares satisfaction in the traditional educational setting to that of the distance educational setting. Much of this research used the outcome of student satisfaction as a means of comparison. Allen, Bourhis, Burrell, and Mabry (2002) did a meta-analysis regarding student satisfaction in the distance education setting, compared to traditional settings. Analysis indicated that students expressed a slightly higher satisfaction level in face-to-face course settings compared to distance formats. Although it was noted that “the replacement of traditional face-to-face education with distance educational technology should demonstrate little decline in student satisfaction with the quality of the educational process” (Allen, Bourhis, Burrell, & Mabry, 2002, p.91).

**Attitude Surveys.** A large number of researchers have used a wide variety of instruments to measure attitudes in the distance education setting. Examples include, but are certainly not limited to: Biner, Dean, Mellinger, 1994; Fung & Carr, 2000; Gunawardena & Zittle 1997; Lim, 2001; Richardson, Long, & Woodley, 2003; Sherry, Fulford, & Zhang, 1998; Shin, 2003; St. Pierre & Olsen, 1991; and Woods & Keeler, 2001. In reviewing the literature, it did not appear that any one specific instrument had
gained widespread use or acceptance for the general evaluation of attitudes in the
distance education setting. Some instruments were specific to a certain technology. For
instance, an instrument that has been repeatedly used to evaluate satisfaction in the
distance education setting is the Telecourse Evaluation Questionnaire (TEQ) (Biner,
Barone, Welsh, & Dean, 1997; Biner, Dean & Mellinger, 1994; Biner, Summers, Dean,
Bink, Anderson, & Gelder, 1996; and Biner, Welsh, Barone, Summers, & Dean, 1994).
Even though this instrument was used repeatedly, the questions were developed
specifically for the telecourse environment.

A number of authors developed instruments that evaluated attitude in addition to
another construct. Examples include the evaluation of satisfaction and motivation
(Hamrick, 2004), satisfaction and transactional presence (Shin, 2003), and satisfaction
and the perceptions of the importance of communication (Archamboult, 2003). Schell
and Thornton (1985) developed a questionnaire for the Canadian distance education
context which evaluated multiple factors in addition to satisfaction, such as reasons for
enrolling, costs and benefits, alternatives to the distance courses being offered by the
particular university being studied, etc. Gunawardena and Zittle (1997) developed the
Global Education Questionnaire, which in addition to attitude and satisfaction, measured
social presence, active participation, barriers to participation, capability for computer
medicated communication (CMC), perceptions of equal opportunity, adequate CMC
training, technical skills, and overall satisfaction. McKay (2003) developed an
instrument for the purpose of finding the factors which contribute to satisfaction.

A number of researchers did studies with attitude surveys without reporting any
validity investigations involving the instruments that they utilized. Examples include the

Several instruments were very contextualized to a particular population, such as a questionnaire developed specifically to evaluate Web-based nursing courses (Thurmond, Wambach, Connors, & Frey, 2002), a questionnaire specifically developed to evaluate distance education in the country of China (Li & Chen, 1999), or the Student Perception Questionnaire (SPQ) (St. Pierre & Olsen, 1991) which was developed for, and had questions specifically relating to, correspondence courses.

The Distance Education Learning Environments Survey (DELES) was an instrument that was validated and developed for use in distance education delivered post-secondary courses (Walker, 2003). This instrument was designed for use in asynchronous environments to assess instructor support, student interaction and collaboration, personal relevance, authentic learning, active learning, and student autonomy.

Kole (1987) developed an instrument to assess adult student attitude toward independent learning. The adults for whom this instrument was developed were doctoral students who were distance learners in field-based environments. Kole’s (1987) instrument was found to be both reliable and valid in determining adult attitudes toward independent learning. The creator of this instrument noted its potential value as an instrument that could be used with adults in other settings to evaluate their attitudes toward independent learning.

Several commercial instruments to evaluate attitude exist. The IDEA Student Ratings of Instruction (The Individualized Development & Educational Assessment
Center, 2005) has as its purpose the evaluation of teaching, learning, and improving. The College Student Survey (Cooperative Institutional Research Program, 2005), which is also a commercially available instrument, was developed to measure a variety of constructs. The constructs it measures include: academic achievement and engagement; student involvement; cognitive and affective development; student values, attitudes, and goals; degree aspirations, career plans, and uses of technology. Another commercial instrument, the Noel-Levitz Student Satisfaction Survey (Noel-Levitz, 2005), measures both student satisfaction and student priorities.

Misanchuk (2003) developed an instrument that provided a general measure of student satisfaction that was appropriate for adult distance students in a post-secondary educational context. Although it was initially designed as a method of determining satisfaction for students in an online master’s degree program, specifically an educational technology online master’s program, the questions were general enough that they could be used for a variety of learners in different contexts.

Summary of attitudes in distance education literature. In reviewing the literature regarding student attitudes in the distance education environment, a number of themes emerged. The theme that appeared most important was that of a relationship between learner attitudes and learner autonomy/independence.

Research exists that supports the relationship of learner attitudes to learner autonomy and control. Rangecroft, Gilroy, Long, & Tricker (1999), who were discussed earlier, noted that the opportunity for flexible study was most associated with learner satisfaction. Richardson, Long, and Woodley (2003), who were also discussed earlier, noted that high ratings on student choice were found to be associated with higher
satisfaction ratings. Choice has been noted to be related to control and independence (Garrison and Baynton, 1987). Also, as noted earlier, the strongest predictor of satisfaction in a study done by Thurmond, Wambach, Conners, and Frey (2002) was variety in ways of assessment. Having variety in ways of assessment would seem to be related to student control and independence (Garrison & Baynton, 1987) and subsequently autonomy (Moore & Kearsley, 2005). These findings suggest that autonomy and independence are of primary concern in the distance learning environment. This is consistent with the writings of Saba (2000) who notes that learner independence and autonomy should be given primary consideration in the distance learning environment. Unfortunately, research investigating the relationship between the variables of autonomy/independence and attitudes, is minimal. The importance of learner autonomy and independence in distance learning environments is significant and deserves much more attention and investigation. Further investigation into the relationship between learner autonomy and attitudes is greatly warranted.

Even though autonomy/independence appeared to be the most significant factor for learner independence, the literature in this area was limited. The area of literature that was most prolific however, was that of interaction and its relationship to satisfaction. Fulford and Zhang (1993) found that increased perceptions of interaction were associated with increased satisfaction. Of the various types of interactions investigated, student-teacher interaction appeared to be most associated with positive attitudes and was found repeatedly (i.e. Biner, Barone, Welsh, & Dean, 1997; Biner, Dean & Mellinger, 1994; Rangecroft, Gilroy, Long, & Tricker, 1999; St. Pierre & Olsen, 1991; Swan, 2001; Thurmond, Wambach, Conners & Frey, 2002; and Woods & Ebersole, 2003). Research
investigating student-student interaction was also found to be repeatedly associated with attitudes (Biner, Welsh, Barone, Summers, & Dean, 1997; Rangecroft, Gilroy, Long, & Tricker, 1999; Shin, 2003; Swan, 2001; and Woods & Ebersole, 2003). An association between attitudes and institutional interaction was also found (Biner, Dean, & Mellinger, 1994; Gunawardena and Zittle, 1997; Rangcroft, Gilroy, Long, & Tricker, 1999; Richardson, Long, & Woodley, 2003; Shin, 2003). Other positive relationships identified were between student attitude and performance levels (Biner, Barone, Welsh, & Dean, 1997), perceived learning (Swan, 2001), academic engagement (Richardson, Long, & Woodley, 2003), and better academic performance (Biner, Welsh, Barone, Summers, & Dean, 1997).

The meta-analysis performed by Allen, Bourhis, Burrell, and Mabry (2002), which found that student-satisfaction for distance educational settings is comparable with satisfaction in traditional educational settings is significant. Hopefully this meta-analysis will encourage future researchers in exploring different research questions and not continue the practice of repeating questions for which research has already answered.

In reviewing this material, it was obvious that there have been repeated research studies indicating a relationship between interaction and attitude in the distance setting. Especially interesting was the repeated findings of the apparent importance of student-teacher interaction. Since student-teacher interaction is required for dialogue to occur, this research suggests that students may be more satisfied in distance educational situations with high dialogue. Since high dialogue distance education situations are associated with low transactional distance, and since low transactional distance is associated with low autonomy, then it makes one wonder if the majority of the students in
these studies had low autonomy. Alternatively, since it is unlikely that these studies included only learners with high levels of autonomy, perhaps only learners with lower levels of autonomy were less satisfied with higher transactional distance environments.

As Saba (2000, p1) has noted, “first and foremost, distance education is about the student and her/his independence in learning”. Learner autonomy should be given primary consideration in the distance learning environment (Saba, 2000). Knowles (1980, p.43) noted, “It is a normal aspect of the process of maturation for a person to move from dependence toward increasing self-directedness, but at different rates for different people in different dimensions of life. Teachers have a responsibility to encourage and nurture this movement”. Perhaps there are certain, as yet unidentified predisposing learner characteristics, such as multiple intelligences, that influence the degree of autonomy of which learners are capable, and which impact attitudes toward independent learning. If this is the case, then distance learning interventions could be initiated, so that attitudes toward independent learning could improve.
Chapter III

Methodology

The aim of this study was to determine if learners who have experienced a high transactional distance environment which engages a variety of intelligences demonstrated positive attitudes toward independent learning, and whether there are positive relationships between strengths in one or more of the multiple intelligences and attitudes toward independent learning.

Research Design

Survey research (Babbie, 1998, p.256) was used in this study. Survey research is one of the most prevalent types of research associated with dissertations (Hill, 2001). The use of surveys facilitated the data collection process, and allowed for data collection from participants at a geographic distance. Survey methods allowed for the collection of an adequate breadth of information so that the study variables could be quantified. It also facilitated confidentiality of the participants.

Variables

Dependent (response) variable. The dependent variable for this study was attitude toward independent learning. This form of measurement was ordinal. Babby (1998, p.142) states that “variables with attributes we can logically rank-order are ordinal measures”.

Independent (predictor) variables. The independent variables were the ratings of each of the eight multiple intelligences strengths for each individual in the study. The eight intelligences for which strengths were measured were: musical, kinesthetic, logical-
mathematical, spatial, linguistic, interpersonal, intrapersonal, and naturalistic. These intelligences perceptions also had a form of measurement that was ordinal.

**Research Questions:**

The formal research questions were:

A. Do learners who successfully progress in a high transactional distance environment which engages a variety of intelligences demonstrate positive attitudes toward independent learning?

B. For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between one or more of the intelligences and attitude toward independent learning?

This question will result in eight sub-questions:

1. For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between linguistic intelligence and attitude toward independent learning?

2. For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between logical-mathematical intelligence and attitude toward independent learning?

3. For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between spatial intelligence and attitude toward independent learning?

4. For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between bodily-kinesthetic intelligence and attitude toward independent learning?
5. For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between musical intelligence and attitude toward independent learning?

6. For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between interpersonal intelligence and attitude toward independent learning?

7. For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between intrapersonal intelligence and attitude toward independent learning?

8. For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between naturalistic intelligence and attitude toward independent learning?

**Measurement**

**Unit of analysis.** Babby (1998, p.93) notes that “individual human beings are perhaps the most typical units of analysis for social scientific research. We tend to describe and explain social groups and interactions by aggregating and manipulating the descriptions of individuals.” Individual adults were the units of analysis for this investigation.

**Sampling.** Babby (1998, p.109) states that “we are almost never able to study all the members of the population that interests us, however, and we can never make every possible observation of them. In every case, then, we will select a sample from among the data that might be collected and studied”. A convenience sample of adults who were affiliated with the physician assistant program at the Pennsylvania College of Technology
(PCT), including current students and recent graduates (graduated within the past three years), who have all had similar independent distance learning experiences, were used for this study.

Population. Babbie (1998, p.109) has noted that “the population for a study is that group (usually of people) about whom we want to draw conclusions”. The population for this study was all the Pennsylvania College of Technology (PCT) physician assistant students and graduates who have experienced independent learning experiences similar to this sample.

Describing the transactional distance

The model that was used to categorize and describe the transactional distance of the learners in this study was Braxton’s (1999) refinement of Moore’s (1983) typology for distance education programs. A description of this model is in the transactional distance section of the literature review chapter in this document.

Participants and context

The American Academy of Physician Assistants (2005, p.1) provides the following description of physician assistants: “Physician assistants (PA’s) are health care professionals licensed to practice medicine with physician supervision. PA’s employed by the federal government are credentialed to practice. As part of their comprehensive responsibilities, PA’s conduct physical exams, diagnose and treat illnesses, order and interpret tests, counsel on preventive health care, assist in surgery, and in virtually all states can write prescriptions. Within the physician-PA relationship, physician assistants exercise autonomy in medical decision making and provide a broad range of diagnostic
and therapeutic services. A PA’s practice may also include education, research, and administrative services”.

The ability for autonomy is a necessity for all physician assistants. Physician assistants, whether graduated or in training, spend a significant portion of their time in independent learning environments. Even before being admitted to a physician assistant program, most students are required to demonstrate their familiarity with the environment and culture of the health care setting. This is accomplished entirely through independent learning. As students, they are placed in field-based settings where they are required to function as independent learners in a distance learning environment. In these settings, they need to identify learning goals and mobilize processes and available resources to reach these goals. Virtually all employment settings require graduate physician assistants to become certified, and maintain certification. Certification maintenance is accomplished through processes that include distance education and independent learning. Beyond certification maintenance requirements, graduates need to continuously keep updated regarding medical advances so that they may provide the best possible care to their patients. Much of this occurs via distance education and independent learning. In addition, many physician assistants who have graduated with a baccalaureate degree pursue a physician assistant related master’s degree through distance learning.

The convenience sample for this study consisted of adults who were affiliated with the physician assistant program at the Pennsylvania College of Technology (PCT), including students and graduates who have all had similar independent distance learning experiences in common. PCT is an affiliate of The Pennsylvania State University (PSU). This technical college is located in the small city of Williamsport with a population of
approximately thirty-thousand which is located in rural north central Pennsylvania. The PCT offers certificate, associate, and bachelor’s degree programs. Enrollments at this institution have been increasing. Fall of 2004 had the largest enrollment in PCT’s fifteen year history, showing a 1.7% increase from the previous year to a total enrollment of six-thousand, three-hundred, and sixty-three.

The PCT physician assistant (PA) major is a ten semester, one-hundred and fifty-two credit, bachelors degree program. The independent learning that students and graduates from this program experience is similar to that experienced by PA students and graduates from other physician assistant programs. These independent learning activities include obtaining a familiarity with the health care environment and culture prior to their professional education, field-based independent learning as a key part of their professional training, and the maintenance of their certification as graduates. The varying technologies used for these independent learning activities include, but are not limited to: texts, journals, e-mail, CD’s, videos and WebCT. These structured activities include well-defined learning objectives, schedules, policies, and procedures.

