SHIFTING TEACHER PARADIGMS: A STUDY OF ANDRAGOGICAL PROFESSIONAL LEARNING STRUCTURES

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ABSTRACT OF DISSERTATION

As public education seeks to address the needs of a globalized, 21st Century workplace, curriculum and instructional methodologies increasingly require classroom technology integration, infusion of critical thinking skills and information and media skills over rote memorization of facts. In order to retrain teachers in the new instructional archetype, this study designed and implemented a professional learning program, grounded in adult learning theory, which sought to shift teacher’s instructional paradigm from that of didactic information provider to student-driven learning facilitator. Specifically, the research questions addressed the current level of technology integration at a moderate size middle school in the Southeast United States and, from the teachers’ perspective, what barriers existed to increasing technology integration. Additionally, this study investigated what characteristics of professional learning programs teachers indicated not only effectively increased technology integration but were also likely to produce a sustainable paradigm shift. Using volunteer secondary teachers through an action research model, participants engaged in an andragogy-based professional learning program. Working with the researcher over a forty-five day period, participants assessed their current technology integration level, built a directed professional learning plan and utilized resources
and feedback to adjust continued implementation and increase overall classroom technology integration.

Keywords: andragogy, 21st Century skills, technology integration, professional learning, classroom technology, digital natives, adult learning theory
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DEDICATION

This doctoral study is dedicated to my husband, Michael and our children Stephen and April. You are my inspiration in all things. Of all the things I’ve accomplished in my life, none of them are as meaningful as you. Thank you for encouraging me, for enduring me and for allowing me the freedom and latitude to selfishly remove myself from you, in order to do something for me. The three of you are all I’ll ever want, or need, in this world and I love you more than you’ll ever know.
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Chapter 1: Introduction

During the 20\textsuperscript{th} Century the American educational system indoctrinated its collective practice. Students gained knowledge by reading textbooks and listening to their teachers’ direct instruction. They demonstrated knowledge through individual written tests primarily focused on recall of directly conveyed facts. Educational processes aligned with not only the entertainment of the day but the workforce standards as well. Families read books together or gathered around a radio to listen to news, politics and entertaining radio shows. The workforce reflected a factory model where assembly lines and individual responsibilities fed into a larger system to produce goods and services. The alignment between these facets of American life made functional sense and were effective. But, this is not the 20\textsuperscript{th} Century.

The dawn of the digital age fundamentally changed the face of the global marketplace. Entertaining today’s youth is a complex and multi-tasked process. Entertaining endeavors often compete between video soundbytes and technological gadgets. A 21\textsuperscript{st} Century student’s paradigm is defined by navigating digital overload. A student may entertain themselves playing any one of numerous video gaming platforms, most of which offer online interaction with multiple players from around the world. They continue that interaction through fast-paced social networking sites like Facebook and Twitter while downloading music to their iPod and watching multitudes of short video clips on YouTube. As hardwired home telephones disappear, the vast majority of today’s students own cell phones. They maintain communication through text messaging, instant messaging and increasingly prefer video communication such as Skype and Face Time over traditional audio phone calls. More than mere consumers of digital technology, today’s students often produce and publish their own media. Handheld video cameras, iPods, cell phones, photo editing programs and online software enable students to enhance their digital
footprint and produce media that is published to the worldwide web. Information gathering, management and dissemination are not passive activities. Students are often engaged in multiple digital endeavors simultaneously; everywhere but their respective classrooms.

The 21st Century student bears little resemblance to the 20th Century student. The burgeoning global economy is fundamentally different from the structures of the industrial age. Yet the systems developed to govern curriculum and instruction, designed 100 years ago, remain unchanged. This dichotomy produces an educational system that is essentially alien to the modern student, misaligned with the needs of the global marketplace and arguably ineffective overall.

**Statement of the Problem**

The generation gap between technologically savvy youth and their more traditionally connected elders constitutes an increasing area of interest among researchers and educational theorists. Mark Prensky (2001) championed the idea of the digital divide and monikered its respective participants as “digital natives” and “digital immigrants” (p. 1). He argues that the immersion of digital technology established fundamental differences between the generations. According to Prensky, digital natives, raised on rapid fire, technology enhanced information gathering methods, developed physiologically different neuropathways from digital immigrants. However digital immigrants, and the established systems of education, fail to recognize that divide and continue to present education as was effective for elder generations.

The digital divide concept, while relatively nascent, is gathering popularity among educational reformers. Dillon (2006) discusses an alternatively planned high school where both curriculum and instruction relate to the global economy. She delineates the distinction between
reading and a 21st Century literate student. She also refers to the battery of skills necessary to connect with, and prepare, digital natives for a changing economy. In a similar sense, Shaw (2009) directs her work toward educators and clearly describes the differences between a 20th and 21st Century classroom in terms of technology, instructional delivery and their respective relationship with the digital native student. Richtel (2010) explicitly enumerates the varied digital distractions that impact young students and illuminates their preference for digital interaction over traditional textbook learning. Even more compelling is the development of the Partnership for 21st Century Skills. This organization is comprised of member organizations from the educational and business community including corporations such as Cisco Systems, Inc., The Walt Disney Company, Crayola and the National Education Association. They developed and published a framework for teaching and learning with the context of 21st Century skills and are actively advocating these changes to educational policymakers nationwide (Partnership for 21st Century Skills, 2009).

This trend toward 21st Century skills constitutes a significant shift in curriculum and instruction that illuminates the differences between digital natives and digital immigrants. While these innovations, arguably, address the digital native, they are paradigmatically dissimilar for digital immigrant teachers. Traditional 20th Century teachers gravitate toward direct instruction, individual assessment and textbook support. However, digital divide advocates indicate a successful classroom is one that include collaborative interaction, inquiry-based exploration and a facilitated (rather than directed) environment that is grounded in critical thinking and shared problem solving (Dillon, 2006; November, 2010; Pappas, 2009; Partnership for 21st Century Skills, 2009; Quinney, Smith & Galbraith, 2010; Shaw, 2009).
In order to bridge the gap between digital natives and digital immigrants, significant structural and financial investments are being redistributed within numerous nationwide school systems. District leaders emphasize their commitment to eradicating the digital divide as they allocate increasingly sparse resources to improve infrastructure, connectivity, hardware and software availability for both students and staff (Keengwe, Onchwari & Wachira, 2008; Lawless & Pellegrino, 2007; Zhao & Bryant, 2006). National consortiums developed and advocated for fundamental changes in curriculum that are progressively being adopted by increasing numbers of state governments and essentially producing a national curriculum (National Governor's Association Center & Council of Chief State School Officers, 2010). These curriculum standards are founded on the recommendations espoused by organizations like the Partnership for 21st Century Skills (2009) and specifically address the popularly accepted description of the digital native. As teachers, generally defined as digital immigrants, shoulder the responsibility for implementing these innovative curriculum and instruction mandates, professional development becomes a significant area of emphasis.

Technology integrated skills, instruction and curriculum provide a rich landscape for professional developers to create, implement and train teachers to deliver effective 21st Century instruction. As these topics remain significant foci among district leaders, and hence occupy significant proportions of allocated professional learning budgets, the availability of myriad training programs, systems and organizations abound. As a result, respective professional learning programs intended to address emerging 21st Century skills are unfocused and lack a solid research base (Lawless & Pellegrino, 2006).

Research regarding technology integrated classrooms lacks cohesion. Researchers have attempted to define what classroom technology integration looks like. (Okojie, Olinzock &
Okojie-Boulder, 2006). There have been numerous studies to address teachers’ comfort and/or expertise with technology tools and their respective impact on classroom implementation (Clark, 2000; Clausen, 2007; Davis & Eslinger, 2001; Flowerday, Bruning & Hoffman, 2003). Others have spent considerable effort investigating how the teachers’ personal beliefs or core values impact the use of classroom technology (Ertmer, 2005; Iding, Crosby & Speitel, 2002; Harteis, Gruber & Hertramph, 2010; Hixson & Buckenmeyer, 2009; Overbaugh & Lu, 2008; Palak & Walls, 2009). Still others have researched teacher education programs focusing on technology integration and how that effects preservice and/or inservice teacher implementation (Corbell, Osborne & Grable, 2008; Duran, Fossum & Luera, 2006; Russell et. al., 2003). Some studies specifically addressed the implementation of classroom technology, but stopped short of connecting that use with student achievement (Overbaugh & Lu, 2008; Sheumaker, 2001). Among these myriad programs and foci, there is little to no systematic evaluation of these respective professional learning models to indicate their overall effectiveness (Guskey, 2001; Lawless & Pellegrino, 2007). Bauer and Kenton (2005) conducted a study to determine why (for all the investment in classroom technology) authentic practice is still lacking. Among the multiple reasons the researchers noted for the lack of integration, it is most concerning that they concluded authentic integration had yet to occur. This research aligns with others’ assertions that there is little evidence to indicate professional learning programs are effectively transforming classroom practice (Frederick, 2006; Zhao, 2006). In the absence of clearly delineated research that addresses the authentic transformation of traditional to 21st Century classroom structures, educational agencies are likely to continue allocating funds that do not produce proportional results and fail to prepare students to function in a globalized marketplace.
Significance of the Problem

The 20th Century standards for public education aligned with the factory system that predominated the workplace. During that time, the American workforce did not necessarily require a high school diploma or higher education to work in industrial positions. Direct instruction, textbook learning and individual responsibility for work completed reflected the dominant workplace skills. However, the dawn of the digital revolution changed the fundamental landscape of the global economy. Moreover, that global marketplace changed the requisite skills required for a successful workforce.

Friedman (2006) described the digital revolution as a seminal turning point in the life of public education. He argued that the globalized marketplace represents a significant divergence from any economic structure heretofore understood in the United States. This turning point is not without predecessors. The common school movement fueled by the Industrial Revolution marked the origin of public education as it now exists. This system emerged in order to produce a viable workforce for the burgeoning factory business model (Mondale & Patton, 2001). Largely unchanged until 1957, the launch of the Soviet Sputnik satellite unleashed the first of many educational reform efforts. Directing the focus specifically to math and science education, the emphasis on curriculum underwent considerable scrutiny. That examination continued, in 1983, when the National Commission on Excellence in Education released of *A Nation at Risk* (Mondale & Patton, 2001). This report issued a specific, and scathing, conclusion that the system of American education was failing. Claiming American students fell behind their international peers in nearly all areas of standardized investigation, political lobbyists, educational interest groups and others unleashed multiple reform efforts in an attempt to rectify our failing schools (Mondale & Patton, 2001; Tyack & Cuban, 1995).
These 20th Century turning points primarily impacted curriculum. Academic subjects became increasingly rigorous, curriculum standards required specific seat time, graduation standards increased and mandatory attendance legislation was enacted. However, the basic structure of instructional delivery saw little change. Classroom instruction in the final decade of the 20th Century was arguably unchanged from classroom instruction during the 20th Century’s first decade. Sputnik and A Nation at Risk changed what American classrooms instructed; not how those classrooms delivered that instruction.

This distinction between what the system of education teaches and how it is taught marks the fundamental difference between the seminal turning points of the 20th Century and the current emergence of the Digital Revolution. Friedman (2006) aligns those fundamental differences with a likewise departure in the operation of the global economy, hence drawing a parallel between the systems that exist and the ones that are necessary for the future. Educational agencies are now charged with preparing students for a future that cannot be easily anticipated. With the rapid-fire release of new technologies and communication systems the jobs current students will compete for have yet to be developed (Fisch, 2009; Friedman, 2006) and there is growing concern among the business community that the educational system is falling farther behind in preparing a viable 21st Century workforce (Peddle, 2000). Friedman (2006) summarized these concerns succinctly when he stated, “in the future, how we educate our children may prove to be more important than how much we educate them” (pg. 302).

However, changing the method of instructional delivery, more so than related content, directly addresses the generation gap between teachers and students. Prensky (2001) clearly delineated the differences between digital natives and digital immigrants. Additionally, between the two groups, he alluded to the idea that their respective developmental differences may have
given rise to essentially dissimilar neurological development. However unsubstantiated that claim may be; digital natives and digital immigrants most assuredly experienced a significantly dissimilar cultural upbringing. Beloit College (2009) produces an annual list for their faculty to describe the cultural context of their freshman class. Students may be described as never having seen a rotary telephone, never lived in a world without the internet and have never cut and paste with a pair of scissors (Beloit College, 2009). Without such understanding, and a specific adjustment of instructional methodology to fit contemporary students’ experience, educational theorists claim that the fundamental misalignment between instructional practices and disposition to learning is insurmountable to produce a relevant 21st Century education (Shaw, 2009; Prensky 2001, Quinney et al., 2010; Ritchtel, 2010).

Under increasing pressure from the business community to reform the public education system, states are changing teacher evaluation models to reflect 21st Century skills. Following the lead of educational research and theorists, district and state leaders are addressing outdated standards for teacher performance. In 2009-2010, North Carolina launched a new statewide teacher evaluation process that clearly defines excellent teachers as those who have shifted the instructional paradigm from that of direct instructor to learning facilitator. Within these facilitated lessons they are also expected to demonstrate authentic, student-led, technology integration as a tool to facilitate critical thinking skills (Public Schools of North Carolina, 2008).

North Carolina’s specific attention to problem-solving and higher order thinking skills is reflective of current trends in educational reform. Business leaders, educational communities and multiple state agencies have joined together in collaboration to produce, advocate and implement curriculum and instruction standards that reflect 21st Century skills. These revised instructional standards focus on higher order thinking, interactive communication strategies and information
and media technology skills (Moersch, 2002; Partnership for 21st Century Skills, 2009). In order to adapt to these changing standards for curriculum and instructional delivery, district leadership must prepare professional learning programs that strategically focus on the nuances between teaching with technology and learning through technology to maintain quality evaluated staff.

**Practical and Intellectual Thesis Goals**

**Practical Goals**

Maxwell (2005) defines a researcher’s practical goal as either those specific tasks they would like to accomplish or goals to they intend to achieve. This thesis study establishes the following two practical goals:

1.) With increasingly limited educational budgets, this thesis seeks to develop a reproducible professional learning structure that will be financially responsible yet effective in accomplishing its stated objectives.

2.) As shifting the instructional paradigm from teacher to facilitator is increasingly important for relevant 21st Century student learning and teacher evaluation ratings, this thesis seeks to create a viable professional learning program that will successfully increase student-driven classroom technology integration.

**Intellectual Goals**

Maxwell (2005) describes an intellectual research goal as one that can provide understanding and potentially answer a question of practice. This thesis focuses on two of his five delineated goal types and includes process-oriented and context goals.
**Process oriented goals.** Process oriented goals are primarily concerned with the process of a qualitative study, more so than the outcome. While the outcome is important, the processes and nuances that led to the result are of primary focus (Maxwell, 2005). This thesis seeks to determine if a professional learning program, grounded in the theory of adult learning, can be successful in changing teachers’ instructional paradigm by asking the following two process-oriented questions:

1) Do professional learning participants indicate a program grounded in adult learning theory is personally relevant?

2) Is there an observable difference in student-driven technology integration in classroom environments where the teacher participates in a professional development program grounded in adult learning theory?

**Context goals.** Maxwell (2005) defines context goals as those that allow the researcher to understand the context influencing the participants’ action and how that influence is characterized. This thesis seeks to address the following context-oriented questions:

1) Is there an observable difference in student-led technology integration among program participants that indicate a personal investment in their learning process?

2) Is there an observable difference in student-led technology integration among program participants that incorporate life experience into their learning?

3) Is there an observable difference in student-led technology integration among program participants who identify their learning interests?

4) Is there an observable difference in student-led technology integration among program participants who indicate a specific and/or immediate learning need?
**Brief Synopsis of Research Questions**

Utilizing the theoretical framework of andragogy, this thesis seeks to explore the following research questions:

1) What is the current level of individual teacher classroom technology integration at a mid-size Southeastern United States middle school as measured by the LoTi © observation framework?
   
a. From the classroom teacher’s perspective, what barriers exist at a mid-sized, Southeastern United States middle school that impede the expansion of classroom technology integration?
   
b. From the classroom teacher’s perspective, what professional learning programs are necessary to increase classroom technology integration at a mid-sized, Southeastern United States middle school?

2) What characteristics of a mid-sized, Southeastern United States middle school based professional learning program do teachers indicate effectively increase classroom technology integration as measured by the LoTi © observation framework?

3) What characteristics of a mid-sized, Southeastern United States based professional learning program do teachers indicate are most likely to encourage a sustained increase in classroom technology integration?

These questions were explored through an action research model. While the results are applicable only to the studied context, the action research model allows for a systematic investigation of a site-based problem. The results provide practical guidance in order to inform effective site-based solutions (Stringer, 2007).
The thesis begins by determining the current level of practice applicable to the respective research questions. Per action research design, that information is collaboratively considered with the program participants, shared interventions are implemented and the results evaluated. Those results provide the context for continuing discussion and intervention development. This constitutes a continuous and recursive process that the researcher and program participants collaborate within in order to gain clarity regarding the study’s stated objectives.

This thesis report delineates the research process employed to investigate the aforementioned questions. It is divided into sections for clarity of purpose and readability. Immediately following this initial summary is the related theoretical framework and applicable literature review. The theoretical framework discusses the andragogical academic frame. Chapter two explores existing academic literature. The literature review addresses the 21st Century student and research relevant to professional learning. Chapter three encompasses the research design. In this chapter, the research questions are expounded. The methodology, limitations, site and participants, methods and timeline for data collection and its requisite analysis are addressed. In subsequent headed sections, the report will explore the thesis’ credibility and validity and protection of human subjects. Chapter four examines the collected data, explores individual participant responses and engages in an analysis of data trends. Chapter five revisits the theoretical framework, problem of practice and provides suggestions for further research. The conclusion summarizes both the academic integrity of the study and also how it contributes to the existing literature. A comprehensive bibliography offers citation for the proposal itself and additional resources for continued investigation.
Theoretical Framework

Andragogy and Adult Learning Theory

This problem of practice addresses the education of adults. Therefore, substantive research should be grounded in a theory relevant to adult learning. Different from the more identifiable body of research known as pedagogy, andragogy is defined as the processes involved in leading adult learning (Robles, 1998). First introduced by Malcolm Knowles, andragogy considers the unique characteristics of adult learners. In his defining work, *The Modern Practice of Adult Education: Andragogy versus Pedagogy*, Knowles (1970) defines four key assumptions (self-concept, experience, readiness to learn and orientation to learning) that constitute andragogical theory’s essential characteristics. Andragogy advocates for the partnership of teaching and learning between the instructor and the student rather than the traditional hierarchical structure many of our teachers espouse. When designing, conducting and evaluating a professional learning program intended to transform adult practice through educational activity, the andragogical framework provides relevant guidance.

Although andragogy finds tenuous roots in the works of ancient Greek, Renaissance and Enlightenment thinkers, it did not bear description as an independent scientific theory until the mid-20th Century (Klapan, 2002). Championed by Malcolm Knowles (1980a), its relative nascence draws academic debate regarding its classification as a theory as opposed to a teaching method or mere description of philosophy (St. Clair, 2002). Knowles, Holton and Swanson (2005) defined it as a collection of adult learning principles applicable to all adult learning experiences.
Principles of andragogy. The andragogical model is defined by a set of generalized assumptions that characterize the cognitive process of adult learning. These assumptions are as follows: adults function as independent and self-directed learners; adults defer to life experience to process and/or attach meaning to new learning; adult learners are problem-oriented in their learning and will respond best to experiential and relevant situations; adults are motivated to learn what is useful and/or personally beneficial (Aderinto, 2006; Galusha, 1998; Knowles, 1980b; Kosova, 2010; Robles, 1998; St. Clair, 2002). Knowles, Holton and Swanson (2005) later appended these assumptions to include the following two principles: adults need to understand the reason for learning new information; and internal factors, such as self-esteem, are personal catalysts for learning motivation. These characteristics, taken together, discern a unique learner.

Learner self-concept. If the primary goal of formative education is to develop and prepare a child for adulthood, then the andragogical characteristic of self-concept reflects that goal’s achievement. As learners, children are educationally dependent. They have not developed the skills, background knowledge or experience to discern meaning in abstract or unsupported environments. Hence, they are dependent upon teacher direction relative to both instructional content and methodology (Cercone, 2008). Robles (1998) described this hierarchical relationship as one where the teacher is dominant to the learner. Knowles (1973) contended the development of independency, and the establishment of a reciprocal equality between teacher and learner (Robles), heralded the transition to adulthood. An adult learner acquires an evolved self-concept. He or she attains new status as a producing member of society. Performance as a worker, spouse, parent and/or citizen defines his or her worth more so than their previous status as a learner. As non-educational responsibilities eclipse the majority of adult accountability, he or she is expected to make decisions and navigate the respective consequences (Gehring, 2000).
Knowles establishes this phenomenon as the first grounding principle of andragogy. This altered self-concept demands recognition among peers. The adult learner expects to be recognized as self-directing. Learning environments that are incongruous with that self-concept can establish a contentious psychological disconnection that produces resentment. Therefore, the andragogical framework insists adults be treated with respect, given freedom to make their own decisions and recognized as unique individuals. Any structure, method or content that can be perceived as childish or juvenile must be avoided to alleviate adult resistance (Gehring).

**Role of experience.** The role of experience constitutes one of the fundamental differences between the adult and child learner. Adults accumulate experience as they age. These experiences produce consequences in adult learners that andragogical theory addresses. First, adults have the ability and desire to enrich the learning experience based on the personal resources provided by life experience. Second, that experience establishes a broad foundation that can enhance and anchor new information. Third, adult learners possess more fundamentally programmed habits and patterns of behavior than their younger counterparts (Gehring, 2000). Therefore, the knowledge structures (or schemata) already constructed, provide a wholly different scaffold in which to build, integrate and understand new learning (Cercone, 2008). Knowles (1973) extends this idea by his assertion that experience is something that happens to a child whereas experience is what defines an adult. This is a cognitive construct that cannot be ignored. The second basic principle of andragogy values the absolute importance of building the learning environment around adult experience. Didactic measures that discount adult experience, such as lecture, rote memorization and direct instruction, are summarily less effective than interactive methods that reference adult schemata (Knowles).
Readiness to learn. Just as the developed self-concept and wealth of experience separate the adult from adolescent learner so does their respective readiness to learn. As adults experience personal and professional discord, they discern issues, possible solutions and knowledge deficiencies. As they seek answers to practical problems they develop an inherent readiness to learn (Holyoke & Larson, 2009). Knowles et al., (2005) contend that readiness to learn develops in direct correlation with developmental milestones. As adolescents grow into adults, their readiness to learn continues to grow proportionally. Gehring (2000) describes three stages of adult development that directly impact readiness to learn. Early adulthood is marked by initial independence and social context identification. This phase is marked by celebratory milestones such as marriage, purchasing a first home, bearing children etc. Middle age encompasses maturing activities that may include caring for aging parents, molding children into adults, and establishing civic and social legitimacy. Later maturity includes adjustments to retirement, the death of spouses and/or friends and coping with deteriorating health conditions. Through each of these stages the challenges and opportunities create an evolving readiness to learn. Adults seek information that will develop the skills, knowledge and abilities to cope with new situations encountered as they mature (Aderinto, 2006). Adults identify and direct their own learning activities based on personal and professional needs. Therefore, the andragogical framework demands teachers act, not as directors and purveyors of knowledge, but as facilitators that enable a self-directed learning experience (Robles, 1998).

Orientation to learning. An adult learners self-concept, life experience and readiness to learn combine to create an orientation to learning that is defined by applicability and personal relevance. Adults respond to immediate personal and professional needs when seeking new learning experiences. They engage in learning that tends to be life or problem centered and...
presents the opportunity to solve practical problems over developing abstract theory (Gehring, 2000; Holyoke & Larson, 2009). The andragogical framework contends that adults demand applicable learning experiences that directly impact an immediate need. They prefer hands-on, interactive instructional delivery where they can analyze, understand and apply information to an issue of personal relevance (Robles, 1998). Learning environments best address the adult’s orientation to learning if they are presented in a congruent context to the adult’s identified learning objectives (Knowles et al., 2005). These characteristics represent a departure from the child’s orientation to learning where education serves to establish a theoretical and widespread base of general knowledge that may, someday, be applied to larger concepts and issues (Robles). Gehring (2000) suggests the most effective adult learning facilitators are person-centered individuals that build learning experiences around instructing the learning process rather than the rote content knowledge associated with the program focus.

Motivation. Adult learners, defining their own professional and personal learning shortfalls seek out new learning in order to specifically and quickly address relevant life issues. This process reflects the andragogical principle of internally motivated learning. Whereas young students may be motivated to learn by their peers, parents, role models or other external rewards or incentives those catalysts are less prevalent for adults. Externally, adults may be motivated to learn by seeking a promotion, a new position or perhaps a higher salary, the andragogical framework contends that the strongest motivators are internally driven (Knowles et al., 2005). As the adult’s self-concept continues to evolve, internally motivating factors such as increased self-esteem, a sense of accomplishment, completion and/or personal fulfillment become more pronounced. The innate desire to achieve becomes more motivating than external pressures to gain new knowledge (Aderinto, 2007). A study conducted by Benson, Hewitt, Heagney, Devos
and Crosling (2010) tracked sixteen students’ diverse pathways to higher education. Among the students’ varied backgrounds and experiences, Benson found a strong commonality in their psychological habits of mind. As each participant described transformative, but differing, life experiences the researcher noted similar resulting growth in their respective psychological mindsets. These matured psychological frameworks reflect the internal motivation to learn purported by andragogical advocates.

Adults’ lives are significantly more complicated than those of young learners. Adults experience competing commitments, responsibilities and varying obligations (Aderinto, 2006). They often hold full-time employment, maintain significant emotional relationships (such as marriage) and frequently raise one or more children simultaneously. They understand their responsibility to maintain an acceptable lifestyle, provide financial stability and establish themselves as a contributing member of society. Their motivation to learn may stem from personal fulfillment, competition with colleagues and/or workplace requirements for position advancement. Therefore, adult learning motivation tends to be intrinsic but unerringly practical. Adults are unlikely to respond favorably to irrelevant content or instruction and expect life experience to take an active role in new learning. Their defining factors, such as intrinsic learning motivation, prerequisite skill set and considerable life experience distinguish adult learners from children.

The distinction between andragogy and pedagogy. Although the term “pedagogy” is prolific in educational vocabulary, it is often used too generally. The term pedagogy is derived from two Greek stems; Paid (meaning ‘child’) and agogos (meaning ‘leading’). Therefore pedagogy, strictly translated, is the art of leading children. The initial conception of pedagogy hails from a set of learner assumptions compiled between the seventh and twelfth centuries in
relation to teaching young boys. As the common school movement evolved in the 19th Century (Mondale & Patton, 2001), the pedagogical framework became the pervasive instructional standard (Knowles et al., 2005). As the field of educational research developed, the art of teaching children (pedagogy) evolved.

The knowledge, skills and abilities contained within the modern pedagogic sphere represent the summation of research as it pertains to children and animals, or instruction of children under compulsory attendance (Edwards, 1996). Gehring (2000) describes the major emphasis of pedagogical instruction as didactic and direct instructional methods that rely on rote memorization of base knowledge to account for children’s lack of experience and knowledge. He likened children to empty vessels that must be filled with knowledge. However, Knowles et al (2005) note that the teacher maintains exclusive discretion regarding educational content, process and assessment. Robles (1998) furthered the description of pedagogy by defining the adult as the dominant figure in a one-directional learning model.

Gehring (2000) compares pedagogy and andragogy conceptually, strategically and with deference to their respective outcomes. Table 1.1 on the following page represents that comparison.
### Table 1.1

**Comparing Pedagogy and Andragogy**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Pedagogy</th>
<th>Andragogy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Concept</strong></td>
<td>Children are empty vessels without considerable social experience or knowledge base and must be guided by adults.</td>
<td>Adults bring valuable experience to enhance the learning environment and seek specific, applicable skills.</td>
</tr>
<tr>
<td><strong>Strategies</strong></td>
<td>Direct, didactic methods are prevalent and encourage structured delivery of rote knowledge memorization.</td>
<td>Respected individual needs are addressed through individual, relevant and experiential learning methods.</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td>Content driven, skill-oriented learning objectives through direct instruction and assessment.</td>
<td>Problem-based, individualized learning that is swiftly applicable to professional or personal objectives.</td>
</tr>
</tbody>
</table>


This comparison is roughly equivalent to Knowles (1970) initial description. Pedagogy and andragogy seemed to occupy opposite ends of the theoretical spectrum, with pedagogy designed specifically for children and andragogy for adults. However, by Knowles’ revision (1980) he noted that children instructed with even limited exposure to the andragogical framework showed positive results. Hence, Knowles (1980b) clarified pedagogy as excluding the assumptions of andragogy while andragogy includes pedagogical assumptions. By 2005, the andragogical framework reemphasized the differences between the two philosophies but conceded that either may be appropriate based on the learning objectives and learner background knowledge (Knowles et al., 2005). However, the general distinctions and characteristics of adult and young learners must be respected.

The field of educational psychology abounds with theories and research pertaining to the development of young learners. Generally speaking, young learners encompass a range of ages.
that, arguably, spans fifteen to eighteen years. The age ranges of adult learners easily span twenty, forty or even sixty years. Holyoke and Larson (2009) studied the generational differences among adult learners as it pertained to andragogical theory. Defining the generations into Baby Boomers (those from “traditional homes” through the 1970’s), Generation X (latchkey kids of the 1980’s) and Millenials (born during the digital revolution in the 1990’s), the researchers addressed the andragogical principles of readiness, orientation and motivation to learn. Holyoke and Larson noted commonalities among the generations. All participants were most engaged and ready to learn when they could establish connections to their varied experience. Each generation expressed a need for immediate practical application in order to orient their learning effectively and the researchers found that discovering personal motivations were effective for individual growth (Holyoke & Larson, 2009). While each of these commonalities reflects similar characteristics among a wide range of differently aged adult learners, the idea of individualizing instruction based on experience and learning objectives remains vital. Andragogical principles define adults as self-directed, internally motivated, problem-driven learners with considerable experience. Hence, the andragogical framework seeks to address adult learning characteristics rather than applying the ideology assigned to children. In order to provide effective learning to adults, they must be instructed as adults rather than children (Knowles et al., 2005; Quinney et al., 2010).

**Characteristics of andragogical adult learning programs.** Several researchers offer practically applicable suggestions for designing adult learning experiences that align with andragogical principles. The aforementioned principles of self-concept, experience, readiness to learn and motivation to learn should be addressed, structurally, in any adult learning activity. The adult’s matured self-concept demands equality with the instructor. Learning activities should set
the facilitator and participant as partners in the learning process (Cercone, 2008; Gehring, 2000; Tolutiene & Domarkiene, 2010). In order to facilitate this equitable relationship, the program should develop a trusting environment both in facility and interaction. Respectful adult learning occurs in adult settings with appropriate décor, lighting and attention to adult interests and needs (Gehring). Moreover, the program should foster the positive relationship between facilitator and participant by specifically engaging in trust-building activities. Those interactions should be characterized by positive and objective exchanges (Riley & Roach, 2006). These objective reflections also address the andragogical principle of experience.

Adults enter into learning experiences with an extensive preset schemata and wealth of varied experience. Riley and Roach (2006) suggest an extension of the partnered learning concept by encouraging co-exploration of the learning among both the participant and the instructor. This social relationship builds active discussion which can help connect new learning to existing experience. Active discussion and paired reflection is vital to adult learners (Tolutiene & Domarkiene, 2010) and the cognitive application of new information to existing experience develops essential connections that are the foundation of adult learning theory (Cercone, 2010; Gehring, 2000). In fact, the strategy of experiential learning is most effective for advancing practical application and is generally considered good andragogical practice (Cercone; Gehring). Gehring takes this principle a single step further by encouraging the integration of adult experience to catalyze a misalignment of their comfort zone with the objectives of the learning experience. This “unfreezing” (p. 158) process helps the learner to see themselves objectively and encourages their existing readiness to learn.

Adult learning programs that address the learner’s readiness to learn maintain clearly identified course objectives (Cercone, 2010; Gehring, 2000; Riley & Roach, 2006). The defined
stages of adulthood present varied learning opportunities. As adults are less likely to engage in learning that is not timely and relevant, well-designed adult learning courses specifically delineate what the course intends to do, and how, in order to facilitate successful self-direction (Gehring). Adults who are not ready for the course objectives, have moved beyond them, and/or find them personally irrelevant will choose alternate experiences. Those courses that provide relevancy from the outset will attract adult learners ready to discover the material (Cercone; Riley & Roach). Because adult participants are self-directed and choose these experiences based upon their interest, these respective programs are likely to be populated by a developmentally homogeneous group of learners. However, Gehring contends that mandated programs establish homogenous grouping in order to facilitate learners’ respective readiness levels. For example, a mandated classroom management program should divide participants into homogenous groups (based upon their readiness) in order to differentiate multiple modes of delivery based upon what is relevant to the participating teachers. Tolutiene and Domarkiene (2010) further this concept by suggesting successful adult learning programs provide a full spectrum of objectives, services and learning goals to encourage participants to enroll based upon intrinsic motivation.

Unlike adolescent learners, adults are intrinsically motivated to undertake new learning. Although external pressures (such as improved compensation) exist, adults are most interested in learning that will increase job satisfaction, self-esteem and quality of life (Cercone, 2010). Adults frequently seek training and coursework that will positively affect job performance and establish more effective workplace practices (Riley & Roach, 2006). It is not uncommon to hear an adult discuss their professional dedication as a matter of personal fulfillment rather than monetary compensation. This is especially true for educators that choose employment in a traditionally underpaid profession. The incentive to allot time, effort and resources toward new
learning is a reflection of that intrinsic motivation. Successful adult learning programs capitalize on these characteristics and provide clearly titled learning opportunities that use relevant and applicable hands-on instruction to enhance skills transfer, personal marketability and professional certification (Gehring, 2000; Tolutiene & Domarkiene, 2010). Such programs are found in existing literature and use these structures to engage the adult learner with varying degrees of success.

**Andragogical theory in practice.** Andragogical theory presents a multi-faceted approach to a complex construct. Significant debate exists over the classification of andragogy as a theory. Some researchers consider andragogy a collection of characteristics that define an adult learner rather than a theory to understand the process of adult learning (Haggis, 2002). Amid these dichotomous definitions, the literature is equally unfocused. As the field of adult education fails to establish common definitions and guiding principles, it is cumbersome to compare the multitude of training programs and/or the studies undertaken to explore them (Galusha, 1998). Among other foci, researchers have explored using andragogical principles to study remedial community college students’ success (Guffey, Rampp & Masters, 1998), align personal reflection with learning goals (Hagger et al., 2008), associate gaming enjoyment with learning (Reiber & Noah, 2008) and correlate adult learning principles with postgraduate educational experience (Haggis, 2002). Amid these varying studies, the contexts, methodologies, conclusions and limitations remain as diverse as the questions posed.

Several studies specifically integrate the andragogical framework within an adult learning experience. Of those studies, the majority were conducted in higher education settings. Bishop (2006) conducted a pilot study at Open University (United Kingdom) and addressed self-directed foreign language acquirement. Ham and Davey (2005) sought to determine effective

Andragogical theory addresses the complexities of adult learning. Due to its multi-faceted nature, the research lends itself to the expository nature of qualitative methodology. Nearly all of the related empirical studies were conducted qualitatively (Bishop, 2006; Haggis, 2002; Ham & Davey, 2005; Holyoke & Larson, 2009; Manning, 1987; Quinney et al, 2010; Riley & Roach, 2006). Woodward (2007) conducted a quantitative study, but it was exceptionally short, lacked rigor and provided little information to allow replication.

As the contexts and research methods varied, so did the researchers’ intent. Investigated questions ranged from whether andragogical theory was transferable to workplace training (Woodward, 2007) to the idea that self-directed learners could choose, implement and complete educational objectives with only facilitative direction (Bishop, 2006; Manning 1987). Taken collectively, these studies overwhelmingly viewed andragogical theory as an effective basis for successful education and/or training programs (Bishop; Haggis, 2002; Holyoke & Larson, 2009;
Manning; Quinney et al., 2010; Riley & Roach, 2006; Woodward). However, they also collectively cautioned against summary judgment in favor of andragogical theory. Riley and Roach concluded that coherent and comprehensive theory still eluded the research field and Ham and Davey (2005) observed that the research regarding andragogical theory produced more questions than answers.

These qualified conclusions illuminate myriad limitations with andragogical research. Most importantly, existing studies indicate that the process of adult learning (and hence the theory to ground it) is far more complex than Knowles (1980) stated dimensions. Research suggests that readiness to learn, orientation to learning, motivation, self-concept and life experience are only part of the greater whole (Haggis, 2002; St. Clair, 2002). Of the research included, many studies involve small sample sizes. Ham and Davey (2005) utilize only two participants; Bishop (2006) involves three. Other research includes less than 100 participants (Haggis; Holyoke & Larson, 2009; Manning, 1987; Quinney et al., 2010; Riley & Roach, 2006) and all studies employ volunteer convenience sampling strategies. Therefore, while the research may produce attractive outcomes, those results are not generalizable to other contexts (Bishop, Haggis, 2002, Ham & Davey; Holyoke & Larson; Manning 1987; Quinney et al.; Riley & Roach; Woodward, 2007). Most concerning among these contexts, is the lack of published research directly related to the K-12 educational setting. The absence of directly applicable research actually provides the structure for the present academic endeavor.

Those studies attending to andragogical theory and adult learning environments provide practical suggestions for the development and implementation of structured adult learning activities. Integrating the most prolific strategies in a K-12 context may provide new information to bridge the existing research gap. This study directly engages the principles of andragogy
within an executed professional learning model and investigates whether respective participants showed success in conceptual acquisition.

The remaining sections of this report address existing literature related to the research topic, a thorough exploration of the research design (including applicable questions, methodology, limitations and research site details) consideration of credibility and validity concerns and the protection of human subjects. It further analyzes the data collected from the research program and relates it to the theoretical frame and stated problem of practice. A generalized conclusion addresses the value of this research; it’s applicability to current educational practice and its place in academic literature.
Chapter 2: Literature Review

21st Century Skills

While every generation seems to perennially espouse subsequent generations as fundamentally different from their own, in the case of millennial learners, recent literature addressed the notion that such a dichotomy may be culturally (if not neurologically) plausible. Prensky (2001) estimated that today’s average 21 year old would have experienced in excess of 40,000 hours interacting with television and digital media compared to only 5,000 hours engaged in traditional reading. Rideout, Foehr and Roberts (2010) stated that young people aged eight to 18 spend approximately seven hours and 38 minutes engaged in digital media every day. When adjusted for multiple media exposure through multi-tasking, that estimate increased to ten hours and 45 minutes of media content exposure on a daily basis. Beloit College (2009) produces an annual mindset list to delineate the societal experience of incoming freshman from their respective instructional faculty. In the list for the class of 2012, Beloit College described traditional residence hall staples, such as landline telephones, as a cultural oddity for incoming freshman who are far more accustomed to using mobile technology than a hardwired handset. Shaw (2009) reinforced the idea of digitally native learners and claims digital learners exhibit fundamental differences in both global perception and interaction. These learners are immersed in handheld digital, gaming and interactive technologies that transform the experience of young students from that of a passive receptacle of information to a globally active and contributing participant. This technological immersion begins in the toddler and preschool years where children use multi-media devices, internet tools and handheld games to learn basic information about the world around them (Shaw). Such overall adolescent development produces a generation of learners who are predisposed to multi-task. They prefer random accessed and
parallel information. They are gamers who prefer instant gratification, soundbyte-style streaming information and graphics over text (Prensky). Richtel (2010) supported this assertion and discussed the overall effect of immersed multi-tasking in highly stimulating environments as having a greater collective effect on young learners than television. For educational institutions the reality purported by such literature is that 21st Century learners are fundamentally different, and therefore communicate differently, than both their elder counterparts as well as the educational institutions that exist to serve them (Prensky). Vishal Singh, a rising high school senior, reflected this concern as he states,

I’m doing Facebook, YouTube, having a conversation or two with a friend, listening to music at the same time. I’m doing a million things at once, like a lot of people my age. Sometimes I’ll say: I need to stop this and do my schoolwork, but I can’t. (Ritchtel, 2010, p. 7).

If the experience of Vishal Singh is indicative of the greater population of young learners, the assertion that K-12 institutions must respectively adjust their paradigm of instruction has merit.

The assumption that today’s students are fundamentally different from today’s teachers remains the catalyst for this thesis proposal and therefore must address the research related to Prensky’s (2001) alleged digital divide. This emerging field of research seeks to address the fundamental changes in marketplace and educational expectations derived from a rapidly evolving global economy. The literature examines the characteristics of 21st Century learners, the arguable disconnection between students and teachers and recommendations for relevant education. This body of literature is divided between increasingly prolific claims that 20th Century teachers and 21st Century students are fundamentally different in their approach, access
and processing of information and other researchers who believe these claims to be unsubstantiated by academic research.

**Marketplace and educational expectations.** The American public school initiative finds purpose in creating an educated democratic constituency. Furthermore, the common school movement seeks to respond to the economic needs of the nation and prepare a viable workforce. Therefore, changing market expectations impact the purpose and function of public education. This is evident in the public school system response to the 1840’s Industrial Revolution (Mondale & Patton, 2001) and the October, 1957 launch of the Sputnik satellite (Flynn, 1995). The current Digital Revolution presents another seminal turning point in the lifespan of public education. Friedman (2006) presented an exhaustive discussion of the globalized marketplace. The emergence of instantaneous and collaborative technology allows for insourcing, outsourcing, multi-national corporations, off-shoring and globally equal access to markets previously accessible only to developed nations. This globalized playing field represents a significant divergence from any economic structure heretofore understood in the United States (Friedman). Logically, if the system of American education exists to produce an economically viable, democratic, constituency, and the fundamental operation of the economy has evolved then education must follow suit. Friedman advocates for this transformation and asserts that the manner in which we educate our future workforce has more vital importance than the content that is being delivered.

Karl Fisch (2009) substantiates much of Friedman’s (2006) assertions through a series of evolving multi-media presentations regarding the impact of rapid-paced shifts in the global marketplace. Now existing in multiple versions addressing various audiences, Fisch primarily advocates awareness of the changing landscape to encourage his audience to consider, plan
and/or implement fundamental changes relative to the new global economy. Responding to such pressures, educational and business leaders are beginning to supplant 20th Century educational dogma with 21st Century skills.

Taken at its basic purpose, education exists to produce a functionally literate populace that can perpetuate a civilized and fruitful society (Mondale & Patton, 2001). However, in light of elementary changes in global connectivity, economic codependence and instant information access the question of what literacy means is subject to debate. Dillon (2006) argues that literacy in the digital age is far removed from the 20th Century tradition of rote memorization and recall. Rather than merely decoding text as a claim to literacy, the 21st Century learner will only be defined as literate if they can analyze, interpret and make sense of the world in a manner that will allow them to apply their knowledge in new situations and produce successful outcomes (Dillon). These skills are not taught or evaluated under the standardized testing regime in any manner that will define proficient students as substantively “literate” in the 21st Century (Dillon; Pappas, 2009). Rather, Pappas encourages the widespread implementation of inquiry-based learning as a method to encompass necessary 21st Century skills. Through active inquiry and investigation, students can develop 21st Century skills such as, critical thinking, social interaction, communication and creativity. The Partnership for 21st Century Skills (2009), a consortium of numerous business and education-based organizations, advocates a framework that includes specific emphasis on skill development within core curricula areas. Their model redefines literacy to include content such as economic, civic, health, environmental and entrepreneurial literacy. Moreover, it stresses the importance of skill development in the categories of learning and innovation, information, media and technology, and life and career environments (Partnership). This framework, and its respective elements, is rapidly gaining
stakeholder support among education policy makers and therefore eliciting a tangible effect on classroom instruction. The State of North Carolina recently adopted a new teacher evaluation structure that is specifically based on the framework advocated by the Partnership for 21st Century Skills. Under the requirements of the new evaluation model, teachers must address, integrate and advocate for 21st Century skills both within classroom instruction and also as a tenet to individual professional development (Public Schools of North Carolina, 2008).

Not unlike the differences in 20th Century and 21st Century learning standards, the concept of Web 1.0 and Web 2.0 signifies an evolution of skills, access and technology implementation that reflects specific implications for the classroom (Greenhow et al.; Robelia & Hughes, 2009). Whereas Web 1.0 technologies primarily function as a point of non-interactive information dissemination, Web 2.0 capability involves the participant as a collaborative publisher and content editor that operates in partnership with other participants across demographic and geographic borders (Greenhow et al.). Shaw (2009) explains Web 2.0 as a necessary component to 21st Century skill development as the means of applying knowledge in a socially integrated environment. She compares the 21st Century classroom to its predecessor and offers practical suggestions for the implementation of 21st Century skills. Most importantly, the function of the 21st Century teacher must shift from that of a distributor of knowledge to a facilitator of learning in order for new literacy skills to be achieved in the classroom setting (Greenhow et al.; Shaw). Instructional gaming provides a relevant example of the nexus between 21st Century skills and their classroom based implementation.

Instructional gaming is not a new concept in education. However, the evolution of interactive technology and social networking sheds a new light on an old teaching method. According to Oblinger (2004), instructional gaming environments are essentially informal
learning structures where students must derive existing content knowledge and apply it in a new situation. Depending on the parameters of the game, it may require collaboration, teamwork, problem solving, critical thinking and/or student facilitated learning situations. These facets combine 21st Century skills with existing core content requirements in order to produce a solution, product or result in a new situation (Oblinger). Instructional gaming provides a “multi-sensorial environment” (Oblinger, 2004, p. 4) that addresses not only the manner in which people learn (i.e. providing feedback, activating prior learning) but also addresses the innate qualities of the digital native.

The digital divide. Prensky (2001) coined the terms “digital native” and “digital immigrant” to discern between generations’ familiarity, use and reliance upon emerging technology resources. Since the inception of this terminology, the monikers (and their respective descriptions) have become commonplace within related academic literature. What once defined the digital divide as an inequity of technology resources among classes now more often describes the fundamental differences between tech-savvy youth and their less technologically inclined elders (Waycott et al., 2010).

Prensky (2001) asserts that a singular and fundamental dichotomy exists between digital natives and digital immigrants. While he recognizes the incremental differences in successive generations, he claims that the divide between today’s student and teacher is insurmountable without specific interventions to address the dissonance. He candidly asserts that the current system of education is not designed to instruct the digital native population that it now serves and advocates for significant professional development of digital immigrant instructors. Beloit College (2009) electronically publishes an annual profile of incoming freshman to their faculty. This profile describes the student in terms of their cultural background based on their birth year.
As successive classes are posted each August, instructors can discern the increasing breadth of the digital divide in the listed bullet points. Students entering Beloit College in recent years have never lived in a world without mobile phones, have never known Russia to be an enemy, have never “dialed” a rotary phone, nor had to “dial up” the internet (Beloit College). The lack of common vocabulary Prensky described between digital natives and digital immigrants is demonstrated through this annual website publication and illuminates the fundamental differences in generational characteristics.

Arguably, the most significant characteristic of the digital native is their hyperconnectedness (Prensky, 2001: Richtel, 2010; Sprenger, 2009). Proponents of the digital divide claim that digital natives are technology multi-taskers (Richtel; Sprenger). They are frequently engaged in some form of digital communication through texting, instant messaging, Facebook, Skype, Twitter and various other social networking platforms. Additionally, they often claim that the tasks of communication, publishing web content and engaging in traditional schoolwork are occurring simultaneously (Richtel). Those proponents further assert that such unrelenting environmental influence actually effects neurological structural changes that separate digital natives from digital immigrants (Prensky; Sprenger). As a result, digital natives possess fundamentally different learning styles and instructional preferences than those who instruct them (November, 2010). This alternate brain development is encouraged by the abundance of available technology resources that further characterize the digital native.

Prensky’s (2001) primary argument is not that a single student or small group of students may be markedly different from their elder instructors, but that the entire cohort is substantively similar in their dissimilarity from the previous generation. This phenomenon is not limited by socio-economic status or geographic location due to the increasing abundance of technology
resources. Even new technologies that emerge with significant price tags are quickly available to multiple classes and educational institutions due to marketplace competition. O’Brien and Scharber (2010) further declare that while this abundance is equally available to digital immigrants, their innate frugality, and experience when technology was not affordable, leaves them less likely to take advantage of it as their younger counterparts. Systemically, O’Brien and Scharber claim slow implementation of classroom resources are less the result of concerns over cyber-security and more attributable to the digital immigrant’s tendency to conserve resources. He further states that such frugality actually impedes technological progress, limits the consistent and immersive integration of that technology and hence stalls a potential instructional evolution. This example of immigrant frugality versus native immersion exemplifies the generational characteristics fueling the debate over the appropriate education of 21st Century students.

Prensky’s (2001) description of digital natives and digital immigrants espoused a great deal of academic interest, not the least of which was the question of the construct’s validity. The case for the digital divide is founded in two general suppositions. First, that there are specific, definable and significant differences between the digital native and digital immigrant generations, and second, that our existing system of education must fundamentally respond to those differences in order to remain effective (Bennett, Maton & Kervin, 2008). While Prensky’s (2001) assertions find widespread popularity and a growing base of support in academic literature, empirical research casts considerable question as to the validity of the digital divide.

**Empirical support of the digital divide.** The primary impetus of the digital divide is the generalized notion that digital natives favor interaction in a technology-rich and engaged learning environment. In one study, Friedl and Vercic (2010) directly addressed digital natives’ media preferences regarding internal communication procedures. They conducted a quantitative
correlational field study within a large multi-national information technology corporation. Of the 310 respondents included in the data, 69% indicated social networking sites such as Facebook and Twitter were the most popular form of social media. Others indicated a preference for watching videos online, reading and responding to online forums and discussion boards as well as reading online blogs. When juxtaposed to more traditional media, the respondents indicated a preference for social networking over paper newsletters and published magazines. Participants also indicated a preference for team presentations through video sharing rather than more traditional presentation structures. At face value, Friedl and Vercic present compelling empirical support for the concept of the digital native. However, they also conclude that while respondents actively engaged in, and preferred, social media in their personal lives, they were less inclined to support such innovations through a corporate intranet.