All the adults in the study sample had experienced field-based distance education, independent study, profession-related courses. These adult learners had responsibility for meeting many of their learning objectives through independent learning activities. These independent learning activities were overwhelmingly instructor driven. According to Braxton’s (1999) definition of structure, these experiences are considered high structure (+S).

Although modern technologies, such as e-mail and Web-CT existed, multi-way communication was typically not experienced by these independent learners in their
field-based settings. Any multi-way communication that occurred involving course content among these learners was usually very limited and often incidental. It usually occurred during their meetings on campus which happened approximately every four-six weeks at the end of each of the independent learning courses they were required to take during their entire senior year. Interactions which occurred in the field-based environments between the students and other health care workers may, or may not have, met Moore’s (1993) definition of dialogue. These interactions, if and when they occurred, were believed to be relatively limited due to the time constraints of the working environment. The student-teacher interactions that did occur were often oriented toward discussions pertaining to satisfaction (or dissatisfaction) levels, or related to course procedures and requirements, and not toward improved understanding of content (K. Wiegand, personal communication, May 5, 2005). Although the communications initially appeared to best fit Braxton’s (1999) definition of medium dialogue, it was noted that the contents of these student-teacher interactions, for the most part, tended to not fit Moore’s definition of dialogue (1993). Therefore, although these independent learning environments appeared initially to fit into Braxton’s (1999) description of medium dialogue (D), further scrutiny of these interactions appear to place these environments on the lower end of the dialogue spectrum (-D).

**Transactional distance.** Meeting course objectives was each learner’s responsibility. These adults were required to be independent and autonomous enough to take advantage of their environment and their resource materials so that their learning objectives were met. They had to identify the processes and resources they needed to
reach their goals. They needed to mobilize their energy and attention to attain these learning objectives.

Examination of the degrees of dialogue and structure present in these independent learning environments revealed that, according to Moore’s typology (1983) and/or Braxton’s (1999) refinement, they had relatively high structure (+S) and relatively low dialogue (-D). “Programs that fall below the x-axis and represent low dialogue are more distant than those that are above the x-axis and represent higher levels of dialogue” (Braxton, 1999, p.6). These environments, when observed in the graphical representation of Braxton’s (1999) refinement of Moore’s typology (1983), showed that in general, the independent learning environments that these adults experienced fell below the x axis and to the right of the y axis, in the lower right quadrant of the graph. See chapter II in this document. These high structure/low dialogue environments were therefore on the higher end of the transactional distance spectrum. This high degree of transactional distance required students to have a relatively high degree of autonomy and independence in these environments.

Multiple intelligences engaged. Examination of the field-based independent learning environments for these learners revealed that a variety of MI’s appeared to be engaged. The traditionally valued intelligences, those of linguistic and logical-mathematical, appeared to be utilized greatly in these settings. These adults were required to communicate pertinent medical information both orally and in writing. The information they communicated needed to be accurate, precise, and concise. In addition, students were required to read extensively so that their learning objectives could be met, and also so that they could be prepared for written and practical exams when they
Logical-mathematical intelligence also appeared to be routinely utilized as students used science and logic to identify the cause and effect of diseases based on patient signs and symptoms. Mathematic skills were utilized for calculations related to the diagnosis and treatment of patients (i.e. calculating body mass index to determine obesity or calculating medication dosages).

Other intelligences, beyond the traditionally valued intelligences, also appeared to be utilized in these settings. Bodily-kinesthetic intelligence appeared to be utilized when physical examination maneuvers were performed, such as when physically examining the abdomen, or looking in a child’s ear. These adults also appeared to use their spatial intelligence as they needed to visualize in their mind where parts of the anatomy were in three dimensions while examining their patients. This was necessary so that they could identify the locations of diseased tissues and organs based on the information obtained from the medical history or physical examination. Spatial intelligence also appeared to be utilized when these learners used WebCT to interact with the course instructors, or download course related materials. Even naturalistic intelligence appeared to be utilized in these field-based environments. Adults needed to be able to identify normal from abnormal and to categorize the abnormalities so that an appropriate diagnosis may be found. They also needed to be able to categorize differences in normal versus abnormal based on age and lifespan.

The personal intelligences appeared to be very important to these learners in these settings. Interpersonal intelligence appeared to be required so that these individuals could appropriately appreciate the emotions and plight of others. These individuals needed to be able to interact effectively with others, both patients and other health care
workers, and analyze the reactions of others. Intrapersonal intelligence appeared to be needed because these learners needed to have the capability of self-reflection and self-analysis. They needed to not only self-reflect and self-analyze regarding their actions and interactions with patients and other health care providers, but they also needed to self-reflect and self-analyze regarding how well they were “fitting in” in their field-based environment. They needed to be able to reflect upon and evaluate their own choices and actions, as well as understand their own thoughts and feelings. Being able to have the insight necessary to monitor their own performance and progress, as well as the ability to make any necessary changes in actions and behaviors, was of utmost importance. This researcher has observed that the few adults that have had difficulties progressing during their field-based independent learning experiences appeared to have these difficulties mostly due to deficiencies related to their intrapersonal and/or interpersonal intelligences.

The only intelligence that appeared to be underutilized was musical intelligence. The only example of these learners potentially using some degree of musical intelligence is when they listen to the rate and rhythm of heart sounds. Otherwise, musical intelligence did not seem to be engaged.

Sample size

As is common in social science research, a controlled experiment was not possible, and sample size difficulties can arise. This study required a sample size large enough so that the potential for rejecting the null hypothesis for the second research question existed. This null hypothesis stated that: Learners who successfully progress in this high transactional distance environment will not have a positive relationship between one or more of the intelligences and attitude toward independent learning. “One of the
best ways to increase the chance of rejecting the null hypothesis would be to increase the sample size. Unfortunately, increasing the sample size also has the negative effect of taking more time and costing more money and, in some cases may not be practical” (Roberts, 1996, p.330).

The minimum number of adults that should be surveyed in order to have the potential to reject the null hypotheses “depends on the size of the pool of potentially useful explanatory variables at this stage. More cases are required when the pool is large than when it is small. A general rule of thumb states that there should be at least six to ten cases for every variable in the pool” (Neter, Kutner, Nachtsheim, & Wasserman, 1996, p. 330). Based on the number of explanatory variables in this study and the expected number of adult participants, it appeared that there were enough participants to perform statistical regression on each of the explanatory variables (intelligences) individually. Also, there appeared to be enough participants to do multiple regression and analyze the intelligences together in their ability to predict the response variable (attitude toward independent learning), although multiple regression required that some (about half) of the predictor variables (intelligences) with the lowest p values be dropped from the final regression analysis.

Since there were eight predictor variables, and six to ten observations were required for each variable; this meant that responses would ideally consist of at least forty-eight to eighty respondents for multiple regression analysis to analyze the intelligences together in their ability to predict the response variable (attitude toward independent learning). Unfortunately, a sample size that would result in this many responses was not practical. Only a limited number of individuals with a reasonable
likelihood of participating were available to this researcher. A smaller response number was reasonable, if one considered the probability that not all eight predictor variables would show statistical significance. Since it was likely that some of the variables would be dropped from the final analysis, a smaller target sample size could be sufficient. If several predictor variables failed to show statistical significance, they would be dropped from the final analysis. If half, or almost half, of the predictor variables were dropped, then the predictor variables would decrease from a total of eight, to a total of four or five. If six to ten observations were required for each of the explanatory variables, and these variables are reduced to four to five in the final analysis, then a sample of twenty-five to thirty appeared to be a more potentially “doable” response number. This response number was much more reasonable and possible for an expected minimum participation number for this investigation.

Response rate needed to be considered. Babbie (1998) has stated that as a general rule of thumb, a fifty percent response rate is adequate for analysis and reporting. Since it has been determined that twenty-five to thirty responses should be present to improve the potential of rejecting the null hypothesis, then it seemed reasonable from a mathematical perspective to make the attempt to identify at least fifty to sixty adults to survey. The sample available for this study was expected to consist of approximately seventy adults. This number should therefore be sufficient. In an effort to encourage participation, adults who completed and returned both surveys had the option of having the results of the MIDAS provided to them.
Instrumentation

Collection of data was done through survey instruments. “One of the most prevalent types of research associated with theses and dissertations is survey research. This type of research uses questionnaires or similar types of instruments for data collection with responses in either written or oral interview format” (Hill, 2001, p.201). The specific method of researching the research questions in this study was through utilization of the questionnaires.

**Adult Attitudes Toward Independent Learning Scales (ATTILS).** The Adult Attitudes Toward Independent Learning Scale (ATTILS) is a simple paper and pencil questionnaire which was designed to measure adult attitudes toward independent learning (Kole, 1987). The reading and comprehension ability necessary to complete the instrument appears comparable to that required for the MIDAS (which is stated to be at or greater than the fifth grade). The assessment materials include the questionnaire and an answer sheet. There is no time limit. Each question has five response choices associated with a numerical value: “almost never, seldom, sometimes, often, and almost always” (Kole, 1987, p.119). Higher scores reflect better attitude. Each respondent’s attitude score will be totaled. The minimum possible score is zero, and the maximum possible score is two-hundred and fifty. It is estimated that the questionnaire will take respondents approximately ten to fifteen minutes to complete.

The ATTILS questionnaire was the result of an investigation which had the purpose of creating a valid and reliable instrument for field-based adult students involved in a distance education experience. The investigation was pursued in the hope that such an instrument could assist the staff from Nova University in counseling field-based
doctoral students in the Programs for Higher Education (PHE) program with less than ideal attitudes toward independent learning. The investigation was pursued in several phases. Initially a survey was developed to determine the independent learning needs for adults in the first two years of a distance doctoral program. As a result, seventeen skill areas were identified as significant components of a highly independent learning style. Meetings with faculty, students, research advisors, research fellows, and administrators resulted in the identification of ten categories. “The ten components were: (1) ambition, (2) creativity, (3) curiosity, (4) decisiveness, (5) enthusiasm, (6) flexibility, (7) goal orientation, (8) persistence, (9) self-confidence, and (10) self-control” (Kole, 1987, p.58). Attitude items for a survey instrument were subsequently developed.

Adult educators had expressed a need for this instrument so that adults who demonstrated poorer attitudes toward independent learning could be identified. Once these individuals were identified, it was believed that intervention strategies could be instituted for the purpose of improving their attitudes. Intervention strategies suggested included: increased faculty and advisor involvement, orientation programs, and independent learning skills programs. It was also believed that adults with high independent learning could be distributed among the students with lower attitudes so that they could be role models.

The initial survey instrument was mailed to twelve clusters with a total of one-hundred and sixty-seven students. The response rate was seventy-one percent. “In conventional usage, the term validity refers to the extent to which an empirical measure adequately reflects the real meaning of the concept of consideration” (Babbie, 1998, p.133). Factor analysis demonstrated that the instrument had construct validity. “In the
abstract, reliability is a matter of whether a particular technique, applied repeatedly to the same object, would yield the same result each time” (Babbie, 1998, p. 129). The resulting final fifty item instrument underwent further investigation. This final Adult Attitudes Toward Independent Learning Scale (AATILS) instrument was subsequently administered and its reliability was estimated. The reliability coefficient was found to be 0.94. “The final instrument is composed of 50 items that resulted from the examination of the factor loadings. Since these 50 items were selected as a result of the factor analysis and were interpreted to describe one scale, the instrument appears to have construct validity. As mentioned earlier, the reliability coefficient was .94. Therefore, the final form of the instrument being both valid and reliable is appropriate to measure the attitudes toward independent learning of adult students” (Kole, 1987, p.73).

Recommendations for the instrument included administering it to future program students and developing appropriate interventions for students with lower attitudes toward independent learning. The creator of this instrument noted that although it was created for the PHE student population at Nova, it may also be appropriate for use with other adult populations.

This instrument is significant as it was developed with the understanding that adults should move from a state of dependence to a state of independence in their learning consistent with andragogy. The author recognized that not all adults are independent learners and that identifying those that are not was important. The need for a higher degree of independent learning was present for the context of the investigation.

The context for which this instrument was developed was one where students were required to be independent learners in a field based environment separated
geographically from their teachers and advisors. The students in this context were, for the most part, geographically isolated as they were distributed throughout the United States and several other countries. Ability for independent learning was critical to their success in their educational program.

This need for a higher degree of independent learning is also present in the context of this investigation. The adults in the context of this investigation have many similarities to those for which this instrument was developed. Pennsylvania College of Technology physician assistant students have a critical need to become independent learners so that they can successfully progress in the program and demonstrate an appropriate level of learner autonomy in their field based environments prior to, and after, graduation. The need for being independent learners after graduation is crucial so that graduates may keep abreast of medical advancements and maintain certification, and so that they may provide the best care possible for their patients.

Because of these contextual similarities, this instrument appears ideal, and uniquely suited, for this investigation.

**Multiple Intelligences Developmental and Assessment Scales (MIDAS).** “The Multiple Intelligences Developmental Assessment Scales is a simple paper-and-pencil questionnaire/interview for adults, adolescents and children with a reading and comprehension ability of at least fifth grade” (Shearer, 1996, p.19). Assessment materials include the questionnaire and answer sheet, and the instrument does not have a time limit. Each question has six response choices and unique responses to match the questions content. “Percentage scores for each scale are calculated from the total number of responses using a scoring matrix derived from factor analytic studies” (Shearer, 2004,
p.5). Therefore, questions that are not answered are excluded from the scoring.

“Typically 35-45 minutes are adequate for self-completion” (Shearer, 1996, p.20).

A MIDAS profile provides a reasonable estimate of a person’s intellectual disposition in each of the eight constructs (Linguistic, Logical-mathematical, Spatial, Musical, Kinesthetic, Naturalist, Interpersonal, and Intrapersonal). The MIDAS is not an objective test of intelligence because the findings are compiled from the perceptions of the person or a knowledgeable observer. It was decided, however, to assess its reliability and validity against standards used to evaluate objective tests. In this way, reasonable estimates regarding the relationship of a MIDAS profile to reality might be inferred.

Shearer (1996) developed the MIDAS over a period of six years. Both rational and empirical methods were used for test construction utilizing MI theory as a theoretical basis. Items were evaluated by subject experts, including MI’s founder, Howard Gardner. Interviews were conducted to provide feedback regarding the questions.

Multiple studies examined the internal consistency of the items within each scale (Shearer, 1996, p.65). The temporal stability and inter-rater reliability of the MIDAS were evaluated and found to be satisfactory.

Shearer also made cultural comparisons regarding his instrument. The resulting data demonstrated strong indications that the MIDAS was not prone to cultural bias. The results were found to be reliable for both African-American and Caucasian students (Shearer, 1996, p. 68).