The division between social technologies for personal and business/educational use is also reflected in Gorra et al.’s (2010) study. In a quantitative study administered across four universities, the researchers sought to discover which technologies digital natives prefer to support their learning. Respondents accessed social networking sites, engaged in text messaging, social media and instant messaging at consistently high rates. Survey results clearly indicated digital natives’ preference to engage in university communication through their mobile devices. The researchers found that mobile phones were invaluable staples to digital natives’ general functioning. However, much like Friedl and Vercic’s (2010) study, these preferences for technology enhanced environments did not perfunctorily extend to the educational setting. Gorra et al. found that students preferred, and accessed, social networking media at consistently high rates, but engaged in such interaction primarily for personal use. Participants were less inclined to participate and increasingly skeptical of university engagement in social media.
communication. Peter’s (2007) study may provide insight as to why this demarcation between personal and professional use appears in current literature.

In a mixed methods study involving 29 interviews with respondents from varied manufacturers of mobile devices, businesses and education providers, Peters (2007) investigated the appropriateness of m-learning technologies. In the educational setting, the researcher noted students’ preference for mobile devices at levels similar to Gorra et al.’s (2010) study. Peters also noted, despite these preferences, that educational institutions engaged with mobile devices at significantly lower frequencies. Previously mentioned studies may infer that lower levels of engagement are occurring per the preferences of digital native students (Freidl & Vercic, 2010; Gorra et al.). However, Peters indicates that m-learning opportunities are less effective and prevalent in educational settings due to organizational infrastructure and teacher ability. Peters suggests that mobile technologies are not currently designed for widespread classroom implementation and those in charge of delivering instruction are less comfortable or technically able to deliver instruction through m-learning technology. In this sense, the digital divide seems particularly acute and may explain the natives’ lack of interest for immigrant implementation of preferred technology resources.

Whether educational institutions are prepared, and popular digital technology is tooled, for implementation in the classroom, studies seem to indicate digital natives’ preference for social media and mobile communication applications (Friedl & Vercic, 2010; Gorra et al., 2010, Peters, 2007). The Pew Internet and American Life Project surveyed over 1,800 students and their parents between 2007 and 2008 and their findings lend further support to the idea of the digital divide (Lenhart et al., 2009). The survey indicates that teenage use of mobile phones, social networking and text messaging is increasing at significant rates. Additionally, it suggests
that digital natives outpace their immigrant counterparts in nearly all categories surveyed. The results imply that the basic argument for the digital divide is sound and that the division between natives and immigrants is growing as interactive, social technologies become more prevalent regardless of race, ethnicity or socio-economic status.

Greenhow et al. (2009) addressed internet use among low-income digital natives. Conducting a mixed-methods study involving 852 urban high school students, the researchers sought to determine trends in internet use among low income students as compared to generalized national data. Roughly comparable to national trends, of the participants included in the sample, almost 94% used the internet. 82.9% accessed the internet from desktop computers while others used laptops, cell phones and other digital devices. While less consistent in their location of access (school, home, friends’ houses, libraries etc.) the researchers found that low-income students prefer to use the internet in equivalent proportions to their higher income peers. Greenhow et al. (2009) discerned that low-income digital natives prefer to use technology in the same manner even if their frequency of access is impacted by their economic situation. They encouraged educational instructors to expect students (regardless of socio-economic status) to have broad experience and preference for internet-based technology. They support the general mantra of the digital divide and note, “such students will not be apprehensive about Internet technology that is introduced into their educational environments and, in fact, view this integration as essential to their schooling and social lives” (Greenhow et al., 2009, p.66).

Levin and Arafeh (2002) suggest that the integration of internet technology into educational settings is not occurring. The authors review the Pew Internet and American Life Project and discusses the considerable disconnect between how digital natives choose to learn and how American educational systems continue to instruct them. In this report, Levin and
Arafeh provide considerable data, “gathered from 14 gender-based, racially diverse focus groups of 136 students, drawn from 36 different schools” (p.ii). While focusing primarily studying internet use and access among students and their respective schools’ the report offers widespread findings in support of the digital divide. Summarily, the report indicates that students are avid consumers of internet based resources in order to facilitate learning and their respective schools have not acknowledged and/or engaged those preferences in the regular delivery of standard curriculum. The researcher names the digital divide specifically as a real, and tangible, issue in American education and encourages policymakers to address the needs of digital natives with fundamental adjustments to educational practice (Levin & Arafeh). While these and other researchers (Friedl & Vercic, 2010; Gorra et al., 2010; Lenhart, 2009; Peters, 2007) argue a compelling case for the digital divide, other researchers question the validity of their claims.

**Non-supporting empirical research.** The digital divide is a nascent realm of empirical research. As the concept is young, so is the emerging research to consider it. However, for as many burgeoning studies seem to support the idea, there are a number of studies that call it into question. Bond, Wells and Holland (2008) studied the implementation of podcasting as an instructional strategy targeted to address digital natives’ hypothesized learning preferences. Among the 574 Australian university students included in the sample, the researchers could establish no clear differences between the digital natives and digital immigrants. Additionally, the matter of age seemed to play little determining role in the participants comfort or acumen with podcasting technology. They addressed the digital native moniker as overzealous in its generalized description of young students (Bond et al.). Using nearly similar language, Lea, Goodfellow and Jones (2008) conducted a qualitative study including 45 students across three British universities regarding the implementation of social networking as an educational strategy
and also cautioned against the digital divide. The researchers found that the sweeping claims for the digital divide were too general in scope and required considerable academic scrutiny (Lea et al.). These studies call into question the popular assertion that classroom instruction must fundamentally adjust to align with digital natives’ technology-imbedded learning preferences and abilities. Others conduct studies that seek to understand if those assumed differences in technology perception and digital expertise exist between the varying age groups.

Salajan, Schonwetter and Cleghorn (2009) conducted a quantitative case study of dentistry students and their respective faculty members at the University of Toronto. Specifically seeking to understand Prensky’s (2001) claims of the digital divide, the researchers studied participants’ varying technology experience and self-perceptions. Salajan et al. concluded that observed differences between cohort age groups did not equally apply to all digital technologies or their respective implementations. They specifically cautioned, “the digital native-digital immigrant divide may be an overly simplified, narrow and potentially polarizing perspective that may not serve the needs of the differing categories of technology users and society in general” (Salajan et al., 2009, p. 456).

Guo, Dobson and Petrina (2008) supported such cautions in their singularly comprehensive study that not only addressed a wide participant group but was also longitudinal in scope. The researchers divided 2,583 pre-service teachers into four categorical age groups. Between 2001 and 2004, they gathered empirical data to determine if trends exist between those classified as digital natives respective to digital immigrants. Guo et al. drew the conclusion that, while some generally observable differences existed between the subject age groups, proponents of the digital divide were excessively enthusiastic. Their research did not indicate statistically significant differences between natives and immigrants in terms of their computer literacy skills
(Guo et al.). Waycott et al. (2010) contributed correspondingly through their investigation of staff and student perceptions of information and communication technologies.

In their study, Waycott et al. (2010) questioned the anecdotal nature of the digital divide platform. They investigated students and staff perspectives regarding information and communication technology both from a personal and professional perspective. Specifically addressing Web 2.0 technologies, the researchers included 46 student and 31 staff participants. They were unable to support any claim that a substantial gap existed between the digital native and digital immigrant cohort groups. Rather, they noted commonalities among the communication and information technologies varying participants used in both their personal and professional contexts (Waycott et al.). Taken together, these studies tend to criticize the popularity of the digital divide as being unfounded and largely built upon non-empirical conjecture and widespread supposition. However these studies, like those that support the idea of the digital divide, are not without inherent limitations.

**Limitations of existing research.** Regardless of the study’s findings, the research related to the digital divide can rarely be generalized. The studies commonly use convenience sampling strategies and/or research strategies that limit their applicability to other contexts (Friedl & Vercic, 2010; Gorra et al., 2010; Greenhow et al., 2009; Lenhart et al., 2009; Levin & Arafeh, 2002; Waycott et al., 2010; Salajan et al., 2009). Some studies’ research processes are not well defined and thus circumspect in validity. Both Levin and Arafeh and Lenhart et al. provide considerable data with little academic specificity to explain how it was derived. Yet the zealousness of their conclusions produces a nearly propaganda-like overtone in support of the digital divide (Levin & Arafeh). Other research strategies produce equal limitations.
Gorra et al. (2010) gathered data through the implementation of a survey instrument. However, the rate of return for the survey was questionable. In one of the university sites studied, only 38 of 448 distributed surveys were returned. In another setting only 29 of the 80 surveys were completed. These surveys were enacted more as a tool to garner feedback for the universities than engage in an academic exercise regarding the digital divide but the rate of response may be questionable for establishing conclusive validity. Gorra et al.’s study also raises the question of selected participants.

Prensky’s (2001) general argument for the digital divide primarily addresses the K-12 educational setting. However, in reviewing the literature, studies including K-12 students are not widely enacted. While this is an emerging area of research, it seems more frequently conducted among older students and/or young adults (Freidl & Vercic, 2010; Gorra et al., 2010; Guo et al., 2008; Salajan et al., 2009; Peters, 2007; Waycott et al., 2010). While age differences exist among the participant groups selected to contribute to these studies, they are still considerably removed from the digital preferences and acumen of an adolescent learner. Additionally, differences in participant ages also indicate a concern with research sites.

In order to apply the digital divide argument with fidelity, not only must K-12 students be engaged in the study, but that research should also be conducted in a K-12 setting. Another limitation for emerging research is the frequency with which it is enacted in alternate settings. Researchers offering insight for the digital divide have conducted their studies in higher education institutions (Gorra et al., 2010; Guo et al., 2008; Salajan et al., 2009; Waycott et al., 2010) or in corporate settings (Friedl & Vercic, 2010, Peters, 2007). Most interesting of the varied studies is the lack of research conducted in the United States. Many of the studies
reviewed were conducted abroad (Waycott et al.; Salajan et al.; Friedl & Vercic; Gorra et al.; Peters) and may not have direct applicability in an American context.

These gaps in the research produce relevant questions in the context of this research endeavor. First, are K-12 students more engaged when traditional curriculum is delivered through authentic Web 2.0 technology integrated instruction? Second, are digital immigrants less capable of delivering 21st Century instruction in a traditional K-12 school setting? Most importantly, does aligning instructional presentation through technology a more effective means of successfully educating current K-12 students? The limitations of the existing literature provide significant opportunities for additional investigation.

**Opportunities for further exploration.** Irrespective of the limitations enumerated above another, more significant, concern surrounds the literature espousing the digital divide. Of the studies reviewed, very few of them enumerate a theoretical framework. Salajan et al. (2009) specifically ground their study in Prensky’s (2001) theory of the digital divide. Their research addresses student and faculty attitudes toward digital learning technologies through the generational lens. Greenhow, Robelia and Hughes (2009) attempt to understand the intersection between classroom instruction and the student learning experience through the social developmental context. Using Vygotsky’s (1978) framework, Greenhow et al addresses student engagement and 21st Century skills through the lens of social development. While Greenhow et al.’s theoretical frame is not specifically aligned with the digital divide it marks one of the only reviewed studies to found its efforts in an articulated framework. This lack of academic rigor leaves the research arguably unfocused and complicates comparative analysis. They seek to understand the concept of the digital divide, but do not root that investigation in grounded theory. Juxtaposed with the limitations of participant selection, research sites and empirical
strategies, the literature related to the digital divide is summarily circumspect and offers little specific direction for future inquiry. In fact, the “gap” in the research may arguably be considered the research itself.

This study intends to specifically address that gap. Operating from a theoretical framework that addresses both digital natives and digital immigrants; this thesis proposal seeks to investigate whether making substantive, technology-based changes in classroom instruction will have a notable effect on student learning. In order to create a study that enables teachers to shift their paradigm from that of a 20th Century teacher to a 21st Century facilitator of learning, the literature related to professional development must also be addressed.

**Professional Learning**

Regardless of the digital divide’s academic relevance, the popular concept continues to entrench itself in modern educational policy. State and local education agencies are allotting increasing portions of narrowing budgets to implement interactive classroom technology (Keengwe et al., 2008; Lawless & Pellegrino, 2007; Zhao & Bryant, 2006). As these resources increase, the nascent research related to technology integrated professional learning programs proliferates academic literature. However, as this field is newly emerging, the related studies tend to be unfocused, lack an empirical base and do not collectively appear to positively address student achievement (Lawless & Pellegrino, 2007). This literature review will consider the contexts, participants, design, results and limitations of the research field as it pertains to the concept of the digital divide and/or the characteristics of adult learning and its resultant pressure to change teachers’ instructional paradigm.
**Professional learning programs.** Research addressing teachers’ professional development regarding 21st Century skills and/or changing teacher practice is an international point of interest. At a private university in Tokyo, Stockwell (2009) conducted a qualitative study that addressed teachers’ self-directed efforts at developing innovative teaching strategies for emerging language learners. In the study, teachers explored how best to familiarize themselves with, and implement Computer Assisted Language Learning (CALL) software in their individual classroom contexts. The researchers designed the self-directed professional learning program based on existing, but not cohesive, literature regarding technology integration in language learning classrooms. While the study indicated success among the included participants, it also indicated that unsupported self-direction proved frustrating. Harteis et al. (2010) set out to discover how individual epistemic beliefs may impact a participant’s manner of using educational technology in order to develop professional skills. In studying non-education professionals participating in varying German corporations’ professional training programs, the authors noted that epistemic beliefs did not necessarily correlate with e-learning program participation. However, the researcher also concluded additional inquiry was necessary to discover the relationships between epistemic beliefs and the quality of e-learning among adult participants. Matzen (2007) conducted a mixed methods study that explored the relationship between professional learning, instructional technology and teachers’ instructional classroom practice. This program evaluation studied 148 K-5 elementary teachers from the Southeast United States and offered a contradiction to Harteis et al.’s study. Matzen claimed teachers’ instructional practices, especially as they relate to technology integration, are grounded in their respective epistemic beliefs. The authors suggest that educational technology may both support existing instruction as well as foster a more constructivist instructional approach among
participating teachers. Matzen indicated that the type of professional learning may impact whether technology integration supported or extended teacher’s classroom practice. Flowerday et al. (2003) investigated the success of the Teacher Network Project designed to increase the use of instructional technology among 22,000 Nebraska school teachers. Specifically addressing teachers with limited technology integration skills, the Nebraska program sought to increase technology acquisition and classroom implementation. Over the course of a 12 month, 3 phase program, Flowerday et al.’s sample of 240 teachers demonstrated significant increases in self-efficacy, functional technology skill level and evidence of classroom technology integration. Other researchers endeavored to determine the results of professional learning programs delivered through means of technology integration. Fisher, Schmaker, Culbertson and Desler (2010) conducted a quantitative study where teachers were randomly assigned to one of two groups. Engaged in the same professional development content, the delivery of learning occurred either through traditional face to face or online multi-media instruction. Of the 59 participating certified teachers, the authors noted both avenues achieved stated program goals and the online delivery of course content was equally effective as the face-to-face structure. Fisher et al also alluded to the importance of relationship building among adult learners in a virtual environment. Another study explored the nexus of 21st Century skill development and adult learning principles.

Glazer, Hannafin, Polly and Rich (2009) conducted a qualitative case study that examined the development of technology integration through a collaborative apprenticeship structure. Two teacher-leaders engaged with nine volunteer participants in an eight week professional learning structure that reflected tenets of adult learning theory. This collaborative apprenticeship continued over a six month timeframe. The researchers noted that all participants
increased their skills and technology comfort level, but only one third of the participants achieved program objectives. Other studies focus changing professional behavior through a specific focus on adult learning principles rather than technology content.

Karagiorgi, Kalagirou, Theodosiou, Theophanous and Kendeou (2008) conducted an extensive survey among teachers attending professional learning programs in Cyprus that addressed the method in which the training was delivered. The content of the professional learning did not necessarily reflect 21st Century technology integration rather; it addressed the extent to which adult learning theory was imbedded in existing professional development designs. Karagiorgi et al. found that the Cyprus based teacher training programs adhered to adult learning theory, but stopped short of indicating the effectiveness of the program’s design. In the United States the research is somewhat more prolific but demonstrates equal contextual variation reflected in the international studies. In a relevant but dated study, Manning (1987) specifically sought to implement Knowles (1980) theory of andragogy in an attempt to elicit professional growth among 91 volunteer physicians. Showing some correlations to the self-directed structures enacted in Stockwell’s (2009) study, Manning focused on aligning professional learning program design with the theory of adult learning. Participants who completed Manning’s program were exceptionally positive about the quality of professional learning and classified the program as superior to other methodologies. Riley and Roach (2006) conducted a qualitative study among 150 Wisconsin early childhood classrooms. A research team worked specifically with 69 teachers and 23 program managers to observe, report, direct and provide guidance to improving teacher practice. Using a relationship-based, long-term approach to professional learning, the researchers reported general increases in the quality of teacher instruction and occupational pride. Taken together, these existing studies in both 21st Century
skills and adult learning principles reflect considerable interest in improving professional practice but also demonstrate a significant variance in program participants, design and characteristics that continue to provide ample opportunity for additional inquiry.

**Participant groups.** The literature reflects a wide variety of participant groups largely related to the type of professional learning studied. While many studies seeking to address the development of 21st Century skills in education professionals involve certified teaching staff (Fisher et al., 2010; Flowerday et al., 2003; Glazer et al., 2009; Karagiorgi et al., 2008; Matzen & Edmunds, 2007; Riley & Roach, 2006; Stockwell, 2009), the characteristics of those participants vary greatly.

Many researchers accessed practicing teachers in order to study the effects of professional learning programs. These studies were conducted in the United States (Flowerday et al., 2007; Glazer, 2003; Matzen & Edmunds, 2007; Riley & Roach, 2006) or internationally (Karagiorgi et al., 2008). Riley and Roach’s (2006) study addressed early childhood education teachers in educational daycare settings. Both Glazer and Matzen & Edmunds included elementary school teachers operating in kindergarten through grade 5 settings. Flowerday et al. expanded the sample to include teachers from kindergarten through twelfth grade certification and Karagiorgi et al. included the entire range by accessing teachers of pre-kindergarten students through the secondary school span. Fisher et al. (2010) conducted the study among a convenience sample of certified teachers who were engaged in graduate studies and Stockwell (2009) addressed university level instructors. Both Harteis et al. (2010) and Manning et al. (1987) sought to respectively address 21st Century concepts and andragogical theory through the study of non-education related participants. While there is great variance in the type of participant accessed in the literature, there is equal variance in the size of participant samples.
Among the studies noted, the range of participants varies from four included participants (Stockwell, 2009) to 273 (Karagiorgi et al., 2008). Four studies included less than 100 participants (Fisher et al., 2010; Glazer, 2009; Manning et al., 1987; Riley & Roach, 2006) and three studies involved 148 to 256 sample members (Flowerday et al., 2003; Harteis et al., 2010; Matzen & Edmunds 2007). The variance in research sample size can be attributed, in part, to an equal variance in research design.

Program design. Studies with larger sample groups tended to relate to quantitative research designs (Flowerday et al., 2003; Fisher et al., 2010; Harteis et al., 2010; Karagiorgi et al., 2008). Smaller sampling numbers were associated with qualitative designs (Glazer et al., 2009; Manning et al., 1987; Riley & Roach, 2006; Stockwell, 2009). The median study, including 148 participants, employed a mixed methods approach (Matzen & Edmunds, 2007). However, the research base for professional development reflected a strength that was lacking in the studies related to 21st Century skills. Unlike the 21st Century Skills studies, only two professional learning studies failed to utilize a discernable theoretical framework (Flowerday et al.; Glazer et al.). The majority of professional learning literature reviewed employed a theoretical framework with which to ground academic inquiry.

Four of the noted studies directly addressed a theoretical framework grounded in the principles of adult learning. Manning et al. (1987) specifically grounds the research project in Malcolm Knowles’ (1980) theory of Andragogy. The research design required physicians to develop individual, personally relevant learning plans. These self-directed plans were supported through physician-specific resources and information brokering relevant to the enacted plan. Additionally, networking sessions among physicians were also conducted to allow for personal exchange of information and professional growth. Karagiorgi et al. (2008) specifically references
Knowles and the academic discussion related to the nuances between pedagogy and andragogy. Their respective study directly addresses the degree to which adult learning principles are incorporated into professional learning modules and their respective success among adult learners. Specifically, the designed sessions address orientation to learning, readiness to learn, accumulated experience and self-concept. These elements were evident in Stockwell’s (2009) study as well.

Although Stockwell (2009) did not explicitly define a theoretical framework, the related literature review is replete with discussion of pedagogical and adult learning concepts. Specifically, the author references personal relevance, self-concept, authentic feedback and reflection. Similar to Manning’s (1987) design, Stockwell requires participants to develop individual learning plans based on personal needs and designs a generally self-directed professional learning program. In much the same way, Riley and Roach (2006) also indirectly addresses the principles of adult learning. While engaging in discussion regarding pedagogical learning principles, the authors also address the andragogical tenet of personal experience. They acknowledge and address the importance for teachers to include their experience and learn from others’ in an educationally relevant environment. Moreover, Riley and Roach specifically employs a constructivist approach to their research design. In a six tiered approach the authors develop a professional learning model that encompasses adult learning principles while maintaining the expectation that participants actively construct their own relevance.

Harteis et al. (2010) discuss the socio-constructivist basis for epistemic theory. Their research is specifically related to how individual epistemic beliefs impact e-learning in the workplace. They describe the context of epistemology, in this case, as the process of making one’s own meaning from their respective global context. Personal construction of meaning is the
primary tenet of constructivist theory. They further discuss the importance of self-direction, social interaction and the motivation to learn. While not specifically cited in the authors’ literature review, these are key tenets to adult learning and provide a well-defined nexus between andragogy and constructivism. Matzen and Edmunds (2007) literature review also discusses the direct importance of constructivist practice. The authors directly relate their discussion of constructivist theory to the burgeoning 21st Century expectation that students collaboratively lead instruction and devise their own meaning. Moreover, they discuss the importance of instructional technology as a catalyst for constructivist classrooms. Their respective professional learning program designs a constructivist, student-driven, environment where teachers are expected to perform collaboratively to attain programmatic goals.

Results. The literature related to the nexus of professional development, adult learning styles and 21st Century skills offers varied guidance. Of the studies reviewed, less than half of them produced positive results. Although not related to 21st Century skills, Manning’s (1987) work directly addresses professional learning through an andragogical context. The scaffolded, yet self-directed, learning plans facilitated by designated information brokers allowed participants to determine their individual needs, devise unique growth plans and offered supporting resources to ensure those plans were successful. The participants who completed the program considered this method either equal to or superior than traditional continuing education. In a much larger study, Riley and Roach (2006) evaluated early childhood education programs that sought to change teacher behavior through individual, objective observation, discussion and reflection. Although not expressly grounded in andragogy, the concepts of individual support, personal reflection and relevant learning undergird this study. The program intended to provide teachers with conceptual labels related to the classroom environment, increase teacher
understanding and provide a connection between research-based practices and defined conceptual labels while encouraging individual self-reflection. The author’s study indicated that the structure of the program was successful and achieved stated objectives. Observed quality of instruction increased in participant classrooms and teachers reported greater occupational pride. While the content of this program did not address 21st Century skills, its structure and execution did establish tenuous a relationship with concepts embedded in adult learning theory.

In contrast, Flowerday et al.’s (2003) study addressed the development of 21st Century skills without providing any association to adult learning constructs. Participants received laptop computers and 18 months of general, non-differentiated large group instruction. The researchers noted guided practice and formative feedback available to program participants, but the foundation of the statewide training program did not address adult learning principles. Professional development workshops were conducted through direct instruction to participant groups encompassing up to 80 people. Due to remote locations or lack of funding, some delivery sites required participants to share resources during training sessions. Regardless of these structural differences, and lacking attention to adult learning principles, Flowerday et al.’s program evaluation indicated positive results for 21st Century skills. Participants indicated significant increases in teacher efficacy, competence and classroom technology integration.

Fisher et al.’s (2010) study referenced neither adult learning principles nor the development of teachers’ 21st Century skills yet found similar success. In their study, teachers were randomly assigned to one of two groups. While the content of the professional learning remained equivocal, delivery was conducted either through a traditional face-to-face method or an online virtual environment. Although this study also did not address the theory of adult learning, or classroom technology implementation directly, it did seek to deliver professional
learning through a 21st Century construct. The authors found that adult participants in both the experimental and control groups were successful. Both groups demonstrated increased target behaviors regardless of program delivery. Specifically, the virtual environment group established positive results for changed behavior and student achievement.

These studies show little direct association with each other. Researchers used different methods, with differing participant groups, in studies that lacked substantive connection. Yet, these studies all successfully introduced new learning to adult participants. While the variation in context, structure and design is common to the professional learning literature, program success is not.

Stockwell (2009) devised a study that is, arguably, related to Manning’s (1987) conception. In this study, a small number of participants developed self-directed strategies, in a supported environment, to develop instructional proficiency with computer assisted language learning (CALL). Unlike the many physicians involved in Manning’s study, the majority of participants failed to achieve their stated objectives. Among the surviving participants, classroom implementation, program completion and quality of learning varied widely. Stockwell postulated that the isolation of a self-directed program may adversely affect the participants’ success and advocated for a community of adult learners to share experiences and build understanding.

Glazer’s (2009) study, while not specifically based in adult learning theory, investigated a professional learning program grounded in a community of adult learners. In a collaborative apprenticeship, a community of teacher learners shared planning time, personal connections, and exchanged information, lessons and classroom experience. Over the course of the six month study, these relationships strengthened and benefitted teachers’ instructional experience.
However, even with noted gains in skills, knowledge and technology integrated lesson planning only one third of participating teachers achieved 21st Century proficiency. The researchers questioned the value of community goals and values as mitigating factors to the program’s success.

As communities are comprised of individuals, another study investigated the role of personal epistemic beliefs relative to workplace e-learning. Harteis et al.’s (2010) non-educational study did not reference adult learning theory or 21st Century skill development. However, much like Fisher et al.’s (2010) design, the authors examined professional development through a 21st Century construct (e-learning). The researchers found no relation between participants’ epistemic beliefs and the amount of e-learning undertaken. Notwithstanding their personal technology beliefs, subjects participated in e-learning opportunities at virtually equivalent rates. In this case, it seems the andragogical principle of personal relevance did not relate to adult learning participation or success. Still other studies were unable to determine a positive or negative nexus between professional learning, andragogical theory and 21st Century skills.

Karagiorgi et al. (2008) studied the intersection of professional development and adult learning theory. In this quantitative study, the researchers addressed Cyprus’ teacher in-service training structure. Multiple professional learning sessions developed from an andragogical research base. These sessions directly addressed orientation to learning, readiness to learn, accumulated experience, self-concept and personal background. 273 respondents across five in-service training modules responded to a likert-style questionnaire. After statistical analysis, the researchers found that Cyprus’ training system aligned with and reflected adult learning principles. However, they were unable to discern whether the andragogical foundation proved an
effective means for accomplishing program goals and objectives. Matzen and Edmunds (2007), operating from the constructivist framework, conducted another study that addressed professional learning and 21st Century skill development. Contrary to Karagiorgi et al., Matzen and Edmunds instituted professional development sessions requiring participants to function through pedagogical principles in order to determine if technology can be used in a manner that not only supports existing teaching practice, but also serves as a catalyst to shift teachers’ instructional paradigm. 148 elementary subjects participated in a seven day, 50 hour professional development program that addressed instructional practice, standard curriculum and computer use. Matzen and Edmunds’ mixed-methods program evaluation supported a positive intersection between teacher beliefs and implemented classroom technology practice. While they found this program did increase teachers’ constructivist technology practice, the researchers were unable to determine if this program structure enabled an instructional paradigm shift. The latter result, although inconclusive, may derive from an insufficient framework to define that change.

Moersch (2002) devised a specific framework for observing and categorizing classroom technology integration. The instrument’s initial release focused on three areas of teacher technology practice. It measured a teacher’s level of technology integration (LoTi), personal computer use (PCU) and current instructional practices (CIP). The Level of Technology Integration (LoTi) scale directly addressed active student engagement, higher order thinking skills and classroom technology implementation. The LoTi scale’s ordinal continuum classifies instructional practice from teacher-centered lessons devoid of technology to student-facilitated lessons where technology is an integral tool for cooperative, higher-order and globally connected learning (Stoltzfus, 2006). Aligned with the National Education Technology Standards for Teachers (NETS-T) this framework provides a construct for data-driven professional learning
plans that encourage the instructional shift from teacher-directed to student-led instruction (Stoltzfus, 2009). Applied in more than half the United States and numerous dissertation projects, all available on the LoTi website (www.loticonnection.com/research), the instrument has been examined for both construct and content validity.

Stoltzfus (2006) engaged a random sample of approximately 3,770 pre-kindergarten to secondary school inservice teachers. This sample represented nearly 10% of the total population found in the LoTi system’s comprehensive database for the 2003-2004 school year. Stoltzfus studied the construct validity for the newly expanded LoTi survey, referred to as Determining Educational Technology and Instructional Learning Skill Set (DETAILS) as compared to the original LoTi instrument. Table 2.1 (located on the following page) reflects those correlations:
### Table 2.1 Correlations between the DETAILS and LoTi Surveys

<table>
<thead>
<tr>
<th>Name of DETAILS Survey Factor</th>
<th>Number of Items</th>
<th>Correspondence to Original LoTi Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1: Using Technology for Complex Student Projects Requiring Problem Solving, Critical Thinking and Real World Applicability</td>
<td>12</td>
<td>Level 2 (2 original items) Level 3 (4 original items) Level 4b (1 original item) Level 5 (3 original items) Level 6 (2 original items)</td>
</tr>
<tr>
<td>Factor 2: Teacher Proficiency with Using Technology</td>
<td>7</td>
<td>Personal Computer Use (PCU) category (5 original items) plus 2 additional items</td>
</tr>
<tr>
<td>Factor 3: Student Influences on Teachers’ Current Instructional Practices</td>
<td>5</td>
<td>Current Instructional Practices (CIP) category with all 5 original items retained</td>
</tr>
<tr>
<td>Factor 4: Dependence on Resources and Assistance to Increase Comfort Level in Using Technology</td>
<td>7</td>
<td>Level 1 (1 original item) Level 2 (2 original items) Level 3 (1 original item) Level 4a (3 original items)</td>
</tr>
<tr>
<td>Factor 5: Challenges to Teachers’ Use of Computers in the Classroom</td>
<td>6</td>
<td>Level 0 (5 original items) plus 1 additional item</td>
</tr>
</tbody>
</table>


Using standard statistical measures, Stoltzfus (2006) determined a strong correlation between the original and updated LoTi survey instruments. The researcher stated:

The DETAILS Survey clearly has validity as a unidimensional measure of teachers’ levels of technology implementation, the results of higher-order factor analysis also suggest that the DETAILS Survey has validity in capturing five different (though somewhat interdependent) categories of technology implementation. (Stoltzfus, 2006, p.9).
This study provided significant construct validation for the LoTi framework and the researcher followed this work with an additional study to determine criterion validation.

The Texas technology evaluation reflects the constructs of both the original LoTi and newly enhanced DETAILS survey. Therefore, Stoltzfus (2009) utilized the Texas School Technology and Readiness (STaR) rubric in a preliminary study involving 3,556 elementary and secondary school teachers representing 125 varying schools. Using the Spearman’s rank correlation coefficient, the two instruments demonstrated a vigorous relationship that indicated both the STaR rubric and DETAILS survey equally measure similar concepts (Stoltzfus). These previous construct and criterion validation studies establish the LoTi framework’s legitimacy for academic action research projects.

Numerous doctoral projects utilized the LoTi framework. Although the research questions varied considerably, five research studies directly integrated the LoTi construct within implemented professional learning programs. Two studies explored the significance of participants’ self-reflection practices and the resulting practical effect. Dawson (n.d.) investigated if the combination of reflective practice and personal experience resulted in greater professional growth while Worrell (2005) studied the impact of reflective journals in graduate coursework on classroom technology implementation. Other studies incorporated little common ground between them. Heine (2002) compared cooperative and individually driven professional learning programs’ and participants’ demonstrated classroom technology integration. Griffin (2003) described the technology integration professional learning methods teachers found most helpful, and Johnson (2006) studied the effects of a 50 hour technology training course on teachers’ self-efficacy, technology integration and personal computer use. The myriad research questions explored also reflected similar variety in research paradigms and settings.
Of the five relevant research studies, two employ a qualitative design (Dawson, *n.d.*; Worrell, 2005) while the others reflect quantitative research methods (Griffin, 2003; Heine, 2002; Johnson, 2006). Worrell’s multiple case study method involved only five participants whereas Johnson and Griffin included 133 and 259 respective subjects. Of those included in the research, two studies employed adults enrolled in higher education (Dawson; Worrell) while the others accessed practicing K-12 teachers in Texas (Griffin; Heine) or Georgia (Johnson). The qualitative studies indicated positive results related to reflective practice and technology integration. Dawson concluded individual inquiry encourages the active collaboration of experience and professional reflection. Moreover when experience and reflection are systematically and intentionally combined positive strides in professional growth are noted. Worrell’s study supported active reflection as it concluded teachers with increased levels of reflective practice also demonstrated increased levels of technology implementation. The quantitative studies found less positive correlations in their stated research questions. Interestingly, two studies’ conclusions seemed to contradict each other.

Griffin (2003) noted educators’ proclivity to use technology training methods they viewed as most successful. Included in the concluded preferences were teachers’ affinity for peer support, technology specialist support, trial and error and taking coursework for credit. Yet, Heine (2002) concluded working in cooperative teacher teams after a professional learning experience did not produce more effective technology integrated lesson plans than if participants worked in isolation. Hence, while teachers may prefer to work collaboratively to integrate technology, that did not necessarily show success. This idea is further supported by Johnson’s (2006) work that indicated classroom technology integration among 133 teachers in 13 schools was not significantly impacted after an intense 50-hour training program. Although these study
results reflected a similar lack of continuity among more academically rigorous endeavors their inherent limitations must be addressed.

Each of the studies utilizing the LoTi framework was a doctoral research project. Although guided and advised by experienced researchers, these papers are not widely published nor peer reviewed. They also represent inherent biases in the foci of the universities to which they are attached. A disproportionate number of research studies emanated from the University of North Texas (Heine, 2002; Griffin, 2003; Worrell, 2005). While their respective structures were similar, their omissions were also common. Only one University of North Texas (UNT) study referenced a specific theoretical framework (Griffin) and its discussion of self-efficacy and change through learning was superficial. The other UNT studies omitted any reference to a theoretical framework. Dawson’s (n.d.) brief research from the University of Florida also failed to ground its undertaking in a theoretical construct. Only Johnson’s (2006) research offered depth of attention to a constructivist framework. This collective lack of grounding theory presented a specific limitation to the body of literature. While the LoTi structure produced specific validity and reliability research, it has yet to be studied in a peer-reviewed and academically rigorous setting. However, that is not to claim that professional research is without its’ own, sometimes similar, limiting factors.

The applicability of professional learning research is limited by multiple factors. Sample sizes in several studies are too small to produce generalizable results. Fisher et al.’s (2010) participant pool included 59 members. Glazer et al. (2009) utilized a subject pool of eleven teachers and Stockwell (2009) completed the study with only 4 surviving educators. Of the participant groups included, some studies did not address classroom teachers. Harteis et al. (2010) conducted their study among employees of German industrial and administrative
workplaces. Manning (1987) constructed his andragogical learning program for practicing physicians’ continuing education. Other studies involved classroom instructional personnel; however they frequently utilized self-selected volunteer populations (Fisher et al, 2010; Harteis et al., 2010; Karagiorgi et al., 2008; Manning, 1987) that may not be indicative of the larger teaching population. Riley and Roach (2006) did not study volunteer participants. Rather, the 69 teachers and 23 managers included in that program evaluation were required to participate under Wisconsin state law. Even among those self-selected volunteer participants, some studies showed a significant mortality rate. Only 45 of Manning’s 91 participants successfully achieved their growth goals. Similarly, only 57% of Stockwell’s included subjects completed the computer assisted language learning (CALL) program. Irrespective of participant limitations, several studies lacked a specific theoretical framework.

While certain studies directly addressed the principles of adult learning (Karagiorgi et. al., 2008; Manning, 1987), constructivist theory (Harteis et al, 2010; Riley & Roach, 2006) or program evaluation (Fisher et. al., 2010), others did not delineate a theoretical framework to ground their research. Although Stockwell (2009) alluded to self-directed learning, the researcher stopped short of specifically connecting that idea with a theoretical framework. Flowerday et al. (2003), Glazer et al. (2009) and Matzen & Edmunds, (2007) all specifically addressed the intersection of professional learning and 21st Century technology integration, but none of the researchers included a theoretical framework to reference their study design, procedure and/or analysis. The existing literature generally attends to one or two dimensions of the proposed research question, but a dearth of research exists to examine the interaction between 21st Century skills and professional learning within the andragogical framework.
Of the studies reviewed, the majority address the dynamic between 21st Century skills and professional learning. The researchers either attempt this with no addressed theoretical framework (Flowerday et al., 2003; Glazer et al., 2009; Matzen & Edmunds, 2007), with a theoretical framework that is unrelated to adult learning principles (Fisher et. al., 2010; Harteis et al., 2010) or with a vague allusion to adult learning that is not expressly connected (Stockwell, 2009). This project seeks to address the absence of academic research that connects 21st Century learning and professional development practices within the framework of adult learning principles.
Chapter 3: Research Design

Research Questions

This thesis study establishes three research questions. The primary question asks, “What is the current level of classroom technology integration at a mid-size middle school in the Southeastern United States as measured by the LoTi © observation framework?” In order to establish the parameters of investigation, “classroom technology integration” must be operationally defined. For the purposes of this thesis, classroom technology integration is defined as the active, student-directed use of instructional hardware and/or software to facilitate knowledge acquisition of specific learning objectives. In order to observe, measure and record classroom technology integration, the study employed the LoTi observation framework.

The LoTi observation framework (Moersch, 2002) establishes a validated framework for measuring classroom technology integration. The framework establishes clearly observable classroom practices to measure student engagement with instructional technology tools. The LoTi scale measures technology integration in six overall levels from non-use of technology (classified as level 0) to level 6 that engages students in a seamless use of technology, grounded in higher order thinking skills, that enabled curriculum goals to be extended beyond the classroom environment (Moersch). Classifications between level 0 and level 6 reflect a proportionally increasing focus on student-led, technology integrated and critical thinking skills focused learning environments. The operational definition of classroom technology integration and the LoTi framework also allow exploration of two sub-questions within the primary research focus.
Using the established definition for classroom technology integration, this thesis study investigated the following related sub-questions:

1) From the classroom teachers’ perspective, what barriers exist at a mid-sized, Southeastern United States middle school that impede the expansion of classroom technology integration?

2) From the classroom teachers’ perspective, what professional learning programs are necessary to increase classroom technology integration at a mid-sized, Southeastern United States middle school?

In relation to the second sub-question, it is necessary to operationally define, “professional learning program.” For the purposes of this thesis, professional learning programs are defined as any formally structured, administratively-led learning activity that focuses on improving teachers’ professional classroom practice. The remaining primary research questions relate to the professional learning paradigm.

In addition to the aforementioned research question, this thesis study investigated the subsequent interests:

1) What characteristics of a mid-size Southeastern U.S. middle school based professional learning program do teachers indicate effectively increase classroom technology integration as measured by the LoTi © observation framework?

2) What characteristics of a mid-size Southeastern U.S. based professional learning program do teachers indicate are most likely to encourage a sustained increase in classroom technology integration?
In general terms, this thesis expected to discover that, at the present time, classroom technology integration is not well established at the subject middle school. Teachers were expected to be observed in the lowest levels of the LoTi framework. After implementing a professional learning program intended to address this deficiency, it was expected that the data would indicate that the most effective characteristics of that professional learning program will be those facets most closely associated with the principles of andragogy. For example, those program characteristics that relate most closely to personal relevance, directly applicable practice and include adult experience and personal investment in learning goals were expected to elicit a favorable teacher response. Overall, the thesis proposal expected to produce intellectual guidance to practicing educators that could direct the development and implementation of personally effective professional learning programs intended to create effective 21st Century classrooms.

Methodology

As the questions posed are somewhat nebulous and could be influenced by multiple factors, this thesis study utilized a qualitative research paradigm. In doing so, the voices, thoughts and feelings of program participants were explored so that the process of professional learning, within the context of this specific environment could be understood. Bermudez (2008) best explained the advantages of the qualitative perspective when she stated this method affords, “nuanced insight into the development of the complex process of policies and programs, or into the meaning that participants make of their experience and achievements” (p. 8). Ultimately, this study investigated the complex processes involved in shifting a teacher’s personal paradigm from an educator mired in 20th Century direct instructional techniques to one actively engaged in producing a facilitated classroom of 21st Century learners.
Participatory Action Research

In order to investigate the posed questions, this thesis study employed the participatory action research model. This method of research is most appropriate for the type of questions proposed and the context in which they mean to be investigated. The participatory action research model allowed for a systematic approach to explore such complex questions. It is predicated on the idea that generalized solutions are not always appropriate in all contexts. The nuances and characteristics of individual environments impact the viability of suggested solutions and only working, actively, within that context is likely to produce the most effective results (Stringer, 2007).

Participatory action research is especially fitting given the theoretical framework applied to the research questions. This research model aligned with the principles of andragogy. Rather than dictating the questions, interventions and methods used to address them to the participating adults, participatory action research allowed for participant self-direction and utilized the practice of individual goal-setting (Cercone, 2008; Knowles, 1980). As this model occurred within the context of the workplace, it was inherently job-embedded and had the potential to produce evaluation benefits that have personal career relevance (Cercone; Public Schools of North Carolina, 2008).

Limitations

The greatest limitation to the selected method of research is the lack of generalizability to other environments. As this study engaged in participatory action research, the results are specific only to the context in which it was conducted. While intellectual suggestions may be
derived from the data analysis, the results cannot be directly applied to other situations. Due to
the nature of participatory action research, bias is also a limiting concern.

Participatory action research includes the researcher as an active member of the research model. This participation potentially affects their respective objectivity. In this case, the researcher is also a neighboring school principal. That supervisory role, even though she has no supervisory capacity over the participants themselves, may limit the objectivity of the participants. The dual role played by the researcher/principal has the potential to fundamentally affect both the direction and also the outcome of study either through participant reaction to the collaborative nature of the program or in the personal availability of the researcher from an off-site location.

Site and Participants

The research setting is located in a primarily rural area of the southeastern United States. It is the primary feeder school for the neighboring high school. That school opened in 1971, replacing the former historic high school which operated since the early part of the 20th Century. Located in a former textile mill epicenter of southeastern United States, previous graduates often did not pursue higher education, opting to work in the local mill. Hence, the school maintains significant nostalgia as the alma mater for a great deal of the community that still reside there. The attendance lines remained basically consistent since the school’s opening, the feeder system as a community-based school and generally including white, rural students. In 1996, the district migrated to the middle school concept and took that opportunity to redraw lines. The subject middle school converted from a junior high to a middle school model, serving grades six through eight. At that time, a low-income area from the local municipality’s inner-city (the county seat)
became part of the feeder area attendance zone. These changes have included a low-income, primarily African-American cohort of students as part of the school’s attending student body. However, after 16 years of community unrest, 2012-2013 saw those district lines revert to their pre-1996 structure.

Of the faculty and staff, many of the clerical staff (especially custodial and clerical personnel) has been in place for several years. Of the 37 certified staff members, 6 individuals including the Principal, are new to the subject middle school faculty this academic year representing an annual teacher turnover rate of approximately fourteen percent. 22 of the 37 staff members have ten or more years in education. 11 teachers have between four and ten years experience and 4 teachers have three years of experience or less. The middle school boasts four National Board Certified teachers and ten with collegiate degrees in excess of the state required bachelor’s degree. Eight professionally certified staff (21.6%) are male and are most prevalent in the career and technical education and physical education positions. The school operates under the middle school concept of dedicated teacher teams within a traditional academic calendar. For the 2012-2013 school year, the subject middle school offers the typical academic course offerings including academically gifted, special education and regular core courses, career and technical education, arts offerings in music, art and exploratory foreign language.

Selection of participants. Participants for this study were self-selected from existing staff. This selection process represented a non-randomized, convenience sampling of volunteer classroom teachers. As a result of their participation, the study group received a specific career benefit. In order to renew their state issues teaching license, teachers must undertake certified technology-based professional learning. The study’s respective professional learning program granted technology-based continuing education credits to volunteer participants.
Such incentives had the potential to produce a participant sample that is different from the overall general teaching staff. If teachers perceived this program to be more rigorous than the current technology staff development programs, it may have created a sample of teachers with greater intrinsic motivation to integrate classroom technology. However, if teachers perceived this program as less rigorous, or shorter in duration, it may conversely create a sample of participants that are less motivated to fully commit to the program objectives in exchange for easy continuing education credits.

**Participant sample.** Volunteer participants were recruited from a middle school located in the southeastern region of the United States. The subject school employs approximately 35 certified teachers. Letters of recruitment were sent to all certified staff members and four chose to participate. All four participants were female. All participants held valid teaching licenses and possessed bachelor’s degrees in education. Three of the four participants were aged between 21 and 30 and one fell between the ages of 31 and 40. The sample evenly reflected sixth and seventh grade teachers and comprised two math teachers, one science teacher and one social studies teacher. Two of the participants taught one year or less in the classroom, one attained three years of classroom experience and the most senior participant had been teaching for ten years. Of the participants, one was concurrently pursuing a master’s degree in instructional technology.

**Researcher information.** The researcher is a 38 year old female with approximately 15 years of educational experience. She holds a bachelor’s degree in history education, a master’s degree in school administration and is currently pursuing a doctoral degree in educational leadership. Additionally, she is concurrently participating in the National Board for Professional Teaching Standards pilot study for Principal certification. She has been a member of the feeder
area community in multiple, non-consecutive roles. She worked as a member of the high school social studies department from 1998-2001. She returned as a high school assistant principal from 2003-2006 and in July 2011, returned as the feeder high school principal.

Her current supervisory role represented a potential conflict of interest. Through the participatory action research model, the researcher played an active role in the professional learning process. The researcher’s duplicitous role as a neighboring principal may have impacted the volunteer sample. Teachers that perceived her role as an instructional leader may have found little conflict. However, teachers that primarily view a principal as an instructional supervisor may have chosen not to participate for fear of negatively impacted evaluations due to the researcher’s relationship with the current middle school principal. The middle school principal, serving her first year in that role, was most recently the researcher’s assistant principal, and previous to that her principal intern several years before. Conversely, some teachers may have felt compelled to participate so as to not adversely affect their professional evaluations. To mitigate these concerns, the entire staff was introduced to the professional learning opportunity through an Institutional Review Board (IRB) approved letter that clearly indicated their choice to participate in the study or decline the invitation would incur no negative evaluation impact. That letter is included in the final report appendix.

**Data collection**

A variety of data was collected throughout the professional learning program. Initially, all volunteer participants completed the Digital Age Survey (Moersch, 1995) to determine their current level of instructional technology use. That data was aggregated and served as a focus point during the initial focus group discussion. Using methods consistent with adult learning
principles, the participant group set learning goals and an individual professional development plans relative to the initial data.

Over the course of 30 school days (six weeks between September and November), the researcher informally observed and met with individual participants on a regular basis to check their professional development progress, offer resources and feedback, share formative observation data and, if necessary, revise the professional development plan. After the 30th day, the participants completed the Digital Age Survey (Moersch, 1995) again to determine their respective level of classroom technology integration. The participant group completed the thesis study with a focus-group style exit discussion.

The data throughout this process was collected in multiple ways. Pre and post survey data was collected and disaggregated through the LoTiconnection.org (Moersch, 1995) website. This survey has been validated through previous study and both the pre and post study survey were identical in order to produce comparable data. In order to utilize the LoTi (Moersch) framework, permission must be obtained from the proprietors. The documentation of such permission is included in the thesis appendix.

Data was also collected through field notes. These notes documented the responses and discussions occurring in the initial participant meetings where program volunteers discussed initial data findings and developed their professional learning plans. Field notes were also maintained during both individual cycled meetings where learning progress and professional learning plan adjustment occurs.

Focus groups constituted another method of data collection. A focus group protocol was established and adhered to in the opening and exit meetings with program participants. Data was
collected from the focus groups pursuant to that protocol. The timeline for the entire study lasted approximately 35 school days. Active classroom and interview data collection occurred over the active 30 day observation and feedback period. Pre and post surveys and classroom observation occurred approximately one week prior and one week following the active collection of classroom data.

**Data analysis**

Gathered data was collected, stored and analyzed for trends, central themes and consistency. The initial and program end surveys were conducted through the LoTi survey instrument (Moersch, 1995). Data was gathered through participants’ online responses, compiled and disseminated to the researcher from the LoTicollection.org website. This data was analyzed for initial levels of classroom technology integration in order to devise appropriate individual learning plans and provide discussion points for the opening focus group. The post survey data was compared to the initial responses to determine trends, growth and/or stagnancy of response as well as provide data for post-program focus group discussion.