The validity of the MIDAS has been studied in a series of investigations. Initial construct validity was found though investigations aimed at determining if the MIDAS was able to distinguish between seven distinct constructs as initially described by
multiple intelligences theory (Shearer, 1996, p.72). The construct validity for the eighth, naturalistic intelligence, was also determined (Shearer, 1996, p. 72). “The MIDAS scales have been found to have adequate discriminate ability for their designated areas. Validity was also investigated in terms of how well the MIDAS scales correlated with objective tests involving similar constructs” (Shearer, 1996, p. 72). These objective tests included aptitude, cognitive, and achievement tests, as well as an interest inventory. “The resulting correlational values and their pattern between MI main scales and cognitive, achievement and aptitude tests met or exceeded research expectations” (Shearer, 1996, p.74).

MIDAS scales were also compared to vocational interest scales as some of the MIDAS scales were difficult to equate with standard tests of cognition or achievement. Results demonstrated significant correlations.

The validity of the intrapersonal MIDAS scale was investigated by comparing two different, contrasting groups. One was a group of psychiatric patients, and the other was a group of counselors with a graduate level of education. The difference between these scores was statistically significant at the p<.05 level.

Additional research was undertaken to investigate “how well college students’ self report would compare to the “expert ratings” provided by their instructors in order to determine the external validity of the assessment” (Shearer, 1996, p.77). This research determined that students’ self-reports of MIDAS scores and professors’ ratings agreed 86% of the time, within one category. Results from these college students were then further evaluated to see if students in certain majors scored higher on certain intelligences compared to others. “The overall magnitude of the mean MIDAS scores, as well as their
patterns, are logically consistent with what would be expected of college students thought
to be either high or low in specified skills” (Shearer, 1996, p.79).

Since naturalistic intelligence was added later then the other seven intelligences,
its validity was determined separately. Factor analysis included comparing scores from
the naturalistic scale between groups and analyzing this information against the
information from the other MIDAS scales and items. Analysis “revealed patterns that are
logically consistent with what MI theory would predict” (Shearer, 1996. p.79). The
correlations between the naturalistic scale and the other MIDAS scales was performed
and results demonstrated support for the naturalistic scale to be a different construct from
the other MIDAS scales.

Despite findings from a recent large scale factor analysis resulting in the
elimination of several items due to such reasons as redundancy or poor reliability,
overall, the results of this recent analysis continued to support the structure of the
MIDAS (Shearer, 2004).

Protection of human subjects

Prior to soliciting requests for adult participation in this project, an application for
the use of human participants for social science research was submitted to the Office for
Research Protections at The Pennsylvania State University. Informed consent was
obtained through an institutional review board approved consent form.

Procedures

A convenience sample of adults who had experienced field-based independent
study and independent learning as part of their educational experience from the
Pennsylvania College of Technology’s physician assistant program were asked to
participate and have their multiple intelligences perceptions and attitudes evaluated. Multiple intelligences profiles were determined based upon student responses to the Multiple Intelligences Developmental Assessment Scales (MIDAS). Attitude was determined based upon responses to the Adult Attitudes Toward Independent Learning Scale (AATILS).

**Survey Administration.** Each member of the convenience sample was provided a brief description of the study. These adults were provided the Adult Attitudes Toward Independent Learning Scale (AATILS) (Kole, 1987), the Multiple Intelligences Development and Assessment Scale (MIDAS) (Shearer, 1996), an answer sheet for the MIDAS, and a consent form. The consent form had institutional review board approval. The researcher assigned fictitious names and identification numbers for the adult participants. The surveys were hand delivered to adults for which this researcher had face-to-face access. Adults who were not easily accessible in a face-to-face environment had their surveys and consent form mailed to them, with a self-addressed stamped envelope included for the convenience of the respondents. Follow-up mailings with a new copy of the consent form, the questionnaires, and a self-addressed stamped envelope were sent two weeks later for those who did not respond. Participation was encouraged by offering the participants the option of receiving their individual MI profile results. Confidentiality was maintained throughout this investigation.

**Data Collection.** All completed surveys, both the ATTILS and the MIDAS, were returned to the researcher. The MIDAS questionnaires were forwarded to the MIDAS testing center for evaluation. Substitute names and identification numbers were utilized
to maintain confidentiality. MIDAS results for all participants were then forwarded by the testing center to the researcher.

Analysis. The researcher received the multiple intelligences results from the MIDAS testing center. The testing center reported results as percentage scores for each of the eight scales (linguistic, logical-mathematical, spatial, musical, kinesthetic, naturalist, interpersonal, and intrapersonal) for each individual.

The researcher employed the process for the analysis of the attitude data herself. The scores for each question on the AATILS survey were summed to determine a final total response score.

Statistics. The variables for this study consisted of eight predictor variables (the perceived multiple intelligences: linguistic, logical/mathematical, bodily-kinesthetic, spatial, musical, interpersonal, intrapersonal, and naturalistic), and one response variable (attitude).

Data generated from responses to the MIDAS and the AATILS surveys participants could be entered into a statistical software program (i.e. Minitab). The average total score and average score per question for the AATILS survey could be calculated. It was expected that the scores would show that these learners had positive attitudes toward independent learning. When interpreting the AATILS survey, the greater the score, the better the learners attitude toward independent learning. The AATILS consisted of 50 questions with a likert-scale answer where 1 = almost never, 2 = seldom, 3 = sometimes, 4 = often, and 5 = almost always. For the purposes of this study, positive attitudes toward independent learning were defined as an average total score greater than 150, or an average score per question as greater than 3. Multiple regression
could be utilized to assist in determining whether a positive relationship between one or more of the intelligences and attitude toward independent learning existed. The main purpose of multiple regression is “to predict some criterion variable better” (Roberts, 1996, p.142). A regression model is typically utilized to express the tendency of a response variable (attitude) to vary with a predictor variable, or variables (each of the perceived multiple intelligences), in a systematic manner. Multiple linear regression would be used because of multiple predictor variables. Multiple linear regression would be utilized to predict attitude based on perceived multiple intelligences. Once regression assumptions were found to be present, a regression equation and analysis of variance could be generated for evaluation. After getting these results, consideration will be made regarding whether to refit the model leaving out the variables with high p-values.

**Study limitations**

The study was limited to a convenience sample of adults who had experienced similar independent study experiences as a part of their physician assistant education at the Pennsylvania College of Technology. Because of this type of sample, it was known that it would not be possible to generalize conclusions. The number of respondents in this study was not enough to support a multiple regression model with eight predictor variables. The number of participants was enough to support four predictor variables, so refitting of the regression model was planned to decrease the number of predictor variables for multiple regression analysis. An increased sample size in future research could allow for a better study, and perhaps no need for the refitting of the regression equation to find statistical significance for the predictive potential of one or more of the intelligences to predict attitude toward independent learning. A future study with an
increased sample size may also find additional intelligences of statistical significance which would be predictive of attitude toward independent learning for learners in this context. Random assignment was not possible as this researcher’s access to participants was limited. It was not possible to find or develop an experiment and control group for a true experimental design. A large variety of learner variables, in addition to those being investigated existed. These variables included, but were not limited to: socioeconomic status, marital status, number and ages of children, prior work or educational experience, personality, or age. In addition, variables which have been previously associated with attitude in the distance setting such as interactions, performance levels, academic engagement, and perceived learning also could not be controlled. The attitude survey has not been widely used, and its validity and reliability have not been as well tested as that of the multiple intelligences survey. This study assumed that learners with higher levels of independence and autonomy would demonstrate positive attitudes toward independent learning.
Chapter IV

Results and Analysis of Data

The purpose of this study was to determine if learners in a high transactional distance environment which engages a variety of the intelligences have positive attitudes toward independent learning, and whether they demonstrate a positive relationship between one or more of their multiple intelligences and attitudes toward independent learning.

Data collection and results

A group of adults affiliated with the Pennsylvania College of Technology’s physician assistant program, including current students and recent graduates (within the last three years) made up the sample for this study. This was a convenience sample, selected in part, on this researcher’s ability to obtain the permission and access necessary to carry out this research. In addition, this researcher wanted to use this particular sample so that she may have the opportunity, at some future date, to implement changes based on the results of this study, if so warranted. The number of adults identified in this sample was seventy. Of these seventy adults, sixty-five were able to be surveyed, as five of them were unable to be contacted due to a lack of current address information. Of the sixty-five adults who were provided surveys, forty-six responded, resulting in a response rate of 71%.

The AATILS responses were analyzed and each participant’s AATILS score was calculated, and rechecked for accuracy, by the researcher. The MIDAS responses were forwarded to the MI Research and Consulting, Inc. for analysis of this commercially available instrument. Fictitious names and identification numbers were utilized to protect
the identity of the respondents. Results of the MIDAS surveys were subsequently returned to this researcher. Adults who had indicated that they wanted the results of their individual MIDAS profile were provided this information.

Data was entered into Minitab with each column representing a variable (i.e. column 1 represented ‘attitude’, column 2 represented ‘linguistic intelligence’, ‘logical-mathematical intelligence’, etc.). Nine rows of data resulted in Minitab.

Research question number one posed the following question: Do learners in a high transactional distance environment which engages a variety of intelligences demonstrate positive attitudes toward independent learning? Evaluation of the data received from the respondents on the Adult Attitudes Toward Independent Learning Scales (AATILS) demonstrated that these learners who had successfully progressed in an independent learning environment which had high transactional distance and engaged a variety of the intelligences did, in fact, show scores consistent with positive attitudes toward independent learning. The AATILS survey utilized a one through five scale where: 1 – almost never, 2 – seldom, 3 – sometimes, 4 – often, and 5 – almost always. The survey had a maximum possible score of 250. For this study, positive attitudes toward independent learning was defined as an average score per item of greater than 3, and an average total score of greater than 150. The results of this study showed that the mean total score was 196. Figure 3 below shows a histogram which represents the frequency distribution of the scores from the AATILS. The mean score per item was 3.92. These results demonstrated that these learners in this high transactional distance environment which engages a variety of intelligences demonstrated positive attitudes toward independent learning.
A regression model was needed to test whether the different intelligences affect the attitude score for the second research question. The regression model was used to express the tendency of ‘attitude’ (response variable) to vary with the eight ‘multiple intelligences’ (predictor variables) in a systematic manner. Multiple linear regression was used because more then one predictor variable was present. The assumptions for linear regression were found to hold for this model. The regression equation output is noted below.

Table 3: Output from the Multiple Linear Regression Model: Regression Equation.

| Regression equation is: | 133-0.081 music + 0.261 kinesth - 0.074 log-math - 0.270 spatial + 0.330 linguistic + 0.282 interpersonal + 0.551 intrapersonal + 0.124 natural |
The interpretation of the regression equation that was generated demonstrated that:

- For every point increase in musical intelligence, the mean attitude score decreased by 0.081, when all other intelligences were kept constant.
- For every point increase in kinesthetic intelligence, the mean attitude score increased by 0.261, when all other intelligences were kept constant.
- For every point increase in logical-mathematical intelligence, the mean attitude score decreased by 0.074, when all other intelligences were kept constant.
- For every point increase in spatial intelligence, the mean attitude score decreased 0.270, when all other intelligences were kept constant.
- For every point increase in linguistic intelligence, the mean attitude score increased 0.330, when all other intelligences were kept constant.
- For every point increase in interpersonal intelligence, the mean attitude score increased 0.282, when all other intelligences were kept constant.
- For every point increase in intrapersonal intelligence, the mean attitude score increased 0.551, when all other intelligences were kept constant.
- For every point increase in naturalistic intelligence, the mean attitude score increased 0.124, when all other intelligences were kept constant.

The coefficient of determination (R-Sq) is reported as a percentage which shows how much of the variability in the response variable (attitude) is explained by the predictors (the eight multiple intelligences). In this model, the value of R-square is 35%. This means that 35% of the variability of attitude is explained by the eight intelligences. The adjusted coefficient of determination (the adjusted R-Square) is designed to cure one
flaw of R-Square: as more and more variables enter a model, the R-square becomes higher. Subsequently, if one enters more and more variables to a model, the R-Square comes closer to 100%. The adjusted R-Square penalizes the value of R-Square as more variables enter the model. The adjusted R-Square is a percentage and always smaller than R-Square when more than one predictor variable is present. In this model, the adjusted R-square is 21%.

Analysis of variance (ANOVA) demonstrated a p-value of 0.028. A general rule commonly used in research is that if the p-value is less than 0.05, then the null hypothesis can be rejected. The null hypothesis for this question is: For learner’s who successfully progress in this high transactional distance environment, there will not be a positive relationship between one or more of the intelligences and attitude toward independent learning. In this case, the p-value is <0.05, therefore we can reject the null hypothesis. Therefore, we can say: For learners who successfully progress in this high transactional distance environment, there is a positive relationship between one or more of the intelligences and attitude toward independent learning.

The table below the regression equation provides information that can answer the research questions regarding which intelligences impact attitudes toward independent learning. The p-values of the various intelligences are shown in table 4.
Table 4: Output from the Multiple Linear Regression Model: P-Values for each of the Intelligences.

<table>
<thead>
<tr>
<th>Intelligence</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Musical</td>
<td>0.640</td>
</tr>
<tr>
<td>Kinesthetic</td>
<td>0.185</td>
</tr>
<tr>
<td>Logical-mathematical</td>
<td>0.840</td>
</tr>
<tr>
<td>Spatial</td>
<td>0.336</td>
</tr>
<tr>
<td>Linguistic</td>
<td>0.195</td>
</tr>
<tr>
<td>Interpersonal</td>
<td>0.412</td>
</tr>
<tr>
<td>Intrapersonal</td>
<td>0.334</td>
</tr>
<tr>
<td>Naturalistic</td>
<td>0.531</td>
</tr>
</tbody>
</table>

Evaluation of the resulting p-values for the various individual intelligences demonstrated that none of these individually had p-values below the 0.05 level in this model which used all eight intelligences as predictors for attitude toward independent learning. This finding was not unexpected. As noted in chapter 3, the methodology section, it was expected that refitting of the model would be necessary due to the limited number of study participants and the large number of predictor variables (eight intelligences).

After obtaining the above results from the table, refitting of the model was performed leaving out variables with high p-values. Variables found to have consistently higher p-values with refitting were musical intelligence, logical-mathematical
intelligence, naturalistic intelligence, spatial intelligence, intrapersonal intelligence, kinesthetic intelligence, and linguistic intelligence. The model was subsequently refitted without these seven variables. This refitted regression model was used to test whether the remaining multiple intelligence (interpersonal intelligence) affected attitudes toward independent learning. This regression model was used to express the tendency of ‘attitude’ (response variable) to vary with the reduced number of ‘multiple intelligences’ (only interpersonal intelligence) in a systematic manner. The assumptions for linear regression were found to hold for this model. The regression equation from this refitted model is shown below.

Table 5: Output from the Refitted Multiple Linear Regression Model: Regression Equation.

| Regression equation is: | AATILS Score = 152 + 0.759 Interpersonal intelligence |

The interpretation of the refitted regression equation that was generated demonstrated that:

• For every point increase in interpersonal intelligence, the mean attitude score increased by 0.759.