The initial and post-program focus groups were audio recorded through Evernote and converted to mp3 format. That audio file was transcribed and the respective transcript coded. The same process applied to all individual meetings between the researcher and the participant. The researcher employed line-by-line coding in order to determine implicit and explicit participant concerns. In doing so, and noting trends and questions, collected data was utilized to refocus later interviews and/or professional learning plan development under the participatory action research model (Charmaz, 2006). After determining initial trends through line-by-line coding, the researcher used focused coding to categorize those trends and themes (Charmaz).
Individual interviews were scheduled to be conducted with participants at two intervals during the 15 day study cycles. Data from these interviews were maintained in field notes, email conversations, audio files and transcripted notes in Evernote. From these notes, the researcher used axial coding (Charmaz, 2006) to synthesize the interview data with the initially coded focus group data. As these interviews provided insight into the process of professional learning, the researcher produced informal memos (Charmaz) that served to analyze the intersection of the qualitative codes, survey and observation data. This recursive process was intended to clarify emerging ideas, develop data patterns and determine central themes that indicated the overall trends in the research study.

**Validity and Credibility**

This project adheres to six participatory action research principles that, according to Stringer (2004), ensure a valid and credible design. The thesis study includes a prolonged period of time where the researcher and participants interact, develop and revise their course of action. This extended engagement (Stringer) occurred through the initial survey process, multiple 15 day data collection cycles and the post-survey and focus group process occurring at the end of the project where the participants and researcher engaged in prolonged collaboration.

In order to execute a valid and credible participatory action research project, Stringer (2004) stated the triangulation of data is necessary. This research design involves multiple data points from varied sources. The pre and post project LoTi surveys (Moersch, 1995) utilize a previously validated survey tool. The focus groups and participant interviews allow for both whole group and individually offered feedback regarding the professional learning process.
Addressing comprehensive data sources related to the research question provides greater validity and credibility.

Unlike experimental designs, participating individuals will be made aware of the program goals, objectives and outcomes as a collaborative member of the research project. Stringer (2004) claims participant debriefing is vital to establishing validity and credibility in a participatory action research design. This thesis study began with a collaborative evaluation of initial data and concluded with a summary discussion of the project results. This discussion format allowed for alternative points of view and established negative case analysis (Stringer) to counteract overzealous points of view. This was especially important to counteract the potential conflict of interest posed by the researcher. As the research project was conceived, designed and implemented from the viewpoint of the researcher, it is reasonable to suggest her respective point of view is formidable. Including negative case analysis in an open discussion structure mitigated that concern and allowed for well-rounded data collection.

As all members of this thesis study (including the researcher) worked in the same feeder environment and professional culture, they share a common vocabulary. This helped to ensure the validity and credibility of the research project as the discussions, observations, focus groups etc. would have referential adequacy (Stringer, 2004). With a common point of reference, there is greater consistency between coded interviews, discussions, observations and surveys and it is less likely that erroneous conclusions may be drawn from inconsistent cultural or climactic understanding.

As all members of the research project maintain consistent and authentic involvement, it allowed the opportunity for frequent member checks (Stringer, 2004). Member checks allow the
researcher to ensure the program participants are consistently working toward the project’s stated goals and objectives. This criteria helps ensure validity and credibility by actively promoting the collective focus and producing data that is authentic, relevant and reasonably related to the research question.

**Protection of Human Subjects**

Ethical considerations were of concern in this study due to two important factors; teachers may feel coerced into participating in the study because a neighboring feeder area principal is asking for their participation; and the teachers may feel uneasy about being observed and evaluated in their progress of this course by the neighboring feeder principal, believing it may affect their professional evaluation. In order to mitigate these concerns and provide for the protection of human subjects a letter of introduction and recruitment was included that addresses the following points:

1) Participation is strictly optional and should not be considered if the teacher feels threatened or in any way uncomfortable

2) Participation will not in any way affect their professional status or their professional evaluation

3) Participation in the study will remain confidential and will not be divulged or discussed in the educational community by the researcher.

4) Further, all willing participants will sign a statement of agreement that will include a signed statement from the researcher clearly outlining the protection of the teachers’ participation in the study and their professional status at school.
Research design synopsis

21st Century students are born into, and interact simultaneously with, a digital environment that is fundamentally different from the 20th Century’s educational landscape. As the global economy continues to flatten the world’s resources, connectivity and mutual dependency the business community demands an educated workforce prepared for an unpredictable future. In response, national consortiums, state legislatures and local school districts are realigning curriculum and technology resources to address the new requirements of a modern workforce. These sweeping changes represent a significant departure from the traditional culture and operation of American schools. Arguably, the Digital Revolution constitutes an elementary change in American education commensurate with A Nation at Risk, the Sputnik launch or the Industrial Revolution. These respective changes also require a change in teacher practice.

Instructional methodology remains largely unchanged over the last century. Regardless of cultural, technological or economic changes, American classrooms remain focused on direct instruction, textbooks, rote memorization and fact-based recall. In order to facilitate a modern curriculum, instructional methodology must also undergo fundamental change. New curriculum requirements aligned with the global economy require collaboratively created, project-based, critically devised problem solving that is grounded in skills development rather than factual recitation. In order to accomplish these objectives, teachers must shift their paradigm from that of a direct instructor, to a learning facilitator. More specifically, to authentically address 21st Century learning objectives, this lesson facilitation must be accomplished through the successful integration of classroom technology.
In order to move educational professionals from teachers to facilitators, a multitude of varied professional learning have erupted in the educational industry. Lacking specific clarity among program purposes, structures and objectives, there are considerable gaps in the academic research to inform program design. Primarily grounded in the precepts of pedagogy, these professional learning programs are attempting to teach adults in the manner children are taught. This thesis study sought to understand the effectiveness of a technology integration professional learning program that is grounded in an andragogical framework.
Chapter 4: Research Findings

The research study developed and implemented a short term professional learning program grounded in andragogical principles. The purpose of the study sought to discover if an andragogically-based professional learning program could enable teachers to shift their instructional paradigm from directive teaching, to student-led instructional facilitation by use of classroom technology. The primary research question investigated the current level of teacher classroom technology integration at a mid-size middle school in the Southeastern United States as measured by the Level of Teaching Innovation (LoTi) framework. Within that focus, two specific sub-questions referenced the impact of inherent technology barriers and what types of professional learning were considered an effective means of increasing classroom technology integration. The second research question asked what characteristics of a mid-size, Southeastern United States professional learning program teachers indicate effectively increase classroom technology integration as measured by the LoTi Framework. Studying the effects of the implemented professional learning structure, each of the four participants experienced varying levels of personal success. While the overall program results were substantially ineffective for shifting teachers’ instructional paradigms to a facilitative role, the specific program structure engendered an overwhelmingly positive response. This chapter will discuss the data garnered from the four participants as it relates to their professional learning goals and overall program success. Individual data and that of the initial and final focus groups will be analyzed in relation to andragogical characteristics. Finally, patterns of data will be discussed, categorized and summarized to offer insight toward the posed research questions.
The Andragogical Foundations of the Professional Learning Program

The action research design involved four volunteer middle school teachers. After an initial survey and focus group discussion, each teacher established their own professional development goal and the researcher worked individually with each participant over the course of several weeks toward implementing a student-led, technology infused classroom lesson. The research concluded with a post-survey and exit focus group that debriefed the professional learning process. The research design accounted for all major tenets of andragogy, defined as the need to know, the learner’s self-concept, the role of experience, readiness to learn, orientation to learning and motivation (Knowles, Holton & Swanson, 2005).

Each of the volunteer participants either understood the role of instructional technology or already actively engaged in some level of classroom technology integration. Therefore, they understood the importance of the content, Knowles, et al. (2005) described as the “need to know” (p. 64). The study took the learner’s self-concept into account. All participants were given the latitude to not only choose their own technology integration idea, but were also given the freedom to express that goal in whatever format they desired. They were not required to complete a specifically mandated, or formatted, professional development plan. Rather, they were permitted to discuss and determine this goal with the researcher in an informal manner that allowed for adjustment through the study. The role of teacher experience was accounted for in both the initial and final focus group discussion where participants could freely discuss and/or share their experiences with each other. Additionally, during the study, the participants could relate those experiences and collaboratively direct their learning through the individual interactions with the researcher. Individualized resources, conversations, meetings and informal observations invariably included a discussion regarding the teachers’ current or former
classroom experiences. These discussions helped shape the direction of the professional learning program as it related to their individual development goal. This individualized approach also addressed the participants’ orientation to learning.

Adult orientation to learning is directly related to the applicability of that learning to real life situations (Knowles, et all, 2005). As the content of this professional learning program was determined by the participants, all four teachers self-directed their learning toward addressing practical classroom application. Furthermore, the individualized nature of the program design ensured that participants received relevant, timely information and support directly related to their chosen topic. These concepts dovetail with the andragogical principle of learner readiness, which suggests adult learners become inclined to learn information and content that will directly impact their ability to cope with their own present concerns and experience (Knowles et al., 2005).

Each of these program dynamics are designed to encompass andragogical principles and maintain adult motivation to learn. By instituting a program design that is flexible, relevant, directed to participant needs and responsive to necessary adjustments, the study seeks to attain positive change in student led and technology integrated lesson planning and delivery.

**Participant Data Analysis.**

*Dawn.* Dawn exuded low motivation and low initiative in designing and/or implementing a student led, technology integrated lesson plan. She was among the most negative participants in the initial focus group, speaking less frequently than her colleagues but generally contributing negative comments about the effectiveness and/or feasibility of technology integration. She is a young, new teacher. She was hired directly out of student teaching into a
high school math position for the previous academic year and moved to the middle school over the summer. She is newly married (having taken her honeymoon during the course of the study) and shared a new pregnancy as the study closed. She required significant effort on the part of the researcher to engage her in conversation, remind her to complete tasks and request information and/or meetings. By the end of the study she did not create, plan nor implement any student led, technology integrated lesson plans.

Dawn did not purport to be a technology innovator. In terms of Knowles et al., (2005) learners’ self-concept, she rated herself low on the LoTi Digital Age Survey for technology integration. She wanted to make a positive difference for students and through her interactions in the study it seems clear she feels that is best accomplished through one on one teacher to student interaction. She claimed an interest in technology integration but was openly skeptical and gave generally negative responses even to the positive shared experiences of her colleagues.

Her experience was limited. Being a new teacher, she did not have the depth of classroom experience to relate as other participants. Additionally, her responses indicated her life experience is less tied to technology. She spent the summer as a counselor for a basic summer camp experience in the state of Maine. She also expressed to one of the participants in the initial focus group that, even though a member of Generation Y, “I didn’t have [technology] growing up.”

Dawn’s interest in technology appeared attached to traditional teaching methods. Due to budget cuts and changing curricula in the state of North Carolina, she had limited textbooks to use in her mathematics class. Therefore, her chosen area of professional learning encompassed building a digital textbook. While this choice generally demonstrates Knowles et al.’s (2005)
readiness to learn, she did not follow through. She verbally expressed her preference for traditional materials (small white boards and markers over the SMART board) and did not respond to any technology or digital resources offered. She was the most difficult of the participants to schedule meetings or observations with and generally did not respond to email in a timely manner. There was no visible use of technology during any observation period and she reported no voluntary computer lab use for her students.

Dawn’s orientation to learning reflected a connection with classroom management and lesson planning. Her initial observation involved students playing a math game and was chaotic in terms of noise and student movement. She specifically voiced a concern regarding the management of students while implementing classroom technology lessons. In referencing SMARTboards she stated, “I have it, but I use it because I don’t want kids walking across the room wasting time and popping everyone on the head.” During the initial focus group, she scoffed at the amount of time a student led, technology integrated lesson would take to plan. This may have been a considerable concern for her orientation to learning given the changes in her personal life with both a new marriage and new pregnancy. She expressed frustration with students not learning the material through traditional teaching methods. She shared, “they ask me a question and I’m like, ‘we just took notes on that.’” She specifically demanded a material answer to solve the problem of student accountability in technology integrated lessons. She asked, “So, how does a flipped classroom work?” When that answer is not forthcoming or immediately specific she visibly dismissed the discussion and offered no further commentary. Likewise, the discussions regarding access and resource barriers are generally met with immediate negativity. She immediately expressed frustration with district blocked website resources such as, “game pop and all the videos out there we can’t watch.” The barriers to
technology integration appeared to be an insurmountable barrier for Dawn and she did not engage in any discussion regarding creative methods to overcome these issues.

While Dawn’s other adult learner characteristics fit well with Knowles et al. (2005) model, her motivation to learn does not. Dawn’s responses indicated that her motivation to learn was externally driven. During the initial focus group meeting she discussed an interest in ensuring she can get her student loans forgiven. As mentioned previously, she specifically stated that she will not authentically engage in professional learning unless there is direct oversight from an administrator. She continued on to indicate if someone in authority is not checking behind her, she will not see the value in the program. These external motivations reflected a more pedagogical development than andragogical and set her apart from the other study participants.

**Kim.** Kim was the quietest participant in the study. She contributed very little to the initial focus group meeting through the general discussion about technology integration and her personal goals for the study. She was immediately vocal in expressing her opinions about professional learning programs. She appeared motivated and interested in the study. She had less than one year of experience and was open to suggestion. She stated her goal was to learn new techniques in order to keep learning fresh and she was receptive to the resources given. She had a general idea of what she wanted to accomplish but was generally unfocused about how to accomplish it. She did not take the initiative to follow up consistently and eventually apologized and admitted that after she got into the project, she realized she was not ready to integrate technology. She accomplished very little during the course of the study.
She shared a similar self-concept to Dawn. She rated herself low on the LoTi Digital Age Survey for technology integration and consistently communicated that her goal in teaching was to make a positive impact in the lives of children. Also like Dawn, she had limited classroom experience as a new teacher. She tended to listen intently to others more so than contribute to the conversation. Especially in the initial meeting, and then through lacking response to given resources, she appeared either overwhelmed or intimidated by the process.

Kim’s purpose for joining the study reflected her readiness to learn. She indicated that she, “feels like I do the same thing day after day and would like to get some new ideas for how to use technology.” By joining this study, she sought new methods to keep her instruction fresh. However, she did not specifically respond to any resources given. She asked for feedback regarding a lesson observation (which was student led but did not integrate technology) and the researcher promptly replied, but Kim did not respond to the feedback given. As Knowles et al. (2005) suggested, her orientation to learning was problem-centered. She desired to make an engaging learning environment and felt that was not occurring with her current expertise in lesson planning. However, when she could not reconcile how to integrate technology within the professional learning community (PLC) lesson structure, her motivation shifted.

An adult’s motivation to learn is primarily intrinsic. Kim indicated she wanted to learn new things and gain experience she could relate to the classroom. Although she asked for feedback, she never responded to the feedback she was given. As she worked with her PLC outside of this study, she was unable to apply her new learning to that structure. As that instructional team is a daily, required structure that likely supplied her with specific lesson planning tips and objectives, Kim’s motivation to learn shifted to the work outside of the study in order to be successful within her job-alike teaching team.
Sandy. Sandy was clearly one of the most technologically proficient participants. She was personally comfortable with technology resources and offered a great deal of experience and insight to her colleagues. During the time of the study she actively pursued a master’s degree in instructional technology. She frequently integrated technology into her lesson plans and often reserved the computer lab for the students’ benefit. However, she expressed significant frustration with the lack of school-based resources and frequently returned the conversation to the barriers inhibiting true classroom technology integration. She expressed, “there’s not enough technology for each classroom teacher to use consistently. When one class or grade is working on a project it prevents anyone else from being able to use computers.” By the end of the study she enhanced her currently implemented lessons but did not develop or integrate any new technology to what she was already doing.

Sandy reflected the highest self-concept of any volunteer participant. She rated herself ahead of all others on the LoTi Digital Age Survey and her confidence and knowledge reflected that self-concept in private meetings with the researcher. Her stated objective for joining the study dovetailed with her university experience and she felt the two experiences would enhance each other.

Even though Sandy only accrued three years of classroom instructional experience, she shared many experiences, tips and ideas regarding technology integration. Many of these references related to prior teaching years and demonstrated her long standing pursuit of classroom technology integration. Her frustrations with limited school resources were generally shared from experience rather than theoretical supposition. However, she also tempered those experiences with the notion that shifting the paradigm from didactic instructor to learning facilitator was a long-term process.
Sandy’s readiness to learn reflected her current stress level over graduate work. She saw this study as an opportunity to augment her higher education goals. In a one on one meeting with the researcher, she shared her anxiety regarding her current coursework. She indicated, “this research [class] is killing me. It’s more work than any of the other classes I’ve had.” These competing responsibilities may help to explain why she did not interact with the researcher regarding the resources given. During the individual observation and interview she discussed her plans, goals and objectives but did not actively incorporate or seek new ideas. Rather, she used the researchers input, guidance and resources as a validation of what she was already implementing. Although initially interested in stop animation lesson planning, she eventually discarded that idea to enhance what she was already doing with Edmodo. She did not seek authentic feedback and appeared disinterested in authentic assistance. Although her actions appeared misaligned with her stated goals for the program, clarification came toward the end of the study. Sandy had been offered and accepted a position at a local community college. She anticipated her resignation from the middle school would occur near the end of the study. This development most assuredly effected her orientation to learning and motivation differently than the other study participants.

Sandy’s orientation to learning reflected an interest to apply practical integration of classroom technology. Both personally and professionally, she reflected a 21st century learning disposition. Her technology based lessons reflected a stronger focus on higher order thinking skills and differentiation than the other participants. She did not seek feedback or clarification, but merely implemented what she thought was appropriate and effective. The frequency of her classroom computer use exacerbated her frustration with limited school based resources. She indicated, “I integrate [technology] on a daily basis to carry out instruction. However, it is often
limited when I actually have students creating and assessing. It all depends on access to computers.” While she navigated those issues within her capability, she was clearly dissatisfied with her inability to integrate technology on a consistent basis. Her decision to leave the school reflected that disquietment.

Sandy described herself as passionate about the visible moment a student grasps a concept. She exemplified Knowles et al.’s (2005) description of andragogical motivation because she reflected clear internal motivators. She enrolled in a master’s degree program to advance her own knowledge. She specifically asked what type of teacher would be considered advanced on the LoTi Digital Age Survey and she remarked that the decision to change careers was intended to increase her job satisfaction and quality of life. While she did explicitly indicate, “I’m going to be honest, I want to make more money,” (which would qualify as an external motivator) she discussed increased compensation as a means to improve her internally motivating quality of life.

**Becky.** Becky was an incredibly motivated, receptive and communicative participant. She possessed a clear intrinsic drive to become the best teacher she could be. She interacted collaboratively with the researcher and shared resources as well as interacted, responded to and incorporated those resources shared with her. Working together with the researcher, she developed a comprehensive, hands-on flipped classroom lesson using new methods, technology resources and acquired learning.

Becky’s self-concept with technology was positive. She rated herself higher than most participants on the LoTi Digital Age Survey if still low on the overall scale. However, she was most vocal that the survey itself (and the expectations it set for a true technology integrated learning environment) delivered a blow to her professional self-esteem. She was the first to
reflect on the survey and express, “I’d like to take that survey again and not feel like a crap teacher.” She specifically stated that one of her goals for the professional learning program was to increase her proficiency on that survey to bolster her teaching confidence.

Becky, entering her tenth year of teaching, was not only the most senior participant in terms of age, but was also the most experienced teacher. She readily shared her experiences and those of her friends during group and individual discussion. She was comfortable in the focus group setting and tended to dominate the conversation with experiences, examples and questions. However, she was also one of the only participants who would readily offer a dissenting opinion, especially as it related to the schools’ instructional technology barriers. She attached new learning in the context of her experiences and regularly sought to integrate new ideas with her existing knowledge of instruction, classroom management and technology.

Becky reflected her readiness to learn in her stated objective for the professional learning program. She specifically favored shifting the paradigm of instruction from teacher to facilitator. She stated her primary interest was to make the students work more during school while she was able to conceivably work less. She shared, “I really want to get to that point that you were talking about where I’m not exhausted at the end of the day and it’s just hard to know how to do it.” She actively responded to given resources. She initiated her own contact with the researcher to discuss a given resource or ask questions. She was the only participant to use the instant message feature in the email system to ask brief, real-time questions. She was open to observation and feedback from both the researcher and also her colleagues. She expressed that she chose to observe other master teachers in her building in order to learn from their experience and apply that knowledge in her classroom. She was the only participant to truly take advantage of the personal resource available through the researcher. She requested a joint planning session to
work through the development of a flipped lesson. During that time she was thoughtful, analytical, open to suggestion and focused on the task at hand. While she recognized, and had considerable anxiety regarding, the barriers to technology integration, she actively planned to navigate those barriers within the limitations of school based resources. In fact, the barriers that were so insurmountable to Sandy were not Becky’s greatest concern.

Becky’s orientation to learning related to resolving the issue of control. Her most frequent concern with student led instruction was how to ensure students would learn her traditionally taught material through a non-traditional method of instruction. She best expressed this concern when she questioned, “I don’t know that they’re ready for that level of independent work.” Control was an overriding issue for Becky. She was unsure how to control student outcomes either through a lesson post-assessment or through the execution of the actual lesson. She worried that students, in the flipped classroom model, would not take their independent learning seriously and/or thoroughly and thus not be prepared for the activities. She reflected an academic trust issue toward her students feeling if, given the choice, they would choose to be irresponsible learners. She said, “when we come back together they didn’t hold onto what I wanted them to hold onto. They can tell me what we did but can’t tell me what I wanted them to get out of it.” She was also the first of the participants to question whether early adolescents were capable of independent learning. But, her concerns also extended to trepidation over controlling how students behave in a student-led learning environment and frustration regarding the inability to control resource availability or student technology access. She did attempt to control these barriers within limits. She developed her plans so she could account for access issues and planned to use resources available in her classroom or computer lab. She further voiced dissent that these barriers were fatal to classroom technology integration. And more theoretical, but still
concerning was the inability to control local school board policies regarding grading practices, established school cultural barriers and the parents’ lacking understanding of 21st Century instruction.

These concerns culminated in an overriding fear of the unknown which may culminate in failure. Becky seemed especially concerned that her efforts may not produce successful results. She discussed testing her new learning one or more times before inviting the researcher to see it to ensure the final version would not fail by stating, “I think I’d need to do it a few times, like a few practice runs, before you come in and watch.” She opened the collaborative planning session by relating her experience of a failed lesson. She also did not want to fail before her supervisors and after building this technology integrated lesson, presented it for administrative approval. That approval was not given and the lesson was not implemented.

Becky is clearly comfortable with technology, it is a personal interest to her, and she is motivated to use it both professionally and personally. She demonstrated the intrinsic need to improve her professional self-esteem and become a better teacher. She showed this motivation through her eagerness to learn, her consistent collaborative nature and feedback seeking. She was generally positive toward her planning, even while considering technology barriers and control issues, but pushes forward despite those concerns.

**Initial Focus Group Analysis**

The initial focus group sought participants’ insight regarding the following questions, in the following order:

1) For what reasons did you choose to participate in this program?

2) What are your personal goals for this program?
3) What characteristics do you think make a successful professional learning program?

4) Describe your level of classroom technology integration?

5) What questions or concerns would you like to address before the program begins?

Participants began, in round robin fashion, discussing their motivating interest in the program. Sandy, Kim, Dawn and Becky each expressed varying, yet related, catalyzing interests. Sandy was currently enrolled in a master’s degree program for instructional technology and felt this study could augment her efforts. Kim was interested in new classroom strategies she could implement to keep instruction fresh. Dawn was intrigued by the idea of a flipped classroom and wished to get more information to judge its feasibility and Becky wanted to specifically move her instruction from that of directive teacher to classroom facilitator. This initial discussion flowed freely and began positively. However, within minutes, the first concerns regarding barriers to successful classroom technology implementation emerged. It is important to note, none of the scripted focus group questions specifically referenced barriers to successful classroom technology implementation. However, two significant areas of concern quickly surfaced and would continue to resonate throughout both the focus group meeting and also the study as a whole.

Participant concerns regarding both student access to technology and school-based availability of technology resources consistently colored the focus group discussion. Sandy was the first participant to indicate a negative response concerning student access and school resources. She asked, “how do you have the resources to do [technology integration] one to one? I don’t know that it’s realistic.” She questioned the realistic viability of student led, technology integrated lesson facilitation given questionable student access to hardware and internet connectivity and limited school resources. Regardless of the scripted focus group question, these
concerns re-emerged at regular intervals as the participants discussed their interest in the program (question one); their goals for the program (question two); and their current level of classroom technology integration (question four). The participants were generally negative in their reaction to these barriers. Dawn, especially, gave examples from her experience where even plentiful school resources did not produce positive results for student led instruction. Specifically she shared, “when I was in college I went to [name removed] county and they all had MacBooks for every kid. But, they were still only doing problem after problem after problem. It didn’t change anything.” Becky remained the most positive, countering Dawn’s argument and providing a personal experience that reflected the opposite result. Becky countered, “I have a friend who teaches at [name removed] charter school and all her kids have laptops. She says a question can’t come out of her mouth before somebody has found the answer.”

The group’s discussion of access and resource barriers actually derailed direct discussion of their program goals. However, the participants generally agreed, regarding their individual goals for the program, that they wished to enhance their professional self-esteem through improved responses to the LoTi Digital Age survey as well as find a practical means to integrate classroom technology despite the aforementioned access and resource barriers.

Although student access and school provided resource barriers dominated the focus group’s general discussion, they were not the only two barriers to technology integration perceived by the participant group. The characteristics of 21st Century students also emerged as a point of discussion. Two of the participants shared classroom teaching experiences that supported Prensky’s (2001) theory of 21st Century learners. Both Becky and Sandy (a science and social studies teacher respectively) indicated personal instructional procedures that valued teaching students to discover information rather than engage in rote memorization. They both
openly questioned the value in directed, memory-based, instruction. Becky declared, “I think it’s more important to know how to find the answer than to know the answer.” Kim and Dawn (both mathematics teachers) expressed dissent, indicating students required a core of knowledge from which to build. This discussion turned to the effectiveness of technology driven instruction.

Becky shared a colleague’s experience where students in a one to one laptop environment were actively engaged and the teacher had a difficult time keeping up with the pace of the students. This example lends some credence to Prensky’s (2001) idea of the digital native. However, in their present environment both Becky and Sandy offered examples of digitally driven lessons that students had a difficult time completing due to lacking, motivation, interest or the ever-present barrier of access and availability of resources. Dawn was specifically negative toward the idea of digital natives, instead indicating her opinion that students would rather work with individual whiteboards and markers. She went so far as to express her preference for school instructional monies to be spent on traditional resources rather than technological ones. She stated, “I would much rather have the money to get dry erase markers for my mini-white boards then have one kid go to the SMARTboard to he can use technology.” All participants expressed some concern over the motivation of students to learn the material in a student led learning environment and the disconnection between North Carolina’s current system of student accountability. Moreover, being teachers of early adolescents, they openly questioned the developmental ability for sixth and seventh grade students to handle student led, technology integrated instruction responsibly.

The discussion regarding technology barriers and student motivation drew the focus group into a dialogue that best categorized their apprehensive attitudes regarding student led,
technology integrated classrooms as fear. Specifically, the participants expressed a tangible fear of losing control of their classroom as well as a fear of multiple unknown outcomes.

The fear of losing control of their respective classrooms emerged in the discussion through several concerns. The participants stated logistic concerns with the effective implementation of technology. Again, returning to a discussion on school based resources, both Becky and Sandy relayed experiences where technology driven lesson plans derailed over malfunctioning technology. Becky indicated she regularly lost instructional facilitation time in the school computer lab in order to trouble shoot login, access and other logistic concerns. She lamented, “Half the time when you go in there, stuff doesn’t work.” Sandy discussed her lack of student interaction with the SMART board as the hardware only allows for one student to touch it at a time, leaving the others nothing concrete to do while they wait for their classmates to transition between their desks and the board. Dawn, Becky and Sandy discussed the likelihood for classroom management to become a palpable concern while students are unengaged and awaiting either functioning hardware or their turn with limited resources. Giving examples from their own classroom experience, they generally agreed that inconsistent operation of school resources, or lacking resources to assign technology to every student caused a material classroom management concern. Both the logistic and classroom management concerns fed a greater anxiety related to student accountability.

Dawn specifically expressed her concern that students needed to be held accountable for their learning. She offered, “If they could be held accountable to a flipped classroom and it was somehow about to be done with those people that don’t have a computer; that could work. But, you have to be held accountable; that’s huge.” Dawn was also clearly skeptical that students possess the academic motivation to overcome the aforementioned technology barriers and
persevere in their learning without the teacher’s direct instruction. Becky articulated a similar fear that students in a flipped classroom environment would not accomplish the needed tasks at home in order to produce a successful higher order lesson at school. Sandy shared experiences where she was specifically uncomfortable, and therefore did not allow, student led learning regarding certain potentially controversial topics (i.e. world religions) because she did not trust the students would ascertain the necessary curriculum objectives. She lamented, “they don’t get it. They don’t all get it and if I leave it at that, I feel like I’m not going to be doing what I’m doing.”

These concerns regarding logistics, classroom management and student accountability highlighted an underlying fear of the unknown. As student led, technology integrated lesson planning is an emerging area of pedagogy, the participants had limited experience implementing this practice, and thus had limited confidence in student outcomes. Their discussion during the initial focus group reflected that fear. Multiple comments surfaced regarding how students would perform in such a structure. They also questioned whether students would, or would be capable, of achieving the lesson objectives without didactic, teacher led, instruction. Becky, especially, was reluctant to give up traditional teacher control of the learning process to the students. This was especially true when related to learning outcomes and teacher accountability in a traditional format. Becky shared her fear that non-traditional instruction “scares me. It makes me nervous and I don’t like that at all.” Sandy specifically stated that she would like to turn over control, but had previous experience where the students were not successful meeting her expectations. Dawn appeared not to have attempted such student led lessons for the reasons expressed by her colleagues. Eventually, the greatest impediment to rising above those fears emerged. The State of North Carolina enacts a comprehensive standardized testing program based on a set, state-wide,
curriculum. At the time of this research study, both the curriculum and the state testing program changed considerably. Among these changes was the addition of several new tests in formerly untested (i.e. social studies and science) curricular areas. Moreover, the participants were aware that student growth and proficiency on these mandated exams now substantially affected their summative evaluation ratings. Hence, participant fear regarding student outcomes in an alternative learning environment regularly colored the focus group’s discussion.

Taken together, the participants concerns regarding access, resource and student barriers to success explained their collectively low personal ratings for classroom technology integration. When asked how they rated themselves, Kim was the first to respond. Noticeably silent and difficult to involve in the discussion, Kim quickly shared, “on a scale of one to ten, I’m going with a two.” Using the LoTi Digital Age Survey as their point of reference, the participants all lamented that the survey was bruising to their professional self-efficacy. Sandy stated that she initially would have placed herself at a five to six on a ten point scale (the highest among all participant members), until she heard the others’ discussion of the LoTi instrument. As they discussed why they rated themselves as low as they did, the conversation returned, yet again, to the access and resource barriers to technology instruction. The only portion of the focus group where barriers to technology integration did not drive participant discussion related to the question regarding professional learning programs.

When asked what characteristics of a professional learning program contribute to its overall success, all participants (including Kim) found their voice. While there was some dissent among the participants regarding the previous questions, there was unanimous consent as it pertained to this discussion. All participants expressed that they wanted professional development programs to respect them as a professionally trained individual. None were
interested in sitting in disconnected workshops with colleagues that were not as technology
savvy as they were. Kim echoed the group’s feelings when she said, “it’s really irritating and
frustrating if you have to sit and wait and would rather do what you need to do.” They expressed
a desire for professional development to be respectful of their time, experience and expertise.
They repeatedly used words like “irritating” and “frustrating” when they felt their time was
wasted waiting for others who were not as adept at navigating digital resources. They wanted
their learning to be relevant, interesting, meaningful and immediately applicable to their
classrooms. They engaged in some discussion regarding professional developers that had the
ability to differentiate their instruction for the experience and expertise of the teachers in the
room and expressed their frustration over those who could not train accordingly. Dawn,
reflecting her interest in student accountability, also discussed her desire to be accountable for
professional learning. She declared, “I don’t see the benefit of [professional development] if
you’re not going to check behind me.” She was the lone proponent of external accountability but
made it clear without such oversight she would not be motivated to learn the content required.

Data Patterns in Participant Results

The four participants in this study produced four different results. The experience of each
participant, and how the researcher interacted with them, was as individual as the subjects
themselves. However, the differing results did produce patterns of useful data. Interesting among
the data trends is the relationship between participant motivation and the accepted level of
support. Presented in a two by two matrix where the x axis represents learner motivation and the
y axis represents accepted support, each dimension can be labeled and represented by a specific
participant. Figure 4.1 (located on the following page) illustrates the data trend:
This professional learning model primarily depended on the quality of interaction between the participant and the researcher. As the researcher attempted to work with all parties equally, the motivation of individual participants and their willingness to accept resources and collaboration established great bearing on their overall success. Dawn, who showed little motivation and interacted infrequently with the researcher, accomplished none of her stated objectives. She experienced essentially no growth. This professional stagnancy showed both low participant motivation as well as low acceptance of professional learning support. Interestingly, Dawn also exhibited characteristics that least reflected andragogical principles. She did not consider herself technologically advanced (low self-concept) and had less than one year of teaching experience to anchor her learning. The researcher’s repeated attempts to contact and interact with her exemplify a lack of readiness to accomplish her stated objectives and her
orientation to learning was grounded in a managerial, rather than instructional, context. Moreover, she expressed clear external motivation over andragogical internal factors. Overall, she appeared least transitioned from pedagogical to andragogical characteristics which may have bearing on her low motivation, acceptance of support and general stagnancy in the study.

Kim, while accepting of resources, amiable and open to discussion, shifted her learning motivation to lesson planning outside of the study. Hence, the technology resources provided were general, less relevant and unfocused. Similar to Dawn, Kim exhibited less developed andragogical characteristics. She expressed a low self-concept in terms of her technology skills and drew from less than one year of teaching experience. She demonstrated limited interaction (readiness to learn) but was eager for feedback regarding her observed classroom lesson. During the lesson, her orientation to learning shifted from her stated professional learning goals to practical job survival skills reflecting her internal motivation to be successful among her PLC partners. While Kim’s self-concept and experience were only beginning to emerge, her readiness, orientation to learning and motivation were marginally more developed than Dawn’s. She was more accepting of professional learning support even if her specific learning motivation showed little direction. Overall, she seemed eager and willing to learn, but her goals were unfocused resulting in minimal professional growth.

As the participants reflected stronger developed andragogical characteristics, their experience with the study demonstrated stronger results. Sandy expressed a strong self-concept in classroom technology skills. She also banked multiple semesters of teaching experience from which to attach her learning. She clearly reflected a readiness to accomplish her learning goals. She met with the researcher as requested, discussed observations and provided accessible communication. However, she used very little of the discussed resources as anything more than a
validation of what she was already doing in class. Her orientation to learning reflected a strong interest in 21st century skills and technology integrated classrooms. Hence, she continued to integrate technology more effectively than any other participant. However, she did not integrate new ideas, technologies or teaching strategies to her established repertoire. The support given was mechanical in nature, given and received amiably, but not collaboratively put into operation. Sandy showed significant internal motivation to accomplish her objectives. But, the professional learning plan she developed was specifically constructed to augment her graduate work that, during the course of the study, eventually led to a career change. In all, Sandy exhibited strong andragogical characteristics through the study and therefore saw increased success over Dawn and Kim. However, her specific motivation was to move forward in her career (which she accomplished) rather than accomplish her stated professional learning goals. Her significant motivation but limited acceptance of resources resulted in an essentially mechanical give and take that did not produce results specific to her stated objectives.

Becky’s experience demonstrated the gains that could be attained with both high motivation and high acceptance of resources. Becky expressed a positive self-concept and had multiple years of teaching experience. She demonstrated a significantly developed readiness to learn and, throughout the study, remained singularly focused on her stated objectives. She and the researcher communicated regularly, exchanged resources and collaborated to design a student led, technology based lesson plan that integrated pedagogy reflective of Becky’s new learning. She clearly indicated her interest in 21st Century skills and her orientation to learning reflected a specific desire to successful integrate classroom technology. She actively worked with the researcher, even initiating her own conversations, to overcome her specific concerns regarding control and fear of failure. Her continued interaction, requests for assistance and focus illustrated
her considerable internal motivation to improve instructional practice. Throughout the study, Becky demonstrated mature and consistent andragogical characteristics. Her high motivation and high acceptance of support engendered authentic instructional gains as Becky was the only participant to achieve her stated objectives.

These data trends appear to indicate a direct relationship between the participants’ developed andragogical characteristics and the related quality of learning success. In general, the less developed and/or focused the participants’ andragogical characteristics appeared, the less interactive, motivated and/or successful they were in achieving their stated objectives. As those characteristics became stronger, the nature of their experience improved from stagnancy (Dawn) to unfocused direction (Kim) to mechanical support (Sandy) and finally authentic instructional support (Becky). Table 4.1 (located on the following page) further illustrates this direct relationship as it summarizes each participant’s interaction with the researcher in terms of motivation and acceptance of available resources.

### Table 4.1 Participant’s Interaction with the Researcher

<table>
<thead>
<tr>
<th>Name</th>
<th>Learner Motivation</th>
<th>Resource Acceptance</th>
<th>Virtual interactions</th>
<th>Personal interactions</th>
<th>Goal Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dawn</td>
<td>Low</td>
<td>Low</td>
<td>10</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>Kim</td>
<td>Low</td>
<td>High</td>
<td>13</td>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>Sandy</td>
<td>High</td>
<td>Low</td>
<td>15</td>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>Becky</td>
<td>High</td>
<td>High</td>
<td>20</td>
<td>2</td>
<td>Yes</td>
</tr>
</tbody>
</table>

From this table one can glean the directly proportional relationship between motivation, interactions and professional learning goal achievement. Dawn, representing the stagnant quadrant had the least number of virtual and personal interactions. This is reflective of the researcher’s persistence with little to no response from the participant. Kim received more virtual
and personal support, but her lacking motivation and direction meant the resources were less
directed toward one specific goal. In Kim’s case, she indicated she wanted to learn new things
and integrate technology in the classroom, so many of her resources covered a wide variety of
program platforms and content in an effort to spark her interest. Sandy’s motivation and specific
interest (Edmodo and stop animation) enabled virtual and personal support to be directed and
specific. However, she rarely responded to these resources and continued to implement
classroom technology as her experience dictated. Becky, the most collaborative, motivated and
accepting of professional assistance received the most resources, worked with those resources
personally and virtually and sought to implement them in the manner discussed. She was the
only participant to achieve her stated professional learning goal.

These data trends indicate that each participant reflected the theoretical characteristics of
adult learning. Furthermore, those characteristics (especially the learner’s motivation) reflected,
in direct proportion, their success in achieving their personally delineated goals. Furthermore,
their individual motivation, in concert with their readiness and orientation to learning, may
impact their susceptibility to taking direction. As these two factors interact with each other, four
varying learner profiles are discerned. From stagnant learner to authentic instructional support,
the quality of the interplay between the adult learner and the professional developer seems
paramount to individual success.

**Pre-Test and Post-Test Survey Analysis**

The participants completed the LoTi Digital Age Survey at the beginning of the
professional learning program as well as the end. The intent of this survey was to glean, from the
participant’s point of view, if tangible, professional growth occurred during the study. The
survey measures three areas considered to be important to the development of technology integrated learning environments. Table 4.2 describes the three areas addressed.

Table 4.2 Areas of Measurement on the LoTi Digital Age Survey

<table>
<thead>
<tr>
<th>Area of Measurement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of teaching innovation (LoTi)</td>
<td>The level assigned in the participant’s profile relates to the value the subject places on 21st Century learning and/or the extent to which those tenets are implemented in the classroom.</td>
</tr>
<tr>
<td>Personal Computer Use (PCU)</td>
<td>The level generated for this domain reflects the participant’s comfort and fluency with personal and professional technology resources.</td>
</tr>
<tr>
<td>Current Instructional Practices (CIP)</td>
<td>The level indicated in this area references the participant’s support for, or regular integration of, research-based classroom practices that are student-led and reflect the teacher’s role as a facilitator rather than didactic instructor.</td>
</tr>
</tbody>
</table>


The survey also seeks to determine the highest priorities for digital age professional growth in any of five categories aligned with ISTE’s National Educational Technology Standards for Teachers (NETS-T) (LoTi Digital Age Profile, 2012). It is important to note, that one of the participants (Sandy), arguably the most technology savvy teacher involved in the study, did not participate in the pre-survey. Only her post-survey answers are included. Table 4.3 (located on the following page) indicates the aggregate data for the participant sample in these domains from the first through the final survey administration.
Table 4.3 Pre-Survey and Post Survey Results for Study Participants

<table>
<thead>
<tr>
<th>Survey Period</th>
<th>Level of Teaching Innovation</th>
<th>Personal Computer Use</th>
<th>Current Instructional Practices</th>
<th>Professional Development Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Test</td>
<td>• One at Level 2</td>
<td>• One at Level 2</td>
<td>• One at Level 0</td>
<td>• Highest; Student learning and creativity; digital age experiences and assessments</td>
</tr>
<tr>
<td></td>
<td>• Two at Level 3</td>
<td>• One at Level 3</td>
<td>• Two at Level 3</td>
<td>• Lowest; Professional growth and leadership</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• One at Level 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Test</td>
<td>• Two at Level 1</td>
<td>• Two at Level 2</td>
<td>• One at Level 2</td>
<td>• Highest; Student learning and creativity</td>
</tr>
<tr>
<td></td>
<td>• One at Level 3</td>
<td>• One at Level 3</td>
<td>• One at Level 3</td>
<td>• Lowest; Professional growth and leadership</td>
</tr>
<tr>
<td></td>
<td>• One at Level 4a</td>
<td>• One at Level 4</td>
<td>• Two at Level 4</td>
<td></td>
</tr>
</tbody>
</table>


The three major frameworks assessed in Table 4.3 each measure different facets of teacher technology integration, but do so in a similar fashion. The Level of Teaching Innovation (LoTi) is represented in the first column. It quantifies a teacher’s technology integration on a scale from zero to six. The lowest level indicates the absolute absence of technology integration whereas level six, reflects student-driven, collaborative technology integration involving extra-classroom impact that addresses individual student interest and motivation. The Personal Computer Use (PCU) domain also operates on an increasing numeric scale from zero to three. Level zero represents respondents with no skill or inclination to use digital resources personally.
or professionally whereas level three demonstrates fluency with implementing digital resources for student learning. Finally, the Current Instructional Practices (CIP) framework measures respondents’ self-assessed method of classroom instruction on a similarly numeric scale. The lowest levels of the framework reflect subject-driven, teacher led instructional methodology. An increasing numeric score indicates a growing shift toward learner-driven, collaborative, facilitated classroom leadership.

Of the three major domains assessed in the LoTi Digital Age Survey, one declined from the first to second administration, one stayed relatively steady and the other increased from beginning to end. The participants’ self-assessment of their Level of Teaching Innovation (LoTi) regressed. This is not surprising given the discussion among the participant group in the initial focus group. Becky specifically stated that one of her goals was to, “take that quiz again and not feel like a crap teacher.” The participants discussed the level of technology integration commanded by the survey instrument to be considered technologically proficient. It is interesting to note that one teacher placed themselves at LoTi level 4a in the post-survey. This rating falls just beneath the proficiency mark for the NETS-T standards. The survey narrative explains level 4a as, “teachers experience classroom management or climate issues that restrict full-scale investigation.” (LoTi Digital Age Survey, 2012, pg.7). This statement is directly reflective of the implementation barriers so regularly referenced by the participants. However, as they progressed through the study, Dawn was unmotivated and disengaged, Kim admitted she was not ready to begin authentic technology integration, Sandy changed careers and Becky lacked self-esteem regarding the decline in this domain is understandable. The participants appeared to realize the characteristics necessary to be considered proficient and assessed themselves more appropriately on the post-survey.
Assessments regarding personal computer use (PCU) remained generally constant. This study occurred between the months of August and November, 2012. Such a short term investigation is unlikely to produce an overall increase in personal computing habits. However, from the primary to secondary survey administration the participants’ assessments regarding current instructional practices (CIP) increased. This domain, “reveals each participant’s support for or implementation of instructional practices consistent with a learner-based curriculum design and research-based best practices” (LoTi Digital Age Survey, 2012, p.8). The participants’ perceived growth in this area is interesting given their overall failure to achieve their individual goals. Three of the four participants did not achieve their professional learning goal and Becky, who achieved her goal of designing a student-led, technology integrated lesson plan, was denied administrative permission to implement it.

The consistency in professional development priority areas aligns with the qualitative data produced by the participant group. During the study, the participants’ orientation and readiness to learn reflected practical, problem-centered concerns. They indicated their preference for practical, applicable strategies to engage students and make their instruction more effective. The “student learning and creativity” professional development priority reflects this collective, and persistent, desire.

Exit Focus Group Analysis

The final focus group intended to collect data regarding the participants’ reaction to the overall professional learning process. The focus group questions also sought subject’s opinions regarding barriers to technology integration, the design and implementation of the study’s professional learning program and whether they felt the characteristics of this program design
could be successful in a broader context. The focus group questions further engaged the participants’ in a reflection of their program experience and perceived growth.

Study participants overwhelmingly agreed that access and resource barriers outside of the professional development process were a significant impediment to integrating classroom technology. The free-flowing discussion immediately referenced limited school-based resources and inconsistent student connectivity access at home. While some teachers, Becky especially, referenced means to work around these barriers, the conversation remained generally negative regarding the ability to engage in authentic classroom technology integration. However, that conversation turned immediately positive when asked about the professional learning program design.

The participants’ expressed an overall positive impression of the professional learning program design. There was unanimous consensus that the individualized nature of the program was beneficial. Dawn noticed, and immediately remarked, “I don’t think what you were sending went to all of us very often,” that very little of the resources were shared among the entire subject group. The teachers conveyed their appreciation that they felt each shared resource was specifically derived, and conferred in an individual manner. They also shared unanimous consensus that the ongoing, consistent feedback, discussion and personal involvement of the researcher was successful. Dawn, who previously expressed her demand for personal accountability, was the first to comment about the frequency and consistency of the researcher’s interactions. Kim, who was noticeably reticent and difficult to involve in the initial focus group, offered positive feedback regarding the program design. She volunteered her experience, during student teaching, in a similarly structured one to one professional learning program. She relayed, “We had a group of people at the school I was at in [State name removed]. They were on a two
year contract…and it was a lot like this and it was great.” She made connections between the individualized nature of that program and the present study which led the focus group in the direction of suggesting improvements.

All members of the focus group agreed that the researcher’s limited real-time availability (being off-campus) was a detractor from overall program effectiveness. The participants’ expressed that personal, immediate access to the professional developer as questions, thoughts and problems arose would constitute one less barrier for teachers to overcome. While complimentary to the researcher, they discussed the necessity for future professional developers to be likewise individualized, adaptive to teacher needs and differentiated in their approach to teaching professional adults. This conversation, unbeknownst to the participants, reflected the andragogical principles implemented as the guiding principles of this study. Unsolicited, the participants renewed their demand for individualized, relevant professional learning that not only fit their schedule, but fit their specific professional development interests. While the concerns over technology barriers continued to pepper the discussion, the participants shared unanimous, positive remarks that this professional development structure could be successful.

The participants discussed the professional learning program in the context of long term success. They felt the structure of this program could positively affect school-wide change with several adjustments. Primary among them, the participants felt the school needed to employ a dedicated professional developer and/or (preferably) a team of developers. They recognized the time required by the researcher to produce relevant, individualized instruction and discussed the need for dedicated personnel to implement that structure on a greater scale. They also discussed the necessity for that person/team of people to be on site and readily available. Returning to Kim’s experience with a similarly structured program during student teaching, they also
discussed the importance of mandating the program or involving some manner of administrative oversight. Dawn observed that only four teachers agreed to participate in this study when their staff numbers over 30. They expressed a concern that unmotivated staff would not take advantage of professional development unless they had an administrative mandate, or licensure requirement, to do so. But, overall they praised the unique nature of the program and its specific relevance to individual instructional needs. They unanimously remarked, given appropriate personnel and technology resources, that the study’s professional learning structure could make a significant, positive difference at the school level. Conversely, they felt this specific iteration of that structure was not successful for the same reasons. The lack of a school-based facilitator, persistent technology barriers and lacking administrative requirement to participate were all specifically mentioned as detriments to the current study’s structure. Additionally, the participants felt, that under general circumstances, a school principal would not have the necessary time available to devote to participating teachers in order to engender success.

**Revisiting the Research Questions**

The study’s research questions emanated from a convergence of the problem of practice and stated intellectual goals. Developing three main research questions, the study was designed and implemented to determine if an andragogically-based professional learning program may effectively shift a teacher’s paradigm from didactic instructor to learning facilitator. The first research question encompassed two sub-questions. The primary question inquired as to the current level of teacher classroom technology integration at a mid-size middle school in the Southeast USA as measured by the appended LoTi framework. At the outset of the study, the average level of individual teacher technology integration fell between a LoTi level two (exploration) and LoTi level three (Infusion). At the exploration level, students generally use
technology resources as enhancements to traditional pedagogy. Student thinking levels tend to remain in the lower cognitive levels and multi-media projects (such as PowerPoint presentations) are utilized to digitally report instructional content. At the infusion level, students begin processing content through higher order thinking activities and use digital resources for teacher-directed tasks (Moersch, 2002). To classify technology integration levels, the LoTi Framework utilizes the appended NETS-S standards for Teachers. It is important to note that none of the teachers participating in the pre-survey data collection self-assessed themselves at the proficient level according to NETS-T standards. It is important to note however, that one of the participants, arguably the most technology-savvy and currently undertaking a master’s degree in instructional technology, did not participate in the pre-survey data collection.