The coefficient of determination (R-Sq), which is reported as a percentage, shows how much of the variability in the response variable (attitude) is explained by the predictors (one of the multiple intelligences in this model: interpersonal). The R-square value for this refitted model is 23.7%. This means that 23.7% of the variability of attitude is explained by this one intelligence (interpersonal). As noted earlier, the adjusted R-square (adjusted coefficient of determination) is designed to cure a flaw of R-
square. This flaw is that as more and more variables enter a model, the R-square becomes higher and higher, approaching 100%. The adjusted R-square penalizes the value of R-square as more variables enter the model. The adjusted R-square is a percentage and is expected to be smaller than the R-square. The adjusted R-square for this refitted model is 21.9%.

Analysis of variance (ANOVA) in this refitted model demonstrated a p-value of 0.001. A general rule commonly used in research is that if the p-value is less than 0.05, then the null hypothesis can be rejected. The null hypothesis for this refitted model is: For learners who successfully progress in this high transactional distance environment, there will not be a positive relationship between one or more of the intelligences and attitude toward independent learning. Since this null hypothesis could be rejected, it is possible to say that: For learners who successfully progress in this high transactional distance environment, there is a positive relationship between one or more of the intelligences and attitude toward independent learning.

The p-value in the table below the regression table for this refitted model which only used one predictor variable (interpersonal intelligence) was the same as the p-value noted for the ANOVA and was also 0.001. This p-value was below the 0.05 level, and therefore demonstrated statistical significance. Therefore, interpersonal intelligence was statistically significant in predicting attitudes toward independent learning. This meant that for interpersonal intelligence, we could reject the null hypothesis. The null hypothesis related to interpersonal intelligence stated that: For learners who successfully progress in this high transactional distance environment, there will not be a positive relationship between interpersonal intelligence and attitude toward independent learning.
Therefore, it could be said that: For learners who successfully progress in this high transactional distance environment, there is a positive relationship between interpersonal intelligence and attitude toward independent learning. See table 6.

Table 6: Output from the Refitted Multiple Linear Regression Model: P-Value for the Intelligence which was Significant in Predicting Attitudes.

<table>
<thead>
<tr>
<th>Intelligence</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interpersonal intelligence</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Summary of findings

This research investigation involved the following research questions:

- Do learners who successfully progress in a high transactional distance environment which engages a variety of intelligences demonstrate positive attitudes toward independent learning?

- For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between one or more of the intelligences and attitude toward independent learning?
  - (This research question had eight sub-questions, one for each of the intelligences)

  Evaluation of the data received from the respondents on the Adult Attitudes Toward Independent Learning Scales (AATILS) was used to answer the first research question. The AATILS survey utilized a one through five scale where: 1 – almost never, 2 – seldom, 3 – sometimes, 4 – often, and 5 – almost always. The survey had a
maximum possible score of 250. For this study, positive attitudes toward independent learning was defined as an average score per item of greater than 3, and an average total score of greater than 150. The results of this study showed that the average total score was 196. The average score per item was 3.92. Therefore, these results demonstrated that: Learners who successfully progress in a high transactional distance environment which engages a variety of intelligences demonstrate positive attitudes toward independent learning.

For the second research question, a multiple linear regression model using all eight intelligences as predictors for attitude toward independent learning was utilized. Analysis of variance (ANOVA) for this model demonstrated a p-value of 0.028. This p-value was < 0.05, and therefore the null hypothesis could be rejected. The null hypothesis was: For learners who successfully progress in this high transactional distance environment, there will not be a positive relationship between one or more of the intelligences and attitude toward independent learning. Since the p-value was <0.05, we could reject the null hypothesis and say that: For learners who successfully progress in this high transactional distance environment, there is a positive relationship between one or more of the intelligences and attitude toward independent learning.

Despite the fact that ANOVA demonstrated a p-value of < 0.05, the p-values for the individual intelligences in this model, which used all eight intelligences as predictors, failed to demonstrate any p-values at the <0.05 level. The model was therefore refitted to leave out variables with higher p-values. Variables found to have consistently higher p-values with refitting were: musical intelligence, logical-mathematical intelligence, naturalistic intelligence, spatial intelligence, intrapersonal intelligence, kinesthetic intelligence.
intelligence, and linguistic intelligence. The model was subsequently refitted without these variables. This regression model was used to express the tendency of ‘attitude’ (response variable) to vary with the remaining interpersonal intelligence in a systematic manner. The coefficient of determination (R-Sq) for this model, which is reported as a percentage and shows how much of the variability in the response variable (attitude) is explained by the predictor (interpersonal intelligence), was 23.7%. The adjusted R-square was 21.9%. Analysis of variance (ANOVA) in this refitted model demonstrated a p-value of 0.001, which is less than 0.05, and therefore allowed for rejection of the null hypothesis regarding interpersonal intelligence. The null hypothesis for this intelligence was: For learners who successfully progress in this high transactional distance environment, there will not be a positive relationship between interpersonal intelligence and attitude toward independent learning. Since this null hypothesis can be rejected, it can be said that: For learners who successfully progress in this high transactional distance environment, there is a positive relationship between interpersonal intelligence and attitude toward independent learning.
Chapter 5
Discussion

This research investigated two primary questions. The first question investigated whether learners who successfully progress in a high transactional distance environment which engages a variety of intelligences demonstrate positive attitudes toward independent learning. The second question investigated whether a positive relationship existed between one or more of the intelligences and attitude toward independent learning for learners who successfully progressed in the high transactional distance environment that was described. Considering this research in light of transactional distance theory aids in understanding how this research adds to the knowledge base in the field of distance education.

The first research question

Research question number one posed the following question: Do learners who successfully progress in a high transactional distance environment which engages a variety of intelligences demonstrate positive attitudes toward independent learning? For this study, positive attitude toward independent learning was defined as an average score per item of greater than 3, and an average total score of greater than 150. The results of this study showed that the respondents mean total score was 196 and the respondents mean score per item was 3.92. Evaluation of the data received from the respondents on the Adult Attitudes Toward Independent Learning Scales (AATILS) therefore demonstrated that these learners who had successfully progressed in an independent learning environment which had high transactional distance and engaged a variety of the
intelligences did, in fact, show scores consistent with positive attitudes toward independent learning.

The findings support the ideas of Wedemeyer (1972, 1973, 1975, and 1981) who recognized and described how independent learning can provide learners opportunities to exert their autonomy, free choice, and independence. These findings are significant in that they demonstrate that learners who are able to progress in a distance education environment high in transactional distance do demonstrate positive attitudes toward independent learning. This finding is significant in that it lends support to previous research that states a positive relationship exists between high transactional distance and learner autonomy (Moore, 1980, 1983, 1993, and Moore & Kearsley, 2005) and independence (Moore, 1973, 1983).

Moore (1983) stated that autonomous learners “are able to identify learning needs, when faced with problems to be solved, as well as skills they don’t have and information they are lacking” and they “know, or find, where and how and from what human and other resources they may gather the information they require, collect ideas, practice skills and achieve their goals. They then judge the appropriateness of their new skills, information and ideas, eventually deciding whether their goals have been achieved or can be abandoned”. Although these independent study experiences provided relatively high structure, the learners were certainly required to meet the learning objectives provided by the course structure via their own abilities and volition. In addition, the limited interactions between learners and instructors, as well as between learners and learners, demonstrate that this environment was relatively low in dialogue. This high structure/low dialogue environment was consistent with relatively high transactional
distance (Moore, 1983). This type of distance education environment which is consistent with relatively high transactional distance would be associated with, according to transactional distance theory, learners that have relatively high levels of learner autonomy (Moore, 1986). The fact that the learners in this study demonstrated positive attitudes toward independent learning suggests that they do indeed have relatively high levels of learner autonomy which allows them to perform the learning tasks that Moore (1983) described. The ability of these students to identify the learning needs, and the ability to identify how and where to find the information they require, as well as the ability to evaluate whether their goals have been achieved, would be an excellent explanation of how these students are able to successfully progress in such a high transactional distance independent study environment.

It is also possible to consider these findings in light of the writings of Saba (2004a). Saba (2004a) states that “transactional distance is a measure of the relationship between the teacher and learner in terms of requisite structure for the instructor or the instructional institution, and the required autonomy by the learner in any instructional situation”. He described a negative feedback loop between autonomy and structure and asserted that more required student autonomy should be associated with less structure between the learner and the instructor. He also noted that this relationship was dynamic, and able to change over time. He believed that learners who became more experienced and knowledgeable could become more autonomous, and as a result, would require less structure. Lee and Gibson (2003) supported this contention as they found that both distance instructors and learners could aid in the development of learner autonomy through collaborative efforts to modify structure.
Kanuka, Collett, and Caswell’s (2002) investigation into Internet-based distance courses revealed the importance of systematic structure as well as flexibility, with the balance between structure and flexibility being essential. The learners in this study had all experienced a relatively low dialogue/high structure independent study environment consistent with high transactional distance. The learners in this study also demonstrated positive attitudes toward independent learning. If one considers this information in light of Saba’s (2004a) negative feedback loop between autonomy and structure, where it is asserted that autonomy increases as structure decreases, then it would suggest that the learners in this study could be even more autonomous. It would suggest that these learners could improve their levels of autonomy through collaborative efforts with the instructors to decrease the structure of the courses. Perhaps if this was done, the learners would become even more autonomous then they are currently, and demonstrate even more positive attitudes toward independent learning then what they did for this study.

This is consistent with Moore’s typology of distance education programs (Moore 1983) and Braxton’s refinement (Braxton, 1999). This suggests that learners could move from –D+S to –D-S in Moore’s (1983) typology (see chapter 2) thereby progressing to an even higher transactional distance environment. Another way to conceptualize this is to envision learners in this study moving from the lower right quadrant of Braxton’s (1999) typology to the lower left quadrant where transactional distance is greater (see chapter 2). This movement to a –D-S environment which is even higher in transactional distance would require the learners to have even greater levels of autonomy then they currently have. Perhaps this would be reflected in even better attitudes toward independent learning then what this study currently demonstrated. This would be an interesting
question to explore in future research. The formal research question for this future research could be: Would increasing the transactional distance of an independent study program result in improved attitudes toward independent learning?

Although the ability to have instructor-learner dialogue, and learner-learner dialogue exists for the learners described in this study, this dialogue, for the most part, does not occur. Jung’s (2001) theoretical framework for Web-based instruction (WBI) pedagogy demonstrated how teaching and learning in WBI are associated with dialogue, structure, and variables regarding learning. Jung (2001), like Chen (1997), found that the concepts of structure, dialogue, and autonomy were multifaceted. The facets identified within dialogue included academic, collaborative, and interpersonal interactions. Although unsuccessful learners who experienced the high transactional distance learning environment with high structure and low dialogue were not evaluated in this study, it makes one curious as to whether these learners were unsuccessful because they required higher levels of dialogue then what the independent study program provided. Perhaps their levels of autonomy were not great enough to progress successfully in an environment with so little dialogue and such high transactional distance. Perhaps this idea could also be explored in future research. The formal research question for this future research could be: Will learners who are unsuccessful in this high transactional distance independent study program become successful if the transactional distance is decreased through increasing dialogue?

In addition, these findings are also significant in that they demonstrate that learners who have experienced a distance education environment which highly engages a variety of the intelligences have positive attitudes toward independent learning. This
lends support to the observations of researchers who have previously observed a positive relationship between the active engagement of a variety of the intelligences and higher levels of learner autonomy (Chan, 2000; Diaz-Lefebvre, 1999; Walters, 1992; and Williams, 1995) and independence (Cornwell, 2001; and Mantzaris, 2001).

Positive attitudes toward independent learning for these learners who actively engage a majority of their intelligences supports the idea that multiple intelligences theory can be used to support the development of autonomy and independence. A variety of researchers have found an association between autonomy and multiple intelligences. Some of these researchers found that offering choices to students in the ways in which they learn and demonstrate their learning allowed for more learner control (Kallenbach, 1999; Coustan, 2001), independence (Mantzaris, 1999; Cornwell, 2001), and autonomy (Chan, 2000; Walters, 1992). Providing a variety of choices to students based on multiple intelligences theory allowed learners to have the opportunity to draw upon their strongest intelligences and approach problems in a unique way. Increased choices were found to be associated with increased learner motivation, enthusiasm, and participation (Diaz-Lefebvre, 1999a). Providing choice allowed students to have more control. Increased learner control was associated with the development of autonomy. Increased control was also noted to improve engagement with learning (Costanzo and Paxton, 1999). The findings of these researchers support the contention that multiple intelligences theory can facilitate the development of learner autonomy. This study with these field-based learners also supports this contention. For the learners in the context of this study who were actively engaging almost all of the intelligences (except musical), positive attitudes toward independent learning were demonstrated, thereby suggesting
that these learners who had most of their intelligences engaged had higher levels of learner autonomy.

It should be noted, however, that requiring learners to engage a variety of their intelligences is different than offering learners a choice as to which intelligence(s) they would prefer to engage. The learners in this study were required in their field-based environments to engage almost all of their intelligences as part of their educational experience. This is in contrast to Diaz-Lefebvre (1999a) who promoted offering learners a choice in which intelligence(s) they engage. Although requiring learners to use most of their intelligences, whether they want to or not, would appear to decrease learner control, it may result in the improvement of these intelligences while students are learning in their field-based settings. Perhaps engagement of a majority of intelligence while learning results in a greater variety of ways for the learners to interpret and represent the information that they are exposed to so that learning occurs more effectively. Gardner (2000, p.202) noted that multiple representations of the core ideas of a topic should be pursued in education and that “our search should be for the family of representations that can convey the core ideas in a multiplicity of ways at once accurate and complementary”. Perhaps the learners in this study experience this situation as Gardner (2000) describes. Perhaps this engagement of a variety of intelligences allows the learners to put various pieces of information and medical concepts together so that understanding is improved. This dynamic relationship between the learner’s intelligences and the learning that occurs through the active engagement of the intelligences may make for a greater immersion of the student into the information that needs to be assimilated and learned. This required engagement of a majority of the intelligences may result in improved strengths of
intelligences (including interpersonal intelligence) and result in improved or more rapid
development of learner autonomy and independence. This could subsequently be
reflected in learners’ positive attitudes toward independent learning. Future research
could pursue this idea. Perhaps a future formal research question could be: Does required
engagement of a majority of the intelligences while learning result in better attitudes
toward independent learning compared to providing learners a choice as to which
intelligences they would prefer to engage?

A number of researchers have been able to demonstrate how MI theory is
compatible with adult education practice. Coustan (2001) was able to integrate MI theory
into her John Dewey (i.e. 1963) inspired teaching practice where she used hands-on MI
inspired learning activities so that students could learn through praxis. Walters (1992)
also noted how MI theory was helpful in providing a contextualized environment where
students were required to solve problems and assessments could be based on authentic
performances. Fogerty (1996) and Krechevsky and Seidel (1998) also noted how hands-
on activities and problem-based learning were more student-centered and allowed for
more authentic learning. Quinones (2001) used MI theory to assist her with her popular
education practice influenced by Paulo Freire (1973). The research performed in this
investigation also supported the contention that multiple intelligences theory is
compatible with adult education practice. The fact that active engagement of the
intelligences in this high transactional distance environment was associated with positive
attitudes toward independent learning for these adult students in the context described in
this study supports the contention that multiple intelligences theory is significant to adult
education practice. This research also supports the use of MI theory in adult distance
education, as other researchers have contended (Krishnasamy, Peck Lee, & Palaniappan, 2003).

As noted earlier, it would be interesting for future research to determine if increasing the dialogue (and thereby decreasing the transactional distance) would enable unsuccessful learners to become successful in their progression through this distance program. This idea is supported by the findings of Munro (1991), who found the learner-teacher relationship affected learners' intellectual and social integration, and subsequently influenced dropout behavior. Munroe (1991) also found that a lack of dialogue was associated with attrition. This research supported Moore’s transactional distance theory and the assertion that learners with lower levels of autonomy require lower levels of transactional distance through more dialogue. He noted that when higher levels of dialogue are not present for these lower level autonomy students, dropout behavior results. It was suggested that “presence at a distance can be enhanced by a dialogue-centered practice” (Munroe, 1991, p.1). In addition, Walker Fernandez (1999) found that increased dialogue was effective in overcoming the decreased student autonomy resulting, at least in part, from cultural differences between the student and the teacher and institution. By providing a distance learning environment with +D+S to the learners in this study, these learners could move from a higher degree of transactional distance to a lower degree of transactional distance. Another way to conceptualize this concept is to envision the learners moving from the lower right quadrant to the upper right quadrant on Braxton’s (1999) refined typology.

If increasing dialogue would be pursued to decrease the transactional distance, then it should be pointed out that Kanuka, Collett, and Caswell (2002), who investigated
the instructional impact of integrating asynchronous text-based Internet communication into distance courses, noted that skill in facilitation interaction was necessary. In addition, this researcher’s evaluation of Bunker, Gayol, Nti, and Reidell (1996) study which investigated the effects of changes in structure on dialogue appeared to demonstrate that certain types of structural characteristic that promoted interaction were associated with increased dialogue. Vrasidas and McIssac’s (1999) research demonstrated that certain course structural characteristics promoted interactions, while other structural characteristics decreased interactions. For example, activities which were structured into the course that required discussion that was to be graded increased interaction. They also found that a lack of structural characteristics to facilitate interaction resulted in a lack of interaction. Another factor identified for the lack of interaction was the high work load, and the incorporation of face-to-face meetings within the course. Learners indicated that a lack of feedback from peers and the instructor was detrimental to the interaction process. These findings suggest that increasing the level of dialogue to decrease the transactional distance for learners would significantly change the experiences of both the learners and the instructors for these courses. In addition since these learners tend to have high work loads in their individualized field-based settings, the additional requirements of dialogue which may be of benefit for those learners with lower levels of autonomy may be burdensome and unnecessary for those with higher levels of autonomy.

Another consideration regarding interaction in the environment the learners in this study experience should be regarding the findings of Chen & Willits (1999) who noted that the more structured the course, the less dialogue that occurred. This finding was
consistent with Moore’s theory. Therefore, the high structure of the distance education courses described for the learners in this study would appear to be associated with lower levels of dialogue. However, this study also found that “the more independent the students reported themselves to be, the more frequently they indicated in-class interaction” (Chen & Willits, 1999, p.54). This was not consistent with previously stated assertions that less dialogue is associated with greater student independence and autonomy. In fact, this study appeared to suggest the opposite: more dialogue may be associated with more student independence and autonomy. Huang (2000) also found a significant correlation between interaction and autonomy based on survey data. Perhaps learners with higher levels of autonomy are more likely to spontaneously dialogue, whereas learners with lower levels of autonomy require interaction facilitation methods to be incorporated into the course for them to participate in discussions.

Creating a lower transactional distance environment for the unsuccessful learners may better meet their learning needs as lower level autonomy learners. Shin’s (2002) research supports this idea. She expanded on the theory of transactional distance and presented the concept of ‘transactional presence’. Transactional presence was defined as: “the degree to which a distance student perceived the availability of, and connectedness with, other parties involved in a given distance education setting”. She concluded that the three types of transactional presence (teacher, peer, and institution) could be significant predictors of student learning success. Chen and Willits’ (1998) research also supports this idea as they found that decreased transactional distance with increased dialogue between student and teacher, as well as between students, resulted in increased student perceptions of learning.
Portier and Wageman’s (1995) research also supports the idea of increasing dialogue in the courses experienced by learners in this study so as to better facilitate success. They suggested analyzing learners’ prior knowledge states before the course begins. It was suggested that this analysis would result in the generation of knowledge profiles. These knowledge profiles could be valuable as learners tend to be very heterogeneous in regards to autonomy levels. The implication was that learners with lower knowledge profiles would be less autonomous. These authors suggested that independent learning could be better supported by providing flexible learning environments. It was believed that these lower level autonomy learners could best be supported through modifications in dialogue and/or structure so that the transactional distance experienced by these learners was changed. It was believed that this would facilitate learner success. In other words, increasing dialogue (through interaction facilitation methods) for the learners who have lower prior knowledge states may result in these learners benefiting from a lower transactional distance environment with higher levels of dialogue, and result in increasing their knowledge state. Their suggestions are supported by the findings of Chen and Willits (1998) who found an association between prior subject matter knowledge, increased dialogue, and decreased transactional distance. Perhaps as learners' knowledge about the course content increases, interaction facilitation methods as described by Vrasidas and McIssac (1999) become less important, and learners become more spontaneous in their dialogue, thereby negating the need for interaction facilitation. This idea is consistent with Chen and Willits (1999) findings that students who believed they were more independent participating in more interaction.

The second research question and sub-questions
The second research questions stated: For learners who successfully progress in this high transactional distance environment, will there be a positive relationship between one or more of the intelligences and attitude toward independent learning? The null hypotheses for this question stated that: For learners who successfully progress in this high transactional distance environment, there will not be a positive relationship between one or more of the intelligences and attitude toward independent learning. Analysis of variance (ANOVA) demonstrated a p-value of <0.05, and therefore this null hypothesis could be rejected. It was therefore possible to state that: For learners who successfully progress in this high transactional distance environment, there is a positive relationship between one or more of the intelligences and attitude toward independent learning.

Multiple linear regression analysis with each of the multiple intelligences (linguistic, logical-mathematical, spatial, bodily-kinesthetic, interpersonal, intrapersonal, musical, and naturalistic) was performed. In this model which included all eight intelligences, regression did not demonstrate any of the intelligence variables at significant levels. This was not unexpected as the number of respondents was not expected to be high enough to support a multiple regression model with eight predictor variables (see methods section, chapter 3). The model was subsequently refitted, leaving out the intelligences which consistently showed higher p-values. In the final analysis, one intelligence was found to be statistically significant in predicting attitudes toward independent learning (p < 0.05). This intelligence was interpersonal intelligence (p<0.001). Therefore, rejection of the null hypothesis related to interpersonal intelligence (i.e. For learners who successfully progress in this high transactional distance environment, there will not be a positive relationship between interpersonal intelligence
and attitude toward independent learning) could occur. It was therefore possible to state that: For learners who successfully progress in this high transactional distance environment, there is a positive relationship between interpersonal intelligence (as perceived by the learner) and attitude toward independent learning.

Interpersonal intelligence as described by Gardner (1999a, 2004) is the ability to see and appreciate the emotions and plight of others, as well as motivations and needs of others. They also have the ability to analyze or predict the reactions of others. Persons who excel in interpersonal intelligence have the ability to interact effectively with others. Smith (2002, p.2) states: “Interpersonal intelligence is concerned with the capacity to understand the intentions, motivations and desires of other people. It allows people to work effectively with others. Educators, salespeople, religious and political leaders and counselors all need a well-developed interpersonal intelligence”.

Interpersonal intelligence was positively correlated with speaking self-efficacy for English as a foreign language (EFL) classroom (Shore, 2001). Chan (2003) noted that teachers were found to report strengths in the personal intelligences. It would therefore seem logical that those with higher levels of interpersonal intelligence would be better able to interact and communicate with others. It would make sense then that higher levels of interpersonal intelligence would be associated with improved ability for meaningful dialogue between the learner and their patients, as well as with the health care workers in the field-based independent study environments described in this study.

Repeated findings in the distance education literature of a positive relationship between interaction and attitudes exists (i.e. Fulford and Zhang, 1993; Biner, Barone, Welsh, & Dean, 1997; Biner, Dean & Mellinger, 1994; Rangecroft, Gilroy, Long, &
Tricker, 1999; Swan, 2001; Thurmond, Wambach, Conners, & Frey, 2002; and Woods & Ebersole, 2003). Perhaps learners with higher levels of interpersonal intelligence have greater ability for effective interaction for purposes of meeting learning objectives. This greater interpersonal intelligence may result in more productive interactions for these individuals, and result in better attitudes toward independent learning.

This study supports the findings of Coustan (2001), Walters (1992), Fogerty (1996), Krechevsky and Seidel (1998), and Quinones (2001) who demonstrated that multiple intelligences theory is compatible with adult education practice. The ability of interpersonal intelligence to predict attitudes toward independent learning was statistically significant and supports this relationship.

This study appears to support the findings of Krishnasamy, Peck Lee, and Palaniappan (2003) who did research which demonstrated a relationship between interpersonal intelligence and preference for online learning. The findings from this study seem to support their findings in that the students in this study who were learning online had interpersonal intelligence strength. Krishnasamy, Peck Lee, and Palaniappan (2003) also noted that students with strengths in the spatial and interpersonal intelligences were more likely to use and benefit more from online learning. This was in contrast to students with strengths in linguistic, logical/mathematical, bodily-kinesthetic, and intrapersonal intelligences. It may be that students with strengths in spatial and interpersonal intelligences benefit more from the online environment when compared to the traditional classroom setting that typically engages the linguistic and logical-mathematical intelligences the most. It would make sense that learners with strengths in linguistic and logical-mathematical intelligences would benefit more from a traditional
classroom setting that engages these intelligences heavily as compared to an online setting.

The results of this study also appear to support an association between interpersonal intelligence and autonomy. Perhaps higher levels of interpersonal intelligence allow learners to better engage their interpersonal intelligence while in their field based environment, and subsequently improve their attitudes toward independent learning. This better attitude toward independent learning may be a reflection of their higher levels of autonomy that is possible because of the learners' higher level of interpersonal intelligence and the active engagement of their interpersonal intelligence in their field based environments. This association between active engagement of interpersonal intelligence and higher levels of learner autonomy and independence supports the observations of Chan (2000), Diaz-Lefebvre (1999), Walters (1992), and Williams (1995), who noted an association between the active engagement of the intelligences and higher levels of autonomy. The findings of this study would also seem to support the observations of Cornwell (2001) and Mantzaris (2001) who noted an association between active engagement of the intelligences and higher levels of independence.

The results of this research would also seem to support the contention that multiple intelligences theory can facilitate the development of learner autonomy which was suggested by the observations of Kallenbach, (1999), Coustan (2001), Mantzaris (1999), Cornwell (2001), Chan 2000), Walters (1992), Diaz-Lefebvre (1999a), and Costanzo and Paxton (1999). The results of this study seem to support that idea that active engagement of interpersonal intelligence for learners with greater interpersonal
intelligence in the environment described in this study would result in greater levels of autonomy and independence, and subsequently greater attitudes toward independent learning.

Perhaps learners in these field-based independent learning environments who have higher levels of interpersonal intelligence demonstrate more effective dialogue with their patients and other health care workers when compared to those with lower levels of interpersonal intelligence. Perhaps this improved dialogue allows them to better meet their learning objectives and allows them to improve their learner autonomy and independence, as well as improve their attitudes toward independent learning. This idea is supported by the findings of Chen & Willits (1999) who found that more dialogue was associated with greater learner independence and autonomy. This idea is also consistent with Huang’s (2000) findings of a significant correlation between interaction and autonomy. This idea is also supported by the findings of Biner, Barone, Welsh, and Dean (1997) and Biner, Welsh, Barone, Summers, and Dean (1997) who found a positive relationship between attitude and performance levels; Swan (2001) who found a positive relationship between attitude and perceived learning; Richardson, Long, and Woodley (2003) who found a positive relationship between attitude and academic engagement.

Additional support for this idea comes from the research of Chen and Willits (1999) that identified both independence and interdependence as subcategories of learner autonomy. Perhaps interpersonal intelligence allows students to have greater ability for interdependence in their field-based independent learning environments with their patients through dialogue. This interdependence in learning could allow for a mutual give and take between the learner and the patient where both contribute and receive so
that the learner may benefit and learning occurs. Perhaps higher levels of interdependence in learning allow for greater ability for learner independence. As noted by Franz (2002, p.1) “independence with interdependence” is possible, where learners can retain their autonomy while depending on others to “enhance the success of the work at hand”. Perhaps the learners in this study were able to gain greater independence and autonomy through their interdependence with the patients that they see in their field-based settings. As Nah (1999, p.20) noted: “The constructs of independence and interdependence (or dependence) are not located at the two opposing ends of a continuum, just as the constructs of emotion and ration, masculinity and femininity, and justice and relations with others (in moral development models) are not so”. This author goes on to state the “self-directed learners can be independent and interdependent”. Perhaps this is the case for the learners in the context of this study.

Krishnasamy, Peck Lee, and Palaniappan (2003) also appear to support the idea that increased interpersonal intelligence may result in increased dialogue, and that increased dialogue may result in increased interpersonal intelligence, which subsequently results in increased learner independence and autonomy. These researchers found an association between interpersonal intelligence and online learning. Jung’s (2001) theoretical framework for Web-based instruction (WBI) pedagogy demonstrated how teaching and learning in WBI are associated with dialogue, structure, and variables regarding learning. Jung (2001), like Chen (1997), found that the concepts of structure, dialogue, and autonomy were multifaceted. The facets identified within dialogue included academic, collaborative, and interpersonal interactions. Although the on-line learning in this study was different than the experiences of many other online learners
(i.e. these learners were in a field-based setting), an association was also found in this study between interpersonal intelligence and on-line learning. This also appears to support the contention that interdependence may be valuable in on-line distance learning in the development of independence.

Krishnasamy, Peck Lee, and Palaniappans’ research (2003) also seems to support this idea that increased interpersonal intelligence may result in increased ability for effective dialogue, and subsequently better interdependence between the learner and patient, resulting in increased learner independence and autonomy. These researchers also found that incorporation of MI theory into distance learning strategies assisted with interaction and collaboration. Perhaps the engagement of a variety of intelligences supports the development of interpersonal intelligence. If increased interpersonal intelligence is associated with the ability for more effective interaction and dialogue between learner and patient, then perhaps engagement of a variety of intelligences results in an improved ability of interdependence and subsequently autonomy and independence.