The two related sub-questions referenced instructional technology barriers and professional learning programs. The first sub-question sought to discover, from the teacher’s perspective, what barriers exist at a mid-size, Southeastern United States middle school that impede the expansion of classroom technology integration. The data regarding this question was persistent, consistent and shared equally. All volunteer participants expressed frustration with two instructional technology barriers. The most prevalent, and seemingly most frustrating, barrier to authentic integration was the limited available of school-based resources. Teachers consistently complained about the lacking hardware available to them or the inconsistency of its operation. As more of their colleagues attempted to use student computer labs, they were less frequently available for regular use. The school was not equipped with wireless access to support an iPad pilot program, and wireless laptops (equipped with a local hotspot) were old and could not sustain either a charge or consistent connectivity. All teacher classrooms were equipped with SMARTboards, speakers and data projectors. Some had student response systems and wireless
slates that connected with SMARTboards, but the data indicated participants were either unsure how to integrate those resources to engage the entire classroom or expressed classroom management concerns when they attempted to do so. In addition, the participants expressed concern over the lack of students’ personal access to digital resources. Teaching in a school identified with over 70% of the student population served through the federal school lunch program, the teachers felt the impact of the digital divide. Students either did not own personal digital devices, or owned limited devices with lacking or sporadic connectivity to the internet. These two barriers consistently appeared in participant data and regardless of professional learning structure, were reported to be the greatest barrier to participant success.

The second related sub-question referenced professional learning. The question explored, from the classroom teachers’ perspective, what professional learning programs are necessary to increase classroom technology integration at a mid-size, Southeastern United States middle school. The participants were unanimously in favor of an individualized one-to-one professional development program. They expressed positive affect for the tailored nature of the program and also indicated that a variety of offerings would also be preferable (so teacher’s could choose a program based on their interest) in the absence of a one-to-one structure. The data was clear that the participants wanted a professional development structure that was respectful of their time and their associated level of expertise. They unanimously shared their discontent for conversely structured programs that were designed as a one size fits all model. This primary question and its related sub-questions provided a foundational context for the remaining two research questions.

The second research question specifically targets the characteristics of the delivered professional learning program. It seeks to understand, what characteristics of a mid-size, Southeastern United States professional learning program teachers indicate effectively increase
classroom technology integration as measured by the LoTi Framework. Of the volunteer participants, the highest self-assessment on the LoTi Digital Age Survey was a post-program assessment of Level 4a. It is important to note, the post-survey data collection included responses from all program participants, including the teacher pursuing a degree in instructional technology that did not participate in the pre-survey data collection. The LoTi framework defines Level 4a as mechanical integration. At this level, teachers employ digital resources as teaching tools, rather than the curriculum itself. Students are driven by student-centered questions and address authentic real-world problems. Implemented materials are described as pre-packaged, peripheral resources and while they address higher-order thinking skills, require significant external teacher support. However, teachers at this level tend to encounter substantial barriers to technology integration that inhibit them from full-scale, authentic integration. Those barriers may present as classroom management, climate and culture, and/or hardware and infrastructure concerns that are external to the teacher’s control (Moersch, 2002).

This description is compelling given the ferocity of the participants’ frustration with the aforementioned barriers to technology integration. The barriers expressed directly reflect the implementation concerns the LoTi Framework identifies in the description of Level 4a. Arguably a reflection of these barriers, the mechanical integration (4a) rating falls below the NETS-T standard of authentic proficiency referenced by the LoTi framework.

In the post-survey period, two of the participants self-assessed at a LoTi Level one (awareness). The awareness level is defined by didactic, teacher-led instruction that focuses on teacher delivered technology enhancements and lower levels of cognitive processing. Digital tools are teacher driven and are most frequently utilized for non-instructional productivity such as attendance and email correspondence (Moersch, 2002).
The remaining participant self-assessed at LoTi level three (infusion). This level, represented in the initial survey as well, is classified as the infusion stage. Overall, participants rated themselves lower at the end of the study than the beginning. In the initial survey, two participants rated themselves at level three and one at level two. In the final survey, two participants rated themselves at the most basic level, one at level three and one at level 4a. Based on data collected at the initial and exit focus groups, the participants gained clarity regarding the LoTi Framework’s accepted definition of proficient technology integration. The post-survey gain may be attributable to the lacking data from the most technology-savvy participant in the presurvey period. The post-survey declines may be attributable to the participants’ adjusted understanding of authentic technology integration. Regardless of variations from the initial to final survey period, it is important to note that no participant, at any time, rated themselves as proficient by the referenced NETS-T standards. Therefore, the overall indication is that this implemented professional learning program, by participant report and by means of the LoTi framework, was not effective in moving authentic classroom technology integration forward. Rather, without first clarifying the LoTi framework’s domain descriptions, the participants showed a quantitative decrease in their self-efficacy. This awareness marked one of the more negative responses in focus group data collection as teachers discussed the LoTi survey as a clear blow to their professional self-esteem.

The final research question related to teacher’s perceptions of sustained increases in classroom technology integration. For the same school location, the question inquired what characteristics of a professional learning program teachers indicate are most likely to encourage a sustained increase in classroom technology integration. The data here is overwhelmingly positive. The participants liked the structure of the professional learning program. They felt, over
a longer, more sustained period, that the present structure would be a successful avenue for shifting teacher paradigms. Even though the overall self-assessments tended to decline from the pre-survey to the post-survey, and only one teacher achieved their stated professional learning goal, participant reflections regarding their current instructional practices increased. Participants indicated stronger support for instructional practices consistent with a learner-based curriculum and research-based best practices. Specifically, the participants appreciated the individualized nature of the program. They felt shared resources and researcher interaction was not only geared to their stated interests but also to their subject matter, curriculum pacing and level of technical expertise. The participants reflected that these characteristics made the program personally relevant and worth their time. They also shared that, even though this short term program was only marginally successful, implementing some of the program characteristics long-term could make a positive difference.

In the final focus group, the participants discussed how this program could be successful in a long-term implementation. They indicated their preference for a similar structure, put into practice by an individual/team of individuals that were site-based, dedicated professional development coaches. They wanted real-time access and availability of technology and instructional professionals that could successfully individualize their professional development. They discussed the importance of those dedicated instructors to be versed in differentiated instruction so that learning for a technology-savvy teacher could be equally as relevant for a teacher with virtually no technological expertise. Reflecting characteristics of adult learners, the practicality of their ideas became a topic of discussion (funding, position allotments, hiring the right person/people) as did the ever-present discussion about student internet access and school-based technology resource barriers. But, overall the participant group remained unanimous that
(controlling for these technology and logistic barriers) the characteristics of an andragogically-based professional learning program could successfully shift teachers’ instructional paradigm in a long term implementation.

**Research Findings Related to the Theoretical Framework**

The principles of adult learning, monikered as “andragogy” and championed by Malcolm Knowles (1970) provide the theoretical foundation for this research study. The andragogy framework entails five catalyzing principles. Adults demand, and have the natural expectation, that they will be recognized as self-directive, self-sufficient and unique individuals. This andragogical principle of individual self-concept can produce resentment in learning environments that generalize content and instruction for the masses (Gehring, 2000). Unlike the adolescent student, the adult learner attaches new concepts to a schema constructed from a lifetime of amassed experience (Cercone, 2008). This role of experience is an essential principle for adult learners who may interpret, enhance and/or discard information based on previous experience and established habits and behavior. These experiences classify adults into one of three developmental stages; early adulthood, middle age and later maturity (Gehring, 2000). As adult learners progress through these stages they develop a strengthening readiness to learn that is directly related to substantive, life-based, concerns that require redress (Holyoke & Larson, 2009). Adult learners actively seek information and learning that will inform present practical problems (Aderinto, 2006) hence, adult learners must be afforded the latitude to determine and direct their own learning (Robles, 1998). In order to address these practical concerns, adult learners are less concerned with abstract theory and increasingly demand hands-on, applicable and personally relevant strategies to address their immediate learning needs. This orientation to learning suggests, in order to be effective, adult learning environments must directly relate to
learner’s stated goals and objectives. While external goals and objectives, such as increased salary or workplace position are relevant, contrary to the adolescent learner, adults frequently exhibit a strong intrinsic motivation to learn (Knowles et al., 2005). Related to the evolving self-concept, adult learners value increased self-esteem, a sense of accomplishment and job satisfaction over external reward. Each of these five principles provides the foundation for adult learning and were addressed specifically and directly in the research design. The data collected provided overwhelming support for andragogical theory. The data also raised new questions regarding the developmental stages of adult learners and whether any one of the five andragogical principles takes precedence over another when determining learning success.

The present study demonstrated specific similarities to two previously mentioned andragogically-based studies. Manning’s study (1987) included a voluntary sample of medical doctors working toward professional learning credits in individually determined areas. They worked with one specific resource contact that coordinated, directed and supported the learning goals each doctor established. Riley and Roach (2006) studied the effects of a team of professional learning developers in an early childhood education setting. The subject teachers were required to take part in the program and advance their skills as a result of poor state evaluations. In both studies, participants showed growth and a positive effect for the individual nature of the research program. This study, much like Manning’s (1987) utilized volunteer participants that reflected individual levels of success. Although three of the four participants did not achieve their goals, they demonstrated unanimous, positive responses for the andragogical principles employed by the study. This data is reflective of both Manning (1987) and Riley and Roach’s (2006) results, regardless of their respective context and setting. Moreover, the data collected supports the stages of adult development.
Knowles et al. (2005) posited that, like adolescents, adults occupy one of three stages of
development. They classified these stages as early adulthood, middle age and later maturity.
Defining these stages by virtue of life experience, the theorists correlated the stages with
developmental milestones. Early adulthood encompasses new marriages, college graduations,
new home ownership and childbirth. Middle age reflects caring for aging parents, molding
children into adults and establishing civic responsibility and later maturity entails adjusting to
retirement, coping with the death of spouses and/or friends and deteriorating health concerns.
The participants in this study generally reflect the characteristics, and hence the developmental
stages delineated here.

Based on life experience, the majority of program participants would be classified as
early adults. However, within that strata there are individual differences. Kim was the youngest
participant. A new college graduate, unmarried with no children, she was just beginning her
educational career. She reflected motivation to learn how to improve classroom practice, but
eventually that motivation shifted to professional survival in her new position. She could not
reconcile integrating technology with her PLC developed lesson plans, so her motivation shifted
to maintain adequate performance among her peer teaching group. Dawn experienced a variety
of milestones within the last calendar year. She graduated college, started a new job, changed job
locations, got married and was newly pregnant at the end of the study. Although she’d
experienced more milestones than Kim, her motivation for intrinsic learning was nonexistent.
Her responses actually reflected external motivators for learning anything new when she
claimed, “let’s face it, if you’re not going to check behind me, I’m not going to do it.” (CITE?).
So while, Dawn experienced multiple adult milestones, her motivation to learn reflected a more
pedagogical context. Sandy had been teaching three years. She was not married and had no
children. She did own her own home. Her motivation to learn was significantly more developed than either Dawn or Kim. Already enrolled in a graduate program, her motivation for joining the project was purported to reflect that master’s degree. However, her true motivation was directly related to an impending career change. By the end of the program, she did not accomplish her individually set goals, but did accomplish making a successful transition in careers. Becky, having the most teaching experience, was also unmarried and had no children. She, however, reflected the archetypal andragogical learner. She was intrinsically motivated to accomplish her technology integration goal; she regularly shared her educational experience and specifically attached her learning to developed schema. She was the only participant to accomplish her stated goals and objectives.

Overall, the experienced teachers (Sandy and Becky) demonstrated andragogical principles in nearly every interaction. They both expressed and shared their experiences fluidly. They verbally attached new learning and discussion to established personal schema. And although Sandy did specifically mention increased salary as an impetus to change careers, both Sandy and Becky showed greater intrinsic motivation than interest in external reward. The less experienced teachers (Kim and Dawn) either did not openly reference intrinsic motivation or specifically stated external motivation. Dawn, especially, tended to respond in a more pedagogical context than andragogical one. While the experienced teachers tended to directly, if unknowingly, reference andragogical principles when they discussed their preferences for professional development, the inexperienced teachers (while in agreement) were secondary to the conversation. However, the data collected from all participants showed strong, if differing in intensity, unanimous, support for the five principles of andragogy.
While being overwhelmingly positive, the data collected engendered questions regarding the theoretical basis of andragogy. Specifically, the data questioned the concept of adult developmental stages being defined by personal experience. The question raised essentially asks when a pedagogical learner transitions to andragogical learning? Comparable to Piaget’s concrete and formal operations (Miller, 2011), when does an adult become an adult learner and reflect andragogical principles?

As mentioned previously, Knowles et al. (2005) defined the three developmental stages by virtue of milestone experiences. However, the participants in this study reflected varying strength of andragogical characteristics, regardless of life experience. For example, none of the volunteer participants had children. Knowles et al. (2005) list this as a milestone experience demarking the transition to early adulthood. Three of the four participants were relatively new teachers with three or less years of experience. This indicates their milestone experiences of college graduation and new careers are relatively recent. According to the theory as purported, these characteristics should classify all three participants as early adults. However, when you examine their responses, there is significant variation in their andragogical characteristics.

Sandy, with three years of career experience and home ownership (not married, no children), demonstrated clear strengths in the role of experience, readiness to learn, orientation to learning and motivation. Whereas Dawn, who has one year of teaching experience, a marriage, a new pregnancy shared little experience, only moderate readiness and orientation to learning and essentially no andragogical motivation. In fact, Dawn was the only participant to reference external motivators. She clearly indicated her motivation to have her student loans forgiven and expressed the absolute condition that supervisors require and inspect her progress with any undertaken professional learning program. This level of motivation more closely reflects
pedagogical principles than andragogical ones. This brings the aforementioned stages of development into question.

Specifically, three questions emanate from the data discussed. They are as follows:

1) Which is more descriptive of the andragogical stage of development? The learner’s life experiences to date or the learner’s current life focus?
2) Which description (life experience or current life focus) has greater influence on the progression through the adult stages of development?
3) Which of the five principles is most indicative of adult learning success? Does stronger motivation eclipse a weaker readiness to learn? Do other principles weigh heavily into adult learning success?

These questions derive from the profiles of the four volunteer participants. Of all the participants, Dawn experienced the greatest number of seminal milestones. However, she exhibited the least vigorous andragogical characteristics. She was the least motivated to improve her professional learning. However, her specifically referenced intent to have student loans forgiven may be indicative that her motivation was directed toward establishing a new marriage and preparing for a new baby. Kim, the youngest participant, was a new college graduate, embarking on a new career. While she indicated motivation to improve technology integration in the classroom, her practical life focus evolved into maintaining professional pace with her PLC partners. She specifically indicated that she was unable to reconcile integrating technology into the PLC derived lesson plans and first-year teacher survival appeared to take precedence over her learning. Sandy, had three years of experience. She owned her own home but was not married and had no children. Furthermore, she was already undertaking graduate coursework to gain a master’s degree. She was clearly motivated to improve her practice and attach new learning to
her existing framework for instructional technology. She indicated intrinsic motivators for improving her practice but did not achieve her goals. During the study, her practical life focus shifted to a career change which then became her impetus for learning. Finally, Becky exhibited a strong relationship for every andragogical characteristic. With ten years experience, although no marriage and/or children, she set her goals and worked to achieve them. Her practical life focus revolved around building her repertoire of classroom strategies. Therefore, she was committed to every stage of the program and remained the only participant to achieve her goals. These profiles question whether the summation of life experience drive the adult learner or if the learner’s current, practical life focus provide greater momentum toward adult learning. The answer to these questions may provide direction for future professional learning coordinators. If a more comprehensive description of adult developmental stages (and what moves a learner through them) is constructed, it may assist leaders of adult learning in developing more effective, differentiated, professional learning programs.

**Summary of Data Trends**

There were several overall themes that emerged in the data. These themes reflected barriers to technology integration, the tenets of andragogical learning and the overall success of the program structure. Primary among the data trends was the indication that and individualized professional learning program produces individualized results.

Each of the four participants was unique. The resources, quality of researcher interactions, goals and motivations were individualized to address distinctive needs. Therefore, each of the four participants experienced differing results. Those results reflected a continuum of direct proportionality relating personal motivation and accepted level of support. The greater the individual’s motivation and willingness to accept and utilize new learning appeared to directly
influence their overall professional learning success regardless of uncontrolled technology integration barriers.

Barriers to successfully implementing authentic student led, technology integrated lessons were a considerable participant concern. Both the initial and final focus groups, each face to face work session (regardless of participant) and even a few virtual responses referenced a clear frustration with uncontrolled technology barriers. Primary among these concerns was inconsistent student connectivity. Given a free and reduced lunch rate of over 70%, many students did not have connected computers at home, nor did they possess web-enabled smartphones. The limitations of school-based resources exacerbated this concern. The middle school in question did not have school-wide wireless access. They had limited computer labs meant to accommodate the entirety of the student body and the computers in those labs were older and, by participant report, sporadically unreliable. As teachers move toward technology enhanced lessons, those computer labs were often booked or unavailable with enough frequency to make sustained classroom technology integration a significant concern. Aside from logistic barriers, the teacher’s trepidations over new pedagogy also regularly appeared in the data.

Shifting the paradigm from a teacher led, didactic learning environment to a student driven, technology integrated classroom produced several, persistent, concerns among study participants. These concerns can be best categorized as fear. Participating teachers expressed significant apprehension over classroom management control issues as well as academic anxiety that young adolescent students were either incapable of authentic individual learning or that they would not be motivated to perform to the expectations teachers could impose through traditional instructional pedagogy.
**The tenets of andragogy.** The tenets of andragogy were addressed directly and received positively by all participants. In terms of andragogical principles imbedded in professional learning structures, all participants showed clear, positive results. Positive responses to the six dimensions of andragogy consistently appeared throughout the data.

Participants clearly understood the rationale behind this professional learning program. North Carolina recently instituted both a new curriculum and also a new evaluation model. As their administrators observe them through the year, they are consistently evaluated on their application of technology in the classroom. Additionally, the local school district recently spent two million dollars in a matching grant to outfit each of their rooms with SMART technology. There is a dedicated instructional technology specialist in their building one day per week in order to facilitate technology based professional learning. The participants’ discussions in the initial focus group also indicate a general perception that digital native students may respond to technology in a different way. Hence, their need to know the material was evident and comprehensive.

The role of teacher experience resonated throughout the data. In focus groups and in individual meetings participants regularly shared their previous experiences or sought to attach new learning to existing schema. In the initial focus group interview, the two teachers with the greatest experience dominated the conversation while the other two contributed at less frequent intervals. By the exit focus group, the conversation was well balanced between the participants. Participants were respectful of each other’s experience, listened attentively and enhanced the discussion with cogent discussion or related personal experiences.
Participant readiness to learn showed overwhelmingly positive results in the data. The teachers regularly referenced their need for relevant and applicable learning. They were unanimously positive about the individualized nature of the program. They praised the specificity to their classroom and curriculum needs. Becky, specifically, stated that “one size fits all professional development” does not fit her. Participants referenced the need to have programs suited to their level of technology aptitude and specific to their stated goals and objectives. As this program was specifically designed to address those concerns, the positive response from the participants serves as some measure of validation for the foundations of andragogy.

The professional learning design also specifically addressed the participant’s orientation to learning. This dimension indicates adult learning is problem-centered. The participants’ responses for practically applicable strategies and an individually designed professional learning goal, personally relevant to their needs and interests, addressed this dimension. In the exit focus group, the participants were unanimously positive regarding this aspect of the program. They expressed positive responses toward the practical, rather than theoretical, nature of their experience.

Finally, the professional learning program design addressed the andragogical principle of adult motivation. The four participants received little to no external benefit for agreeing to take part in the study. Although they accrued continuing education credits for licensure renewal, those are not necessarily difficult to acquire and none of the participant’s licenses were expiring this year. Therefore, the impetus to join the program demonstrates internal motivation. Internal motivators, like job satisfaction, increased self-esteem, professional competitiveness, etc. surfaced in the data. Both Sandy and Kim asked questions in the initial focus group that hinted at their interest in becoming a highly rated teacher. Sandy’s stated rationale for resigning from her
position was to seek a more fulfilling position. While she did reference financial gain (an external motivator) that was secondary to the internally motivating reasons she gave for her departure. Dawn represented the sole outlier in specifically mentioning external motivators (requirements of supervisors) as a general motivating impetus.

**Professional learning program summary.** Overall this professional learning program was not individually successful. Of the four candidates enrolled in the program, only one accomplished the professional learning objectives devised at the program’s inception. Becky worked collaboratively with the researcher and designed a hands on, student-led, technology integrated lesson plan that utilized the flipped classroom model. Although, unable to implement this lesson, she achieved her stated goal in researching and designing it. Sandy, arguably the most proficient of the participant sample, eventually decided against researching and implementing a new technique (stop animation) as per her stated professional learning goal and reverted to only enhancing the techniques already in place. While she did improve those strategies, she did not meet her initial goal of learning and implementing something new. Kim set a goal of including the SMART board as a student led learning station in a classroom lesson, but did not meet that goal. Stating she was not ready to integrate technology at that level, she eventually apologized for her lack of progress. Dawn showed little motivation or interest. She tended to be the most negative when the discussion turned to technology barriers and did not accomplish progress toward, or the successful completion of building a digital textbook.

However, notwithstanding the lack of personal goal accomplishment, the participants’ general response to and reaction to the program indicated an overall positive affect for the general structure. They expressed the collective, and unanimous, opinion that this professional learning structure could be successful with a few adjustments. They suggested including a
specifically dedicated person and/or team of professional developers in a long-term, mandated program design could successfully increase school-wide, authentic student led, technology infused instruction if the barriers to technology integration (namely student access and school-based resources) were addressed at the school level.
Chapter 5: Discussion of Findings

The dawn of 21st Century learning and the emergence of abundant digital technology are changing the landscape of the American education system. Increasingly, state and local education agencies are making significant changes to instructional programming to address the needs of the 21st Century learner. Specifically, in 2012-2013, the State of North Carolina implemented the Common Core State Standards designed, adopted and espoused by the National Governor’s Association Center and the Council of Chief State School Officers, (2010). These standards embody the principles of 21st Century learning as championed by such organizations as the Partnership for 21st Century Skills (2009). Additionally, the State of North Carolina also instituted significant changes to the statewide teacher evaluation system. This new evaluation model shifted supervisory lens away from mechanized “teaching” and shifted the focus to student learning (Public Schools of North Carolina, 2008). Amid these changes, myriad professional learning programs erupted across the state with the intended effort of improving teacher practice for the benefit of both their digital age students and their personal professional evaluations.

Revisiting the Problem of Practice and Research Goals

The nascent emphasis on technology integration in K-12 classrooms engenders a variety of associated professional learning programs. The goal of raising student engagement undergirds many of these opportunities. However, the problem of practice lies in the function and/or focus of these prolific training models.

As schools, districts and State governments fund technology resources in the classroom, research abounds regarding the influence of teacher readiness (Clausen, 2007; Davis, 2001;
Flowerday, 2003), beliefs (Fox, 2007; Iding, 2009; Palak, 2009) and use of classroom technology (Clark, 2009; Okojie, 2006; Rakes, 2006; Russell, 2003). However, there is less substantial research to clarify the impact of integrated technology resources on student learning, and a dearth of information regarding the effectiveness of professional learning as a means of transforming classroom instruction.

Professional learning models encompass a variety of characteristics. Although improved infrastructure and increasing allotments for technology resources are becoming commonplace items in educational budgets (Keengwe, 2008; Lawless, 2007; Zhao, 2006), there is less evidence that these professional learning programs effectively transform classroom teaching (Frederick, 2006; Zhao, 2006). Some research indicates that the phenomenal financial investments undertaken by government agencies require professional learning programs to improve technology integration. However, those programs are not founded on a research base of knowledge and are therefore ineffective overall (Lawless, 2007). While some studies regarding specific programs showed promise (Overbaugh, 2008; Sheumaker, 2001), these studies focus, primarily, on teacher technology integration and do not extend their queries to student learning. Overall, it appears clear that professional learning models are fervently executed as cognates to increased classroom technology resources. However, the systematic evaluation of these programs, and respective intellectual addition to the academic knowledge base, requires address (Guskey, 1991; Lawless, 2007).

The goal of this research project was to determine whether a classroom technology integrated professional learning program, grounded in the theory of andragogy, could successfully encourage participating teachers to shift their instruction from directive teaching to
facilitated student learning. Specifically, the research project sought to address both process-oriented and context goals (Maxwell, 2005).

Finding a dearth of research regarding andragogically-based professional learning programs, this project specifically asked the following process-oriented questions:

1) Do professional learning participants indicate a program grounded in adult learning theory in personally relevant?

2) Is there an observable difference in student-driven technology integration in classroom environments where the teacher participates in a professional learning program grounded in adult learning theory?

These process-oriented goals were primarily concerned with the development of adult learning and the participants’ respective response to the program. The stated context goals addressed the outcomes in student led, technology integration against the differing facets of andragogy. Those context goals were delineated as follows:

1) Is there an observable difference in student-led, technology integration among program participants that indicate a personal investment in their learning process?

2) Is there an observable difference in student-led, technology integration among program participants that incorporate life experience into their learning?