Moore (1983, p.163) defined learner autonomy as the ability “to identify learning needs, when faced with problems to be solved, as well as skills they don’t have and information they are lacking” and they “know, or find, where and how and from what human and other resources they may gather the information they require, collect ideas, practice skills and achieve their goals. They then judge the appropriateness of their new skills, information and ideas, eventually deciding whether their goals have been achieved or can be abandoned”. It would seem likely that learner’s who have a greater capacity for understanding the needs of others (i.e. interpersonal intelligence) would be more motivated and interested in identifying their learning needs for a particular patient.
encounter so as to meet the needs of the patient. Because of this capacity to understand the needs and desires of their patient, it would seem likely that this increased interpersonal intelligence would enable more effective interaction and dialogue with their patients. This more effective dialogue would enable an interdependency to occur between learner and patient. This interdependence between learner and patient may allow the learner to better define the medical problem that needs to be solved, as well as identify the skills and knowledge they don’t have and the information that they need. This would seem likely to motivate these learners to identify and utilize the resources at their disposal so that they could gather the information they require, thereby motivating the learner to develop their ideas regarding diagnosis and therapy, the practice of skills, and in reaching their goals (i.e. making the patient better). It would seem likely that learners with highly developed interpersonal intelligence who are concerned about the plight, needs, and motivations of their patients would be more motivated to judge the appropriateness of their new skills, information, and ideas, and to determine whether their goals have been achieved so that they could effectively work with their patient(s). In this process, learner autonomy and independence would develop, their knowledge base would improve, and their learning goals would be met. In the most simplest of terms, it appears that learners in this study who ‘care’ more about the others (i.e. increased interpersonal intelligence) develop an interdependence with their patients through dialogue, and become more autonomous learners. As a result, they develop positive attitudes toward independent learning.

It would make sense that individuals with more highly developed interdependence and independence, and subsequently higher levels of autonomy would develop better
attitudes toward independent learning, especially when the independent learning experiences occurred in a relatively high transactional distance environment which required a high degree of learner autonomy and independence. It would also make sense that learners with lower levels of interpersonal intelligence resulting in lower levels of learner autonomy would develop poorer attitudes toward independent learning, especially when their experiences included independent learning environments high in transactional distance. Being an interpersonally weak, lower autonomy level learner in a high transactional distance environment requiring higher levels of autonomy would result in an incongruence between the abilities of the learner and the requirements of the learning environment. This idea is partially supported by the findings of Costanzo (2001) who found that high risk students had either very high or very low scores in the personal intelligences, and that these particular students needed special attention.

Perhaps learners with low levels of interpersonal intelligence are unable to participate fully in the opportunities for interaction and dialogue between themselves and their patients and other health care workers. This lack of ability for effective dialogue between learner and patients, or other health care workers, may result in an inability to develop the interdependence necessary for this high transactional distance environment. Having the ability to see and appreciate the emotions, plight, motivations, and needs of others, would appear to be necessary for the learner to be able to elicit the medical information necessary to determine an appropriate diagnosis and management plan. It may be that a lack of ability to form an interdependent relationship with patients and other health care workers in this field-based environment results in an inability to adequately develop the autonomy and independence necessary for these high
transactional distance courses. This lack of interdependence as a result of lower ability for effective dialogue due to lower levels of interpersonal intelligence may result in decreased ability for the learner to define the medical problem that needs to be solved. It may also result in the learner being unable to identify the skills and knowledge that they do not have. As a result they may have limited ability to identify the information that they need. Perhaps this results in limited ability to identify and use the resources at their disposal, and to develop their ideas regarding diagnosis and therapy. In addition, these learners may be less able to judge the appropriateness of their new skills, information, and ideas, and to determine whether their goals have been achieved. These deficits in their ability to learn in this setting would result in lower levels of learner autonomy and independence in this high transactional distance (low dialogue) distance learning environment. Subsequently, this could result in poorer attitudes toward independent learning.

Perhaps the particular learners described in the previous paragraph would benefit from lower transactional distance, higher dialogue, distance learning courses. Maybe all learners, in the distance learning context described in this study, need some form of dialogue for the development of positive attitudes toward independent learning. Perhaps learners with positive attitudes toward independent learning in this study were able to compensate for the low dialogue, high transactional distance learning environment through the use of their interpersonal intelligence and dialogue in the field-based setting with patients and other health care workers. If this were the case, then learners with lower levels of interpersonal intelligence would have limited ability to compensate for a low dialogue distance course. Their inability to effectively dialogue with patients and co-
workers due to their limited interpersonal intelligence, combined with little or no
dialogue associated with the distance learning courses, could result in inadequate
development of interdependence, and subsequently the inadequate development of
learner autonomy and independence. This may be the reason for their poorer attitudes
toward independent learning. It would be interesting to see if these learners with lower
interpersonal intelligence would have an improvement in their attitudes toward
independent learning if their learning was supported through more dialogue as part of the
distance learning courses. The idea that increased dialogue may be effective in
overcoming decreased student autonomy is supported by Fernandez (1999). Perhaps
certain structural characteristics could be incorporated into the distance learning courses
to promote interaction and dialogue. This idea is supported by Vrasidas and McIssac’s
(1999) research that demonstrated that certain course structural characteristics promoted
interactions. Perhaps dialogue in the distance learning courses would compensate for
lower interpersonal intelligence and ability for dialogue in the field-base settings.

Chen and Willits (1999) noted that learners who self reported greater levels of
independence also self reported more frequent in-class interaction. Perhaps more
dialogue is associated with more learner independence and autonomy. Maybe successful
learners in high transactional distance environments with low course dialogue develop
ways to dialogue outside of the course through the use of their interpersonal intelligence.
It could be that these alternate ways to dialogue result in positive attitudes toward
independent learning. It may be that learners with lower interpersonal intelligence are
unable to develop this dialogue on their own in a high transactional distance environment.
They may require interaction facilitation methods to be structured into the course so that effective dialogue can occur for them and so that their attitudes can improve.

Identifying interpersonal intelligence as significant in predicting attitudes toward independent learning is an important finding which adds to the distance education literature. An improved understanding of interpersonal intelligence’s involvement in the development of learner autonomy is needed. Perhaps future studies may demonstrate that modifications in dialogue and/or structure, which changes the transactional distance and considers interpersonal intelligence, may result in the development of greater levels of interdependence, independence, and autonomy, and subsequent improved learner attitudes toward independent learning. Perhaps a formal research question could be:

What is the relationship between varying the degrees of transactional distance (through modifications in dialogue and structure) experienced by independent study learners, interpersonal intelligence, and the development of interdependence, independence, autonomy, and learner attitudes toward independent learning?

How to investigate this, for learners who experience the distance learning context described in this study, would be a challenge. As noted by Vrasidas and McIssac (1999), certain course structural characteristics promoted interactions, while other structural characteristics decreased interactions. Activities which were structured into the course which required discussion that was to be graded increased interaction. A lack of structural characteristics to facilitate interaction resulted in a lack of interaction with the asynchronous discussion activity. Another factor for the lack of interaction with the asynchronous discussion activities was the high work load, and the incorporation of face-to-face meetings within the course. Experience with computer mediated communications
was also noted to affect online participation in discussions. Students who lacked experience with computer mediated communications were more comfortable with asynchronous, rather than synchronous, communications. Students expressed that the small class size limited their ability to engage in productive asynchronous discussion. Students also indicated that a lack of feedback from peers and the instructor was detrimental to the interaction process.

Vrasidas and McIssac (1999) concluded that certain structural elements promoted interaction and dialogue. Although the authors stated that they interpreted this finding as contradictory to Moore’s transactional distance theory where the constructs of dialogue and structure are inversely related, this author suggests that this is not the case. It appears to this writer that although acts of interaction facilitation need to be incorporated into the structural development of a course if the goal is to assure that interaction and dialogue will occur, this structural characteristic for interaction facilitation is not the same concept as structure in other forms. It is not more structure that promotes interaction; it is the act of structured facilitation that improves interaction. A distinction between the concept of true structure and methods of interaction facilitation needs to be made. If this distinction is not made, then it is almost like saying the instructor structured in less structure to improve dialogue (which does not make much sense). Instead, it makes more sense to look at this phenomenon as thinking that the instructor incorporated interaction facilitation methods to increase interaction/dialogue and decrease structure. For students with average to decreased autonomy, if structured interaction facilitation methods were not used, then most likely less interaction would occur, thereby requiring more structure for students to meet the desired education outcomes. This interpretation could also be
applied to the Bunker, Gayol, Nti, and Reidell (1996) study as well. These contentions are further supported by research findings which demonstrated that students who did not have the autonomy required for a particular course felt lonely and desired more interaction (dialogue) with the instructor (Anderson, 1999). There has to be some structure to any course, or otherwise there is not course. It is how the course is structured and the rigidity of the structure that require continued investigation.

Chen & Willits (1999, p.54) found that “the more rigid the course delivery, the less frequent was the reported in-class discussion”. This finding was consistent with Moore’s theory. However, this study also found that “the more independent the students reported themselves to be, the more frequently they indicated in-class interaction” (Chen & Willits, 1999, p.54. This last finding was not consistent with previously stated assertions where it was postulated that less dialogue is associated with greater student independence and autonomy. The study appears to suggest that the opposite, that more dialogue may be associated with more student independence and autonomy. This finding was also consistent with Huang’s (2000) findings of a significant correlation between interaction and autonomy based on survey data.

An explanation could be that these findings support the premise made by this author regarding the findings by the Vrasidas and McIssac (1999) study. Structural elements of interaction facilitation should not be considered the same as other forms of course structure, where more structure and less dialogue require greater autonomy, and subsequently greater transactional distance. Structural elements such as interaction facilitation methods may be needed more for students with low autonomy, and less for students with high autonomy. In addition, high autonomy students in a low transactional
distance setting may be more self-directed and more willing to interact with the instructor and peers without necessitating any interaction facilitation method application. Students who are more autonomous may be more willing to interact when asked, and may not require the interaction facilitation methods applied by an instructor to encourage their interaction. This interpretation is consistent with assertions made by Saba (2004a). Yet another explanation could be that student self-perceptions of independence may not reflect their actual independence. Further research is warranted. This is yet another interesting example where more knowledge of student characteristics, or variables within autonomy, may have shed more light on the study results.

Perhaps future research will demonstrate that there is a way to modify structure and improve the dialogue that learners experience in the context described in this study (i.e. high transactional distance with active engagement of most of the intelligences) so that they could improve their interpersonal intelligence. Improvement of their interpersonal intelligence could result in increased abilities for interaction and dialogue. These improved abilities for effective interaction and dialogue could result in improved abilities for interdependent learning between the learners and the patients. This improved interdependence in learning could result in increased learner knowledge, which allows them to better meet their learning objectives. This could result in improved levels of learner autonomy and independence, and be reflected in more positive attitudes toward independent learning.
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Appendix A

Adult Attitudes Toward Independent Learning Scales (AATILS) Questionnaire
Fictitious name_______________________________
Fictitious ID # _______________________________

AATILS Questionnaire

Instructions: This questionnaire was designed to gather information on your attitudes toward learning in a variety of settings, e.g. school, work, home, institution, etc. Please read each item, then indicate your perception of how each statement best describes you. The following choices are available:

1  2  3  4  5
Almost Never   Seldom   Sometimes   Often   Almost Always

Please circle your response directly on this sheet. If you decide to change a response, erase completely.

Items:

1. I am succeeding because I want to succeed. 1 2 3 4 5
2. When I stick with a project, I usually complete it. 1 2 3 4 5
3. I believe that I can achieve, and as a result I do. 1 2 3 4 5
4. I attribute my success to effective decision making. 1 2 3 4 5
5. People often seek my advice. 1 2 3 4 5
6. I know that I will be successful. 1 2 3 4 5
7. No matter how long it takes, I always finish the task. 1 2 3 4 5
8. Regardless of the difficulty of the task, I know I will succeed. 1 2 3 4 5
9. I know a great deal about how to manage my life. 1 2 3 4 5
10. People often depend on me for direction. 1 2 3 4 5
11. I attribute my overall success to persistent effort. 1 2 3 4 5
12. I often take action to improve my institution or organization. 1 2 3 4 5
13. I am confident that once I have decided how to proceed, I will be successful. 1 2 3 4 5
14. Whenever one solution fails, I generate another. 1 2 3 4 5
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<th>1</th>
<th>2</th>
<th>3</th>
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<tr>
<td>Almost Never</td>
<td>Seldom</td>
<td>Sometimes</td>
<td>Often</td>
<td>Almost Always</td>
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<td>15.</td>
<td>Given the opportunity, I can design creative solutions to problems.</td>
<td>1 2 3 4 5</td>
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<td>16.</td>
<td>I know if I try hard enough, I will succeed.</td>
<td>1 2 3 4 5</td>
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<td>17.</td>
<td>I often come up with new ideas.</td>
<td>1 2 3 4 5</td>
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<td>18.</td>
<td>I accomplish the most when I prioritize my goals.</td>
<td>1 2 3 4 5</td>
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<td>19.</td>
<td>I frequently succeed on projects that most others abandon.</td>
<td>1 2 3 4 5</td>
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<td>20.</td>
<td>I often initiate projects myself.</td>
<td>1 2 3 4 5</td>
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<td>21.</td>
<td>Once I review the facts, I have little trouble making a decision.</td>
<td>1 2 3 4 5</td>
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<td>22.</td>
<td>I realize that there are many ways to solve a problem.</td>
<td>1 2 3 4 5</td>
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<td>23.</td>
<td>I am always working on personal development plans because the more I improve myself, the more I accomplish.</td>
<td>1 2 3 4 5</td>
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<td>24.</td>
<td>If given the opportunity, I can design creative solutions to problems.</td>
<td>1 2 3 4 5</td>
<td></td>
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<td>25.</td>
<td>I usually find various ways to totally immerse myself in my work.</td>
<td>1 2 3 4 5</td>
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<td>26.</td>
<td>I am inquisitive about anything that I don’t fully understand.</td>
<td>1 2 3 4 5</td>
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<td>27.</td>
<td>I always work on a problem until I find a solution.</td>
<td>1 2 3 4 5</td>
<td></td>
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<td>28.</td>
<td>The more I have to do, the more I accomplish.</td>
<td>1 2 3 4 5</td>
<td></td>
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<td>29.</td>
<td>I usually set achievable goals and quickly accomplish them.</td>
<td>1 2 3 4 5</td>
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<td>30.</td>
<td>Among my friends or colleagues, I often am able to make the best decisions.</td>
<td>1 2 3 4 5</td>
<td></td>
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<td>31.</td>
<td>I always strive to do my best.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
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<td>32.</td>
<td>Others often praise me for my enthusiasm toward my work.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
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</table>
33. When I identify a more effective method to accomplish a task, I adopt it immediately. 1 2 3 4 5
34. I expect to receive regular advances in my career. 1 2 3 4 5
35. The greater the challenge, the more excited I am. 1 2 3 4 5
36. I require very little external motivation. 1 2 3 4 5
37. When I keep my energy level in balance every day, I feel terrific and accomplish much. 1 2 3 4 5
38. I have unique ways of accomplishing tasks. 1 2 3 4 5
39. I often look for new ways to accomplish routine tasks. 1 2 3 4 5
40. I never quit a project that I begin. 1 2 3 4 5
41. Once I start a project, it is difficult for me to stop. 1 2 3 4 5
42. I have much ambition. 1 2 3 4 5
43. I often change my approach to any task once I have found a more effective solution. 1 2 3 4 5
44. I achieve more when I plan my time carefully. 1 2 3 4 5
45. I accomplish more each day than my friends and colleagues do. 1 2 3 4 5
46. I feel as though I can find a solution to any problem. 1 2 3 4 5
47. I am very good about sticking to time schedules. 1 2 3 4 5
48. Whenever I investigate a subject, I often gather more information than is necessary. 1 2 3 4 5
49. I fully enjoy my work and my life. 1 2 3 4 5
50. The better that I manage the stress in my life, the more effective I can be as a person. 1 2 3 4 5

Thank you for your cooperation and have a great day!!
Appendix B

Approval from Dr. Kole
Hello Christine,
Greetings from Kiev, Ukraine! Yes, feel free to use the instrument. Please send me a copy of your work when finished or e-mail it. I'd be interested to read it. Please tell me more about what you are doing & what your career goals are so far. I also want to Penn State & now teach at Clarion University of PA in the Fall.
Best Regards,
Jim

cmulholl <cmulholl@suscom.net> wrote:

Hello Dr. Kole,

I am a graduate student at Penn State working on my D.Ed. I was wondering if you are the Dr. James Kole who wrote "The development of an Instrument to assess attitudes toward independent learning of adult students" in 1988? If so, I was hoping that I might have your permission to use your instrument in my research. Thank you for any help you can provide!