3) Is there an observable difference in student led, technology integration among program participants who identify their learning interests?

4) Is there an observable difference in student-led, technology integration among program participants who indicate a specific and/or immediate learning need?
Relating the Research to the Literature Review

The literature review examined two bodies of literature relevant to the research program. Existing research related to 21st Century learners and professional learning were considered. The data collected through this study, both lend credence to and also contradict existing literature. Prensky’s (2001) archetypal “digital native” was neither confirmed nor denied through this study. The data collected demonstrated volunteer participants’ mixed opinions concerning the student’s capability to function independently in a digital environment. While they agreed with the research espoused by Prensky (2001), Shaw (2009), and Waycott et al (2010) that their student population was familiar and comfortable with digital technology, they were less convinced that the students knew how to engage that technology for the purpose of learning. The ever-present technology access barrier produced questions regarding student readiness for digital learning. Similarly to Bond et al.’s (2008) claim that the digital native label was too sweeping a generalization for young students, the participants also wondered if student age (middle school adolescents versus high school aged young adults) would reflect different levels of 21st Century digital readiness.

However, among these negative concerns for the digital native concept, the participants also stated their preference for learning 21st Century learning strategies. Their purpose for entering the program revolved around building student-led, technology integrated lesson strategies. Their conversation reflected tenets of 21st Century learning such as the elimination of rote memorization and the focus on collaborative grouping and higher order thinking skills. Their desire to build more engaging lessons for the benefit of their students directly correlated with the platforms championed by Shaw (2009), The Partnership for 21st Century Skills (2009) Greenhow et al. (2009a) and Robelia and Hughes (2009). However, as this research primarily targets adult
learners in a structured professional learning program, the information related to 21st Century learners in tangent and does not serve to clarify the academic discourse regarding Prensky’s (2001) digital native.

Similarly to the body of literature related to 21st Century students, this study confirmed some existing literature regarding professional learning while it contradicted other work. This positive data related to the theory of adult learning is reflected elsewhere in the literature. Both Manning (1987) and Riley and Roach (2006) showed similar positive effect for the tenets of andragogy as the foundation for a professional learning program. Karagiorgi et al. (2008) provided an intersection between adult learning principles and professional development. However, that study, similar to this one, could not discern whether the andragogical principles enacted were an effective means for accomplishing participant goals and objectives. Glazer et al.’s (2009) study, while not specifically addressing adult learning theory, addressed the professional learning needs of an adult cohort. While participants gained 21st Century skills, only one third actually achieved proficiency. Similarly, Stockwell’s (2009) study reflected the structure of both Manning’s (1987) study and the present research. A small number of participants pursued an individually constructed learning goal. However, similarly to this study, the majority of Stockwell’s (2009) participant group did not achieve their goals.

While the present research supported andragogical literature, it also produced contradictory results. Aside from the positive response to adult learning principles, this research project was largely unsuccessful. Only one of the four participants met their professional learning goal. Two studies referenced in the literature review provide an interesting juxtaposition. Both Flowerday et al (2003) and Fisher et al. (2010) constructed professional learning programs with the intent improving teachers’ 21st Century instructional pedagogy.
Neither of these studies founded their research in the theory of adult learning. While the andragogical framework remains the single positive result of the present study, both Flowerday et al. (2003) and Fisher et al. (2010) produced effective programs where the great majority of participants achieved the program goal. Such a counterpoint tends to complicate the professional learning research. On one hand, there are multiple studies to indicate andragogical principles may positively promote professional learning among adults. However, other studies, devoid of an andragogical foundation, achieve the 21st Century goals this study did not. And while volunteer participants expressed unanimous support for long-term success, there is little research related to their suggestions to indicate the present program structure would be effective over an extended period of time.

The present research design was both beneficial and concerning. Overall, the data indicated a unanimously positive response to the andragogical framework. Volunteer participants also reacted positively to the action research design that allowed the researcher to collaborate, share resources and partner with the participants in order to further their success. However, concerns arose related to the accessibility of the researcher and the barriers to technology integration. The researcher did not work in the same school as the program participants. Hence, a vast majority of their conversation occurred virtually. While that was not a detriment to the participants, it was not as convenient for either the teachers or the researcher as having a daily presence would have been. Additionally, the participants clearly indicated that, regardless of program design or implementation, the barriers to technology integration were a significant hindrance to their overall success. This program design did not account for the lack of student home access or school-based technology limitations. Both of these factors, if controlled, may have an effect on individual participant outcomes.
Significance

As the educational community scrambles toward 21st Century standards, curricula and instructional methodology, the proliferation of professional learning programs abound. Not only do district and school-based leadership maintain a vested interest in developing classroom teachers into 21st Century educational facilitators, but the professional development industry also senses the economic windfall that an effective program could produce. Hence, the problem of practice remains myriad professional development programs, of varied research backgrounds, structures and effectiveness that all purport to positively affect 21st Century facilitated classroom instruction. The findings discussed here are beneficial in addressing the quality and effectiveness of future professional learning.

Implications

This study’s primary benefit is the data collected respective to the andragogical framework. An individualized professional learning program, explicitly attuned to the principles of adult learning, garnered an overwhelmingly positive response from study participants. Amid a variety of negative concerns, primarily uncontrolled barriers to technology integration, the andragogical structure of the program found consistent, unanimous approval. Participants enjoyed the individualized nature of the program. They appreciated differentiated and personally aligned resources. They liked setting their own goals based on their own interests and the ability to adjust those goals as they progressed in their learning. The structure and execution of the program, although significantly different from standard professional learning workshops, elicited positive effect from the adult learners. While the results did not indicate an observable difference in student-led technology integrated learning, the participant response to the andragogical facets of the study design reflect a direct, and positive, response for all of the study’s 21st Century
context goals. The data collected here indicate a change in the structure of professional learning may be warranted in order to effectively reach adult learners. If teachers’ practice is expected to change, it seems reasonable to expect their own manner of professional development may need to evolve as well.

In order to move teachers’ practice forward, irrespective of professional development designs, implementation and or content, educational agencies must first work to remove those barriers that prohibit teachers from gaining success. The participants in the present research demonstrated significant, persistent and insurmountable frustration related to uncontrollable technology barriers. They were inclined to design student-led, technology integrated lessons but possessed insufficient resources to enable success. Nearly 70% of their student population qualifies for the federal school lunch program. The participants’ concern related to personal student connectivity and access to the internet is warranted. In trying to assuage that concern, the school-based technology resources were limited. Student computer labs were shared between all staff members, the school did not provide wireless access and the school’s hardware was outdated and sporadically unreliable. These barriers coalesce to inhibit the forward progression of teachers’ instruction regardless of the professional learning program meant to improve it. Therefore, if State and district administrations are committed to improving 21st Century classroom practice, the implication for significant hardware, infrastructure and software upgrades is palpable. While this implication revolves around a significant investment in technology resources, the following implication relates to an investment in human resources.

If the landscape of K-12 education requires teachers to shift their paradigm from that of a didactic teacher to one of a facilitative instructor, then the method teachers are trained must shift paradigms as well. It is not feasible to expect instructional practice to experience substantive
change if the method of changing that practice remains the same. The data discovered through the present study demonstrates great positivity that a similarly structured professional learning program could be effective over long-term implementation. However, such a program would require significant support, logistical resources and the dedicated, positive assistance from site-based educational leadership. The participants discussed this implication in some detail during the final focus group. They felt, in order to carry out the study’s design with fidelity across a school-wide setting, there must be a person and/or team of specialized and specifically dedicated on-site professional learning developers. That team could supplant the standard workshop style staff development and deliver mandated professional learning with individual teachers in much the same manner as the researcher. They further discussed the importance of those professional developers to be competent and collaborative but not an evaluative authority. While a significant investment in human capital, the participants were wholly convinced an adragogically-based learning structure would fail without suitable appropriated human resources.

Overall, bringing instruction into the 21st Century requires the elimination of 20th Century barriers. If teachers are expected to shift their paradigm to a facilitative instructional role, they must be provided with appropriate, reliable and numerically adequate resources. While this is a substantial financial undertaking in a volatile economic climate, failing to provide these resources and/or maintaining existing, inadequate, professional learning structures is unlikely to merit success. The data discovered here hints at the general implication that the structure of professional development must change to include andragogical principles while implementing a concerted effort to eliminate encumbering technology barriers.
Limitations

The most obvious limitation to the present study is that it was not successful as implemented. Although the participants in this study summarily approved of the application of adult learning principles, they were not successful in changing their practice. They indicated high regard for the format of the program, yet did not accomplish their objectives. Becky was the only participant that succeeded in building a student led, technology integrated lesson. However, she was unable to implement that lesson due to administrative constraints. Even in Becky’s case, although she designed the lesson, she was unable to execute it and reflect upon its successes and opportunities. Without that culminating activity, Becky’s overall “success” in the program is open to interpretation. That also draws a questioning shadow over the overall practical benefits of the present research study.

Although this research generates specific positive and negative data related to the field of K-12 professional learning, its overall addition to academic research has merit. There are three important findings that can enhance the knowledge base for K-12 professional learning. The most salient of these points is the longitudinal quality of the problem of practice. The shift in K-12 education is radical, but evolutionary. Changing a century-old established system of curriculum and instruction is not a phenomenon that will occur instantaneously. Hence, professional learning directed at changing teacher practice will not be immediately effective either. Study participants agreed that the professional learning structure in question must reflect a long-term, longitudinal design. The present research was conducted over approximately three months. Of the four participants, only one achieved their stated objectives indicating a 25% success rate. In a similarly structured (although unrelated to adult learning principles) study lasting six months, Glazer et al (2009) achieved a 33% proficiency rate. Flowerday et al’s (2003)
study extended the professional learning period to sixteen months and, experiencing similar barriers in funding and resources, reported increases between 58% and 89% among professional learning participants. It is interesting to note the directly proportional rates of success as compared to the term of professional learning. The participant teachers in the present study support the idea of a long-term, sustained, individualized and mandated professional learning program. Not unlike the direct proportions represented here, the participants felt confident this professional learning structure would be effective over a long term implementation. However, as designed and implemented, the three month timeframe significantly limits the data’s usefulness.

Of secondary importance, they praise the andragogical design of this study and indicate their perception of its promise over an extended professional learning period. They unanimously approve of the individualized nature of the program that directly addresses the personal worth, motivation, experience and professional needs. They offer suggestions for how to take the adult learning principles of this program and indoctrinate them, long-term, in a school setting. The participants supported the idea of creating systemic, imbedded professional learning systems that operate in concert with practical teaching and learning rather than cognate additions to unrelated systems. The participant group expressed unanimous positivity toward ongoing, practical professional learning supported by dedicated staffing allotments at the school level. However, for the present study, they found the lack of real-time, accessible contact with the professional developer limiting.

The researcher, acting as professional developer in this action research model, was not based at the subject middle school. Rather, she worked full-time at a neighboring school. While the researcher was available through virtual means (instant message, social media, and email especially), she was not on-site. Both the researcher and the participants felt this was a
significant design limitation. Lacking a physical constancy, she was not available to assist during curriculum planning sessions, to observe implemented lesson plans or ensure compliance with the participants’ stated professional development plan unless those activities were pre-arranged. This lacking spontaneity eroded the ability to capitalize on teachable moments and direct real-time teacher learning. The short time frame and lacking physical presence of the professional learning coordinator presented the greatest limitations to this study. However, the volunteer participants also limited the usefulness of the data.

The support this study lends to the body of professional learning research shares many of its limitations. Only four members of the middle school staff chose to participate. This small, volunteer sample, does not reflect the greater teaching population. Each of these teachers exhibited motivation to learn simply by joining the study. They also showed an interest in 21st Century learning and technology integration that may not be shared among the staff at large. Conceivably, those teachers unmotivated to improve their craft, or disinterested in the implementation of 21st Century skills did not volunteer for this study. Hence, the andragogical processes that were so wholly applauded by the participants may not have met with the same enthusiasm among the school’s larger teaching population. Additionally, the action research design ensures these results are not applicable to any greater school environment. Small numbers of volunteer participants producing data that cannot be generalized beyond the present setting were all noted limitations of the professional development body of literature and this research does not address those limitations.

**Conclusion**

The key findings in this study relate back to both the theoretical framework and also the two bodies of reviewed literature. The theoretical framework posits that adults learn differently
from their student counterparts. Given adults’ life experience, motivation and focus on practicality of learning, pedagogical instruction is unlikely to be effective. In the educational environment, teachers are expected to model the tenets of life-long learning. Associated with that expectation, is the requirement that teachers engage in regular professional learning in order to maintain certified licensure. This study supports the notion that delivering professional learning programs through andragogical instruction holds promise. The participants’ responded consistently and positively to the professional learning structures that were grounded in andragogical principles. Their stated desires for an effective professional learning program unknowingly referenced nearly every facet of adult learning theory. Of the data collected, participant response to the andragogical framework was the research’s single most decisive finding.

The data is less significant in relation to the existence of Prensky’s (2001) digital native. The body of literature related to 21st Century students is divided. A largely non-academic, but influential base of advocates supports the idea that adolescent learners are either preferentially or developmentally different from previous generations. They purport that digital natives are driven through hyper-connected, multi-tasked informational media (Prensky, 2001; Ritchtel, 2010; Shaw, 2009). Their opponents claim there is little to no grounded research to support their position. In fact, they discuss academic research that questions the validity of the digital native claim (Bond et al., 2008; Lea et al., 2008; Salajan et al., 2009). This research study does not forward the position of either argument. The anecdotal data collected from this study indicates that participants recognize varying characteristics of the supposed digital native. However, the evidence gathered here also questions those characteristics. Participants agreed that students could operate digital technology, but were less convinced they could appropriately apply it to
rigorous learning. They also questioned the functional capabilities of low-income students without prolific access to digital technology. Moreover, they questioned the ages of their respective students and speculated whether digital acumen is directly proportional to chronological age. In total, the questions raised through the data, neither advance the field of literature, nor detract from it.

While the present study does not specifically progress the body of academic literature related to the 21st Century learner, it does offer support for the field of literature related to professional learning. This study connects the process of professional learning directly to the andragogical framework in the context of improving 21st Century classroom instruction. This is a nexus of three dimensions that is essentially devoid in the body of literature. This study offers similarly successful responses in terms of how the participants responded to the program’s adult learning structures (Harteis et al., 2010; Karagiorgi et al., 2008; Manning, 1987; Riley & Roach, 2006). In reference to the connection between professional learning and the development of 21st Century classroom instruction, this study produces a compelling result.

**Recommendations**

This study produces recommendations for both existing educational practice as well as district or leadership policy. In practice, educational agencies should consider the idea of establishing full-time, on-site professional developers rather than exhausting resources in workshop style, “drive-by” professional development. Budget managers should give thoughtful reflection to focusing the total allocated budget in one or more personnel allotments rather than splitting those resources among multiple short-term programs of varied content. Additionally, districts should revisit their existing professional development structures. Rather than
coordinating numerous, varied group workshops, districts should give consideration to individual professional learning resources that align directly with teachers’ individual professional development plans. This may mean the elimination of professional learning as it has been ordinarily administered and a paradigmatical shift to individualized, andragogically-based, teacher instruction. However, these efforts are likely to be ineffective if educational policy and resource allocation are not also considered.

Participants of this study were significantly, consistently and overwhelmingly frustrated with uncontrolled barriers to technology integration. District policy makers should revisit the allocation of total hardware and infrastructure resources in the era of 21st Century learning. As curricular requirements, outside agencies and new standards pressure teachers to improve instruction, they have to be given the resources to be successful. Local and state education agencies should research their student connectivity and home access. They should inventory, analyze and consider the operational reliability of presently owned hardware and wiring capacities. With that knowledge in hand, if these agencies choose to require their educational leaders to innovate and align instruction with 21st Century principles, they need to give significant consideration to the reallocation of budgets to remove existing logistic barriers to success.

Additionally, policy makers should address existing policies that do not align with 21st Century learning principles. Participants in this study expressed concern over restrictive testing and grading policies that do not allow for failure and assess students on proficiency rather than growth. If the greater educational intent seeks to change instruction and shift the paradigm from didactic instruction to student-led, facilitated learning, then school-based classroom policies need to shift as well. Policy makers should analyze and address the disconnection between what
teachers are asked to do and the policies in place that prevent those teachers from achieving that directive.

**Suggestions for Further Research**

While this study produces a variety of viable data, it also contains its own limitations. The participants were comprised of a small volunteer sample and may not reflect the teaching population as a whole. Additionally, the action research model is not applicable outside of this particular subject setting. However, the participants themselves offered several recommendations that should be considered for additional study. Of primary importance, a long term study should be undertaken to determine if the direct proportionality observed between length of professional learning program and participant success has merit. Lasting at least one school calendar year, that professional learning study should reflect the same attention to andragogical principles as was designed in the present study. Furthermore, that professional learning program should be mandated by administration to study the effects on willing, technology-ready candidates as well as their more reticent colleagues.

In addition, districts with logistical resources should undertake studying the effectiveness of a dedicated, on-site individual or team of professional developers. These development experts, working individually with teachers, over a period of time may contribute valuable data to the field. This research may encourage or discourage budget managers’ future allocation of resources and advise policy makers as to the feasibility of shifting professional learning paradigms. However, any additional research must account for the elimination of technology barriers as a variable control. This research may be conducted through an individual, group or school-wide participation of teachers, but student access and school-based resources must be
eliminated as a concern either through student permitted or school provided digital technology. In continuing the research related to andragogy, 21st Century learning and professional development, academic investigators can continue to provide needed information to those working in K-12 education. With additional research, educators can continue to improve their practice, conform to changing standards and evaluation practices and shift their paradigm from didactic instruction to student-led facilitated learning, they are more likely to effectively prepare tomorrow’s students for a globalized job market.
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Appendix A

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August 27, 2012

Permission for Use of the LoTi Framework

To: Northeastern University
   Dissertation Review Boards

Please accept this letter as notification that Judith Moore is hereby granted permission to utilize the LoTi Framework and corresponding Digital-Age Survey to collect data for her doctoral dissertation study. Judith is permitted to use the Digital-Age Survey and the LoTi Framework for purposes of the study only. In addition, Judith has permission to review all available LoTi Digital-Age results on the individuals taking place in his study.

The guidelines for using LoTi Connection copyrighted material as part of this dissertation study are as follows:

1. Permission to reprint the LoTi Framework is granted provided that the content remains unchanged and that attribution is given to LoTi Connection.
2. Permission to reprint selected results including graphs and tables in the Appendices of the study is granted provided that the content remains unchanged and that attribution is given to LoTi Connection.
3. Permission to reprint selected questions from the Digital-Age Survey in the Appendices of the study is granted provided that the content remains unchanged and that attribution is given to LoTi Connection.
4. LoTi Connection holds the right to restrict usage of any intellectual property if LoTi Connection finds that the content is being used in an inappropriate manner.

Sincerely,

Dennee Saunders
Assistant Executive Director

Date 08/27/2012
Appendix A

LoTi Resource

LoTi Digital-Age Framework

**LoTi Level 0: Non-use**
At a Level 0 (Non-Use), the instructional focus can range anywhere from a traditional direct instruction approach to a collaborative student-centered learning environment. The use of research-based best practices may or may not be evident, but those practices do not involve the use of digital tools and resources.

The use of digital tools and resources in the classroom is non-existent due to (1) competing priorities (e.g., high stakes testing, highly-structured and rigid curriculum programs), (2) lack of access, or (3) a perception that their use is inappropriate for the instructional setting or student readiness levels. The use of instructional materials is predominately text-based (e.g., student handouts, worksheets).

**LoTi Level 1: Awareness**
At a Level 1 (Awareness), the instructional focus emphasizes information dissemination to students (e.g., lectures, teacher-created multimedia presentations) and supports the lecture/discussion approach to teaching. Teacher questioning and/or student learning typically focuses on lower cognitive skill development (e.g., knowledge, comprehension).

Digital tools and resources are either (1) used by the classroom teacher for classroom and/or curriculum management tasks (e.g., taking attendance, using grade book programs, accessing email, retrieving lesson plans from a curriculum management system or the Internet), (2) used by the classroom teacher to embellish or enhance teacher lectures or presentations (e.g., multimedia presentations), and/or (3) used by students (usually unrelated to classroom instructional priorities) as a reward for prior work completed in class.

**LoTi Level 2: Exploration**
At a Level 2 (Exploration) the instructional focus emphasizes content understanding and supports mastery learning and direct instruction. Teacher questioning and/or student learning focuses on lower levels of student cognitive processing (e.g., knowledge, comprehension).

Digital tools and resources are used by students for extension activities, enrichment exercises, or information gathering assignments that generally reinforce lower cognitive skill development relating to the content under investigation. There is a pervasive use of student multimedia products, allowing students to present their content understanding in a digital format that may or may not reach beyond the classroom.
Appendix A

LoTi Digital-Age Framework

LoTi Level 3: Infusion
At a Level 3 (Infusion), the instructional focus emphasizes student higher order thinking (i.e., application, analysis, synthesis, evaluation) and engaged learning. Though specific learning activities may or may not be perceived as authentic by the student, instructional emphasis is, nonetheless, placed on higher levels of cognitive processing and in-depth treatment of the content using a variety of thinking skill strategies (e.g., problem-solving, decision-making, reflective thinking, experimentation, scientific inquiry). Teacher-centered strategies including the concept attainment, inductive thinking, and scientific inquiry models of teaching are the norm and guide the types of products generated by students.

Digital tools and resources are used by students to carry out teacher-directed tasks that emphasize higher levels of student cognitive processing relating to the content under investigation.

LoTi Level 4a: Integration (Mechanical)
At a Level 4a (Integration: Mechanical) students are engaged in exploring real-world issues and solving authentic problems using digital tools and resources; however, the teacher may experience classroom management (e.g., disciplinary problems, internet delays) or school climate issues (lack of support from colleagues) that restrict full-scale integration. Heavy reliance is placed on prepackaged materials and/or outside resources (e.g., assistance from other colleagues), and/or interventions (e.g., professional development workshops) that aid the teacher in sustaining engaged student problem-solving. Emphasis is placed on applied learning and the constructivist, problem-based models of teaching that require higher levels of student cognitive processing and in-depth examination of the content.

Students use of digital tools and resources is inherent and motivated by the drive to answer student-generated questions that dictate the content, process, and products embedded in the learning experience.

LoTi Level 4b: Integration (Routine)
At a Level 4b (Integration: Routine) students are fully engaged in exploring real-world issues and solving authentic problems using digital tools and resources. The teacher is within his/her comfort level with promoting an inquiry-based model of teaching that involves students applying their learning to the real world. Emphasis is placed on learner-centered strategies that promote personal goal setting and self-monitoring, student action, and issues resolution that require higher levels of student cognitive processing and in-depth examination of the content.

Students use of digital tools and resources is inherent and motivated by the drive to answer student-generated questions that dictate the content, process, and products embedded in the learning experience.
Appendix A

LoTi Digital-Age Framework

**LoTi Level 5: Expansion**
At a Level 5 (Expansion), collaborations extending beyond the classroom are employed for authentic student problem-solving and issues resolution. Emphasis is placed on learner-centered strategies that promote personal goal setting and self-monitoring, student action, and collaborations with other diverse groups (e.g., another school, different cultures, business establishments, governmental agencies).

Students use of digital tools and resources is inherent and motivated by the drive to answer student-generated questions that dictate the content, process, and products embedded in the learning experience. The complexity and sophistication of the digital resources and collaboration tools used in the learning environment are now commensurate with (1) the diversity, inventiveness, and spontaneity of the teacher’s experiential-based approach to teaching and learning and (2) the students’ level of complex thinking (e.g., analysis, synthesis, evaluation) and in-depth understanding of the content experienced in the classroom.

**LoTi Level 6: Refinement**
At a Level 6 (Refinement), collaborations extending beyond the classroom that promote authentic student problem-solving and issues resolution are the norm. The instructional curriculum is entirely learner-based. The content emerges based on the needs of the learner according to his/her interests, needs, and/or aspirations and is supported by unlimited access to the most current digital applications and infrastructure available.

At this level, there is no longer a division between instruction and digital tools/resources in the learning environment. The pervasive use of and access to advanced digital tools and resources provides a seamless medium for information queries, creative problem-solving, student reflection, and/or product development. Students have ready access to and a complete understanding of a vast array of collaboration tools and related resources to accomplish any particular task.
Appendix B

CIP Intensity Level 0 (Not True of Me Now)
A CIP Intensity Level 0 indicates that the participant is not involved in a formal classroom setting (e.g., pull-out program).

CIP Intensity Level 1 (Not True of Me Now)
At a CIP Intensity Level 1, the participant's current instructional practices align exclusively with a subject-matter based approach to teaching and learning. Teaching strategies tend to lean toward lectures and/or teacher-led presentations. The use of curriculum materials aligned to specific content standards serves as the focus for student learning. Learning activities tend to be sequential and uniform for all students. Evaluation techniques focus on traditional measures such as essays, quizzes, short-answers, or true-false questions, but no effort is made to use the results of the assessments to guide instruction.

Student projects tend to be teacher-directed in terms