Christine

5/11/2005
Appendix C

Multiple Intelligences Developmental Assessment Scales (MIDAS) and Answer Sheet
INSTRUCTIONS
Please read!

These questions take about 30 minutes to answer. There are 8 areas of activities, skills and interests covered. Think of this as if you are interviewing yourself. You may be surprised by what you know about yourself when you think carefully. For questions that give you several choices, pick the one activity you're strongest in and rate yourself on that only.

It is important that you give honest responses.
Be fair to yourself.
Do not under rate what you are able to do.

You do not have to answer or guess at every question because each one has an "I don't know" or Does not apply" choice. Use this answer whenever it fits best for you. For example, some of the questions may ask about things you may not remember or you never got to do.

SAMPLE:
1. Can you sing 'in tune'? If "D" is your choice then darken this 'circle':
A= A little bit.
B= Fair.
C= Well.
D= Very Well.
E= Excellent.
F= I don't know.

-> Darken one 'circle' only for each question with a pencil.
The circles marked G, H, I and J are not used.
-> Please do not write on the answer sheet or questionnaire.
-> Erase all changes completely.

Your profile will only be as accurate as your answers.
It's O.K. to respond that you do not know.
MUSICAL

1. As a child, did you have a strong liking for music or music classes?
A= A little.
B= Sometimes.
C= Usually.
D= Often.
E= All the time.
F= I don't know.

2. Did you ever learn to play an instrument?
A= No.
B= A little.
C= Fair.
D= Good.
E= Excellent.
F= I don't know.

3. Can you sing 'in tune'?
A= A little bit.
B= Fair.
C= Well.
D= Very well.
E= Excellent.
F= I don't know.

4. Do you have a good voice for singing with other people in harmony?
A= A little bit.
B= Fair.
C= Good.
D= Very good.
E= Excellent.
F= I don't know.

5. As an adult, did you ever play an instrument, play with a band or sing with a group?
A= Never.
B= Every once in a while.
C= Sometimes.
D= Often.
E= Almost all of the time.
F= I don't know. Does not apply.

6. Do you spend a lot of time listening to music?
A= Every once in a while.
B= Sometimes.
C= Often.
D= Almost all the time.
E= All the time.
F= I don't know.

7. Do you ever make up songs or write music?
A= Never.
B= Once or twice.
C= Every once in a while.
D= Sometimes.
E= Often.
F= I don't know.

8. Do you ever drum your fingers, whistle or sing to yourself?
A= Every once in a while.
B= Sometimes.
C= Often.
D= Almost all the time.
E= All the time.
F= I don't know.

9. Do you often have favorite tunes on your mind?
A= Every once in a while.
B= Sometimes.
C= Often.
D= Almost all the time.
E= All the time.
F= I don't know.

10. Do you often like to talk about music?
A= Never.
B= Every once in a while.
C= Sometimes.
D= Often.
E= Nearly all the time.
F= I don't know.

11. Do you have a good sense of rhythm?
A= Fair.
B= Pretty good.
C= Good.
D= Very good.
E= Excellent.
F= I don't know.

12. Do you have a strong liking for the SOUND of certain instruments or musical groups?
A= Every once in a while.
B= Sometimes.
C= Often.
D= Almost all the time.
E= All the time.
F= I don't know.
13. Do you think you have a lot of musical talent or skill that was never fully brought out?
A= No.
B= Some.
C= A fair amount.
D= A good amount.
E= A great deal.
F= I don't know.

14. Do you often have music on while you work, study or relax?
A= Every once in a while.
B= Sometimes.
C= Usually.
D= Almost always.
E= Always.
F= I don't know.

15. In school, did you generally enjoy sports or gym class more than other school classes?
A= Not at all.
B= A little.
C= About the same.
D= Enjoyed sports more.
E= Enjoyed sports much more.
F= I don't know.

16. As a teenager, how often did you play sports or other physical activities?
A= Every once in a while.
B= Sometimes.
C= Often.
D= Almost always.
E= All the time.
F= I don't know or does not apply.

17. Did you ever perform in a school play or take lessons in acting or dancing?
A= Never.
B= Maybe once.
C= A couple of times.
D= Often.
E= Almost all the time.
F= I don't know.

18. Do you or other people (like a coach) think that you are coordinated, graceful or a good athlete?
A= No.
B= Maybe a little.
C= About average.
D= Better than average.
E= Superior.
F= I don't know.

19. Did you ever take lessons or have someone teach you a sport such as bowling, karate, golf, etc.?
A= No.
B= Rarely.
C= Sometimes.
D= Often.
E= Nearly all the time.
F= I don't know.

20. Have you ever joined teams to play a sport?
A= Never.
B= Rarely.
C= Sometimes.
D= Often.
E= Almost all the time.
F= I don't know.

21. As an adult, do you often do physical work or exercise?
A= Rarely.
B= Sometimes.
C= Often.
D= Almost all the time.
E= All the time.
F= I don't know.

22. Are you good with your hands at things like card shuffling, magic tricks or juggling?
A= Not very good.
B= Fair.
C= Good.
D= Very good.
E= Excellent.
F= I don't know.

23. Are you good at doing precise work with your hands such as sewing, making models, tying flies, typing or have good handwriting?
A= Not at all.
B= Fairly good.
C= Good.
D= Very good.
E= Excellent.
F= I don't know.
24. Do you enjoy working with your hands on projects such as mechanics, building things, preparing fancy food or sculpture?
A= Never or rarely.
B= Sometimes.
C= Often.
D= Almost all the time.
E= All the time.
F= I don't know or doesn't apply.

25. Are you good at using your body or face to imitate people such as teachers, friends, or family?
A= Not at all.
B= A little bit.
C= Fair.
D= Good.
E= Very good.
F= I don't know.

26. Are you a good dancer, cheerleader or gymnast?
A= Not at all.
B= Fairly good.
C= Good.
D= Very good.
E= Excellent.
F= I don't know.

27. Do you learn better by having something explained to you or by doing it yourself?
A= Always better by explanation.
B= Sometimes better by explanation.
C= No difference.
D= Usually better by doing it.
E= Always better by doing it.
F= I don't know.

MATH / LOGIC

28. As a child, did you easily learn math such as addition, multiplication and fractions?
A= Not at all.
B= It was fairly hard.
C= Pretty easy.
D= Very easy.
E= Learned much quicker than all the kids.
F= I don't know.

29. In school, did you ever have extra interest or skill in math?
A= Very little or none.
B= Maybe a little.
C= Some.
D= More than average.
E= A lot.
F= I don't know.

30. How did you do in advanced math classes such as algebra or calculus?
A= Didn't take any.
B= Not very well.
C= Fair. (C's)
D= Well. (B's)
E= Excellent. (A's)
F= I don't know or does not apply.

31. Have you ever had interest in studying science or solving scientific problems?
A= No.
B= A little.
C= Average.
D= More than average.
E= A great deal.
F= I don't know.

32. Are you good at playing chess or checkers?
A= No.
B= Fairly good.
C= Good.
D= Very good.
E= Excellent.
F= I don't know.

33. Are you good at playing cards or solving strategy or puzzle-type games?
A= Not at all.
B= A little.
C= About average.
D= Better than average.
E= Excellent.
F= I don't know.

34. Do you often play games such as Scrabble or crossword puzzles?
A= Very rarely or never.
B= Every once in a while.
C= Sometimes.
D= Often.
E= All the time.
F= I don't know.
35. Do you have a good system for balancing a checkbook or figuring a budget?
   A= Not at all.
   B= Fairly good.
   C= Good.
   D= Very good.
   E= An excellent system.
   F= I don't know or does not apply.

36. Do you have a good memory for numbers such as telephone numbers or addresses?
   A= Not very good.
   B= Fair.
   C= Good.
   D= Very good.
   E= Superior.
   F= I don't know.

37. How are you at figuring numbers in your head?
   A= Can not do it.
   B= Not very good.
   C= Fair.
   D= Good.
   E= Excellent.
   F= I don't know.

38. Are you a curious person who likes to figure out WHY or HOW things work?
   A= Every once in a while.
   B= Sometimes.
   C= Often.
   D= Almost all the time.
   E= All the time.
   F= I don't know.

39. Are you good at inventing 'systems' for solving long or complicated problems? For example, betting at the race track or organizing your home or life?
   A= Not good at all.
   B= Fair.
   C= Good.
   D= Better than average.
   E= Excellent.
   F= I don't know.

40. Are you curious about nature like fish, animals, plants or the stars and planets?
   A= Rarely.
   B= Sometimes
   C= Often.
   D= Almost all the time.
   E= All the time.
   F= I don't know.

41. Have you ever liked to collect things and learn all there is to know about a certain subject such as antiques, horses, baseball, etc.?
   A= Not at all.
   B= A little.
   C= Sometimes.
   D= Often.
   E= Almost all the time.
   F= I don't know.

42. Are you good at jobs or projects where you have to use math a lot or get things organized?
   A= Not good at all.
   B= Fairly good.
   C= Good.
   D= Very good.
   E= Excellent.
   F= I don't know or does not apply.

43. Outside of school, have you ever enjoyed working with numbers like figuring baseball averages, gas mileage, budgets, etc.?
   A= Not at all.
   B= Every once in a while.
   C= Sometimes.
   D= Often.
   E= Almost all the time
   F= I don't know.

44. Do you use good common sense for planning social activities, making home repairs, or solving mechanical problems?
   A= Sometimes.
   B= Usually.
   C= Often.
   D= Almost all the time.
   E= All the time.
   F= I don't know.

SPATIAL

45. As a child, did you often build things out of blocks or boxes; play with jacks, marbles or jump rope?
   A= Never or rarely.
   B= Sometimes.
   D= Often.
   E= All the time.
   F= I don't know.
46. As a teenager or adult, how well could you do any of these: mechanical drawing, hair styling, woodworking, art projects, auto body, or mechanics?
A= Didn't take any.
B= Fair.
C= Good. (C's)
D= Very good. (B's)
E= Excellent. (A's)
F= I don't know. Does not apply.

47. How well can you 'design' things such as arranging or decorating rooms, craft projects, building furniture or machines?
A= Never do.
B= Fair.
C= Pretty good.
D= Good.
E= Excellent.
F= I don't know.

48. Can you parallel park a car on your first try?
A= Rarely or do not drive.
B= Sometimes.
C= Often.
D= Almost all the time.
E= All the time.
F= I don't know. Does not apply.

49. Are you good at finding your way around new buildings or city streets?
A= Not at all.
B= Fairly good.
C= Good.
D= Very good.
E= Excellent.
F= I don't know.

50. Are you good at using a road map to find your way around?
A= Not at all.
B= Fairly good.
C= Good at it.
D= Very good.
E= Excellent at reading maps.
F= I don't know.

51. Are you good at fixing 'things' like cars, lamps, furniture, or machines?
A= Not at all.
B= Not very good.
C= Fair.
D= Good.
E= Excellent.
F= I don't know.

52. How easily can you put things together like toys, puzzles, or electronic equipment?
A= Not at all.
B= It is hard.
C= It is fairly easy.
D= It is easy.
E= It is very easy.
F= I don't know.

53. Have you ever made plans or patterns for projects such as sewing, carpentry, crafts, woodworking, etc.?
A= Never.
B= Maybe once.
C= Every once in a while.
D= Sometimes.
E= Often.
F= I don't know.

54. Have you ever drawn or painted pictures?
A= Rarely or never.
B= Every once in a while.
C= Sometimes.
D= Often.
E= Almost all the time.
F= I don't know

55. Do you have a good sense of design for decorating, landscaping or working with flowers?
A= Not very good.
B= Fair.
C= Good.
D= Very good.
E= Excellent.
F= I don't know.

56. Do you have a good sense of direction when in a strange place?
A= Not at all.
B= Fairly good.
C= Good.
D= Very good.
E= Superior.
F= I don't know.

57. Are you good at playing pool, darts, riflery, archery, bowling, etc.?
A= Not at all.
B= A little.
C= Fair.
D= Better than average.
E= Excellent.
F= I don't know.
58. Do you often draw a picture or sketch to give directions or explain an idea?
   A= Never.
   B= Rarely.
   C= Sometimes.
   D= Often.
   E= All the time.
   F= I don't know.

59. Are you creative and like to invent or experiment with unique designs, clothes or projects?
   A= Very little or not at all.
   B= A little.
   C= Somewhat.
   D= Often.
   E= Almost all the time
   F= I don't know.

LINGUISTIC

60. Do you enjoy telling stories or talking about favorite movies or books?
   A= Not at all.
   B= Rarely.
   C= Sometimes.
   D= Often.
   E= Almost all the time.
   F= I'm not sure.

61. Do you ever play with the sounds of words like making up jingles, or rhymes? For example, do you give things or people funny sounding nicknames?
   A= Never.
   B= Rarely.
   C= Sometimes.
   D= Often.
   E= Almost all the time.
   F= I don't know.

62. Do you use colorful words or phrases when talking?
   A= No.
   B= Rarely.
   C= Sometimes.
   D= Often.
   E= All the time.
   F= I don't know.

63. Have you ever written a story, poetry or words to songs?
   A= Never.
   B= Maybe once or twice.
   C= Occasionally.
   D= Often.
   E= Almost all the time.
   F= I don't know.

64. Are you a convincing speaker?
   A= Not at all.
   B= Every once in a while.
   C= Sometimes.
   D= Often.
   E= Almost all of the time.
   F= I don't know.

65. How are you at bargaining or making a deal with people?
   A= Not very good.
   B= Fair.
   C= Pretty good.
   D= Good.
   E= Excellent.
   F= I don't know.

66. Can you talk people into doing things your way when you want to?
   A= Not at all.
   B= Every once in a while.
   C= Sometimes.
   D= Often.
   E= Almost all the time.
   F= I'm not sure.

67. Do you ever do public speaking or give talks to groups?
   A= Very rarely or never.
   B= Every once in a while.
   C= Sometimes.
   D= Often.
   E= Almost all the time.
   F= I don't know.

68. How are you at managing or supervising people?
   A= Never do or not very good at it.
   B= Fair.
   C= Good.
   D= Very good.
   E= Excellent.
   F= I don't know or does not apply.
69. Do you have interest for talking about things like the news, family matters, religion or sports, etc.?
A= A little.
B= Some interest.
C= Average interest
D= More than average.
E= A great deal.
F= I don't know.

70. When others disagree are you able to easily say what you think or feel?
A= Rarely.
B= Every once in a while.
C= Sometimes.
D= Often.
E= All the time.
F= I don't know.

71. Do you enjoy looking up words in dictionaries, or arguing with others about "the right word" to use?
A= Never or rarely.
B= Every once in a while.
C= Sometimes.
D= Often.
E= Very often.
F= I don't know.

72. Are you often the one asked to "do the talking" by family or friends because you are good at it?
A= Very rarely or never.
B= Rarely.
C= Sometimes.
D= Often.
E= Almost all the time.
F= I don't know.

73. Have you ever been good at imitating the way other people talk?
A= Not really.
B= Fairly good.
C= Pretty good.
D= Good.
E= Very good.
F= I don't know.

74. Have you ever been good at writing reports for school or work?
A= Not really. Never do any.
B= Pretty good.
C= Good.
D= Very good.
E= Superior.
F= I don't know.

75. Can you write a good letter?
A= No or fair.
B= Pretty good.
C= Good.
D= Very good.
E= Excellent.
F= I don't know.

76. Do you like to read or do well in English classes?
A= A little.
B= Sometimes.
C= Usually.
D= Often.
E= All the time.
F= I don't know.

77. Do you write notes or make lists as reminders of things to do?
A= Rarely or never.
B= Every once in a while.
C= Sometimes.
D= Often.
E= Almost all the time.
F= I don't know.

78. Do you have a large vocabulary?
A= Not really.
B= Less than average.
C= About average.
D= Above average.
E= Superior.
F= I don't know.

79. Do you have skill for choosing the right words and speaking clearly?
A= Not at all or rarely.
B= Sometimes.
C= Usually.
D= Most of the time.
E= Almost always.
F= I don't know.

INTERPERSONAL

80. Have you had friendships that have lasted for a long time?
A= One or two.
B= More than a couple.
C= Quite a few.
D= A lot.
E= A great many long lasting friendships.
F= I don't know.
81. Are you good at making peace at home, at work or among friends?
A= Fair.
B= Pretty good.
C= Good.
D= Very good.
E= Excellent.
F= I don't know.

82. Are you ever a 'leader' for doing things at school, among friends or at work?
A= Rarely.
B= Every once in a while.
C= Sometimes.
D= Often.
E= Almost always.
F= I don't know.

83. In school, were you usually part of a particular group or crowd?
A= Rarely.
B= Every once in a while.
C= Sometimes.
D= Most of the time.
E= Almost all the time.
F= I don't know.

84. Do you easily understand the feelings, wishes or needs of other people?
A= Sometimes.
B= Usually.
C= Often.
D= Almost always.
E= Always.
F= I don't know.

85. Do you ever offer to 'help' other people such as the sick, the elderly or friends?
A= Sometimes.
B= Usually.
C= Often.
D= Very often.
E= Always.
F= I don't know.

86. Do friends or family members ever come to you to talk over personal troubles or to ask for advice?
A= Every once in a while.
B= Sometimes.
C= Often.
D= Almost all the time.
E= All the time.
F= I don't know.

87. Are you a good judge of 'character'?
A= Every once in a while.
B= Sometimes.
C= Usually.
D= Almost always.
E= Always.
F= I don't know.

88. Do you usually know how to make people feel comfortable and at ease?
A= Every once in a while.
B= Sometimes.
C= Usually.
D= Often.
E= Almost always.
F= I don't know.

89. Do you generally take the good advice of friends?
A= Every once in a while.
B= Sometimes.
C= Usually.
D= Often.
E= Almost always.
F= I don't know.

90. Are you generally at ease around (men or women) your own age?
A= Rarely.
B= Sometimes.
C= Usually.
D= Almost all the time.
E= Always.
F= I don't know.

91. Are you good at understanding your girlfriend's or wife's ideas and feelings?
A= Every once in a while.
B= Sometimes.
C= Usually.
D= Almost all the time.
E= All the time.
F= I don't know. Does not apply.

92. Are you an easy person for people to get to know?
A= Not at all.
B= Pretty hard.
C= Fairly easy.
D= Easy.
E= Very easy.
F= I don't know.
93. **Do you have a hard time coping with children?**
   
   - A= Usually have a hard time.
   - B= Sometimes it is hard.
   - C= Usually easy.
   - D= Almost always easy.
   - E= Always very easy.
   - F= I don't know.

94. **Have you ever had interest in teaching, coaching or counseling?**
   
   - A= Very little or none.
   - B= A little interest.
   - C= Some interest.
   - D= A lot of interest.
   - E= A great deal of interest.
   - F= I don't know or doesn't apply.

95. **Can you do well when working with the public in jobs such as sales, receptionist, promoter, police, or waiter?**
   
   - A= Fair.
   - B= Fairly well.
   - C= Well.
   - D= Very well.
   - E= Excellent.
   - F= I don't know. Does not apply.

96. **Do you prefer working alone or with a group of people?**
   
   - A= Always alone.
   - B= Usually alone.
   - C= No preference.
   - D= Usually with a group.
   - E= Always with a group.
   - F= I don't know.

97. **Are you able to come up with unique or imaginative ways to solve problems between people or settle arguments?**
   
   - A= Maybe once or twice.
   - B= Every once in a while.
   - C= Sometimes.
   - D= Often.
   - E= All the time.
   - F= I don't know.

**INTRAPERSONAL**

98. **Do you have a clear sense of who you are and what you want out of life?**
   
   - A= Very little.
   - B= A little.
   - C= Usually.
   - D= Most of the time.
   - E= Almost all the time.
   - F= I don't know.
104. Do you get very angry when you fail or are frustrated?
A= Almost all the time.
B= Sometimes.
C= Every once in a while.
D= Rarely.
E= Almost never.
F= I don't know.

105. Have you ever had interest in 'self improvement'? For instance, do you attend classes to learn new skills or read 'self-help' books or magazines?
A= No.
B= A little.
C= Sometimes.
D= Often.
E= Almost always.
F= I don't know.

106. Have you ever been able to find unique or unusual ways to solve personal problems or achieve your goals?
A= Once or twice.
B= Every once in a while.
C= Sometimes.
D= Often.
E= All the time.
F= I don't know.

107. Have you ever raised pets or other animals?
A= Never or rarely.
B= Every once in a while.
C= Sometimes.
D= Often.
E= All the time.
F= I don't know.

108. Is it easy for you to understand and care for an animal?
A= Not at all.
B= Maybe a little.
C= Fairly easy.
D= Quite easy.
E= Very easy.
F= I don't know.

109. Have you ever done any pet training, hunting or studied wildlife?
A= No.
B= A little.
C= Sometimes.
D= Quite a bit.
E= A great deal.
F= I don't know. No opportunity.

110. Are you good at working with farm animals or thought about being a veterinarian or naturalist?
A= Not at all.
B= A little.
C= Some.
D= Quite a bit.
E= Very much so.
F= I don't know.

111. Do you easily understand differences between animals such as personalities, traits or habits?
A= Not at all.
B= A little.
C= Fairly easy.
D= Quite easy.
E= Very easy.
F= I don't know.

112. Are you good at recognizing breeds of pets or kinds of animals?
A= Not at all.
B= At little.
C= Somewhat.
D= Quite good.
E= Very good.
F= I don't know.

113. Are you good at observing and learning about nature, for example, clouds, weather patterns, animal or plant life?
A= Never.
B= A little.
C= Some.
D= Quite a bit.
E= A great deal.
F= I don't know.

114. Are you good at growing plants or raising a garden?
A= Not at all.
B= A little.
C= Somewhat.
D= Quite a bit.
E= Very good.
F= I don't know.
115. Can you identify or understand the differences between types of plants?
A= Not at all.
B= A little.
C= Somewhat.
D= Most of the time, yes.
E= All the time.
F= I don't know.

116. Are you fascinated by natural energy systems such as chemistry, electricity, engines, physics or geology?
A= No.
B= A little.
C= Somewhat.
D= Quite a bit.
E= A great deal.
F= I don't know.

117. Do you have a concern for nature and do things like recycling, camping, hiking or bird watching?
A= No.
B= A little
C= Some.

118. Have you taken photographs of nature or written stories or done artwork?
A= No.
B= A little.
C= Some.
D= A lot.
E= A great deal.
F= I don't know.

119. Is spending time with nature an important part of your life?
A= Not really.
B= A little.
C= Somewhat.
D= Quite a bit.
E= Very much so.
F= I don't know.

You're Finished!
Appendix D
Approval from Dr. Shearer
Dear Christine:

Yes, you have my permission to use the MIDAS assessment for your research. I would like to have an updated Research Plan with timeline in case it has changed, number of profiles, age group, etc.

Good luck with your planning, Branton


... 3/6/2005
Appendix E

Approval to Survey Sample
Christine Mulhollen M.M.S., PA-C  
Faculty, Physician Assistant Program, DIF #123  
Pennsylvania College of Technology  
One College Avenue  
Williamsport, PA 17701

Dear Ms. Mulhollen:

I give my permission for you to use the Adult Attitudes Toward Independent Learning Scales (AATILS) and the Multiple Intelligences Developmental Assessment Scales (MIDAS) surveys so that you may conduct a study to determine the impact of perceived multiple intelligences on attitudes toward independent learning. You may survey senior students and graduates from the Pennsylvania College of Technology Physician Assistant Program.

I look forward to learning the results of your study.

Sincerely,

[Signature]

Joseph Mileto Jr., M.H.Sc., PA-C  
Director of the Physician Assistant Program
Appendix F

Letter to Subjects
A research study entitled: “What is the relationship of participating in a distance education program and attitude toward independent learning given learners’ strengths of intelligences?” is being pursued by Christine Mulhollen M.M.S., PA-C who is a faculty member of the Physician Assistant Program at the Pennsylvania College of Technology (PCT) and a graduate student in the Adult Education Program at the Pennsylvania State University (PSU). The purpose of this study is to determine whether one or more of the multiple intelligences can predict attitudes toward independent learning. Participants for this study will include a sample of adults who have experienced independent learning/distance education (i.e. internships) as part of the PCT Physician Assistant Program educational experience.

Please consider completing the Adult Attitudes Toward Independent Learning Scales (AATILS), which consists of 50 questions, and the Multiple Intelligences Developmental Assessment Scales (MIDAS), which consists of 119 questions. No risks in participating in this research, beyond those experienced in everyday life, is expected. The time to complete the surveys may cause some discomfort (it is estimated that time for completion of both surveys may take up to 40-55 minutes). You may personally benefit from this research in that you may learn more about yourself. You might develop a better understanding of how you perceive your intellectual abilities, and this information may allow you to have better insight into your perceived strengths and weaknesses. In addition, an improved understanding of the relationship between perceived multiple intelligences and attitudes could allow for future educational interventions which may improve attitudes and support learner autonomy and independence.

Although your responses will not be anonymous, they will be held in confidence. Personal identifying information connecting you to the fictitious name and identification number which has been assigned to you will remain strictly confidential. This information will be kept in a locked and restricted access filing cabinet, and in a similarly secured password protected computer file, that are only accessible to the primary researcher. In the event of a publication or presentation resulting from the research, no personally identifiable information will be shared.

If you have any questions or concerns, please contact the principal investigator, Christine Mulhollen, at (570) 326-3761 ext. 7811; e-mail cmulholl@suscom.net. Her research advisor, Dr. Michael Moore, may be contacted at (814) 863-3501; e-mail mgmoore@psu.edu. If you have questions about your rights as a research participant, you may contact The Pennsylvania State University’s Office for Research Protections at (804) 865-1775.
Participant’s who return the completed MIDAS survey and answer sheet, the completed AATILS survey, and the consent form, will have the option of having their multiple intelligences profile results returned to them.

Your participation is voluntary, you may decline to answer specific questions, and you may withdraw your participation or stop at any time. All study participants must be 18 years of age or older. If you agree to participate in this study, please sign your name and indicate the date below. Please retain a copy of this document for your records. Thank you for your participation.

____ Yes, I want the results of my MIDAS profile returned to me.
____ No, I do not want the results of my MIDAS profile.

_________________________________________  ________________
Research Participant Signature                  Date

_________________________________________  ________________
Person Obtaining Consent                        Date
Vita
Christine Mulhollen
1023 Spruce Street
Montoursville, PA  17754
(717) 368-3607

EDUCATION

1996 to present  Enrolled in the Adult Education D.Ed. program
Pennsylvania State University
University Park, PA
Member of Pi Lambda Theta:
Education Honors Association
Biography published in The Chancellor’s List

1995  Saint Francis College, Loretto PA
Master of Medical Science

1988  Saint Francis College, Loretto, PA
Bachelor of Science - Physician Assistant
Cum Laude and Honors Program Graduate
Dean’s List / National Dean’s List
SFC Scholastic Performance Award

EXPERIENCE

June 1996  Pennsylvania College of Technology, Williamsport PA
Physician Assistant Program
Responsibilities include: Instruction; facilitation of learning in collaborative
efforts; cooperative learning; lecturing; student evaluation; student advising;
curriculum development; program planning; assistance in obtaining program
accreditation status.

Oct. 1993 – May 1996  State Correctional Institution, Cresson PA
Responsibilities: Provide comprehensive medical care services

1993 - 1996  St. Francis College, Loretto PA
(Part-time)
Assist with labs and assessments

Feb. 1992 – Oct. 1993  Mercy Medical Center, Johnstown PA
Physician Assistant Department Manager
Responsibilities: Manage and expand department functions; clinical duties
in hospital, urgent care clinics, and community outreach.

1990-1992  Veterans Administration Hospital, Altoona PA
Responsibilities: internal medicine; nursing home; intermediate care unit;
emergency; walk-in clinic; ambulatory care.

1988-1990  Mercy Hospital, Johnstown PA
Responsibilities: H&P’s; d/c summaries; patient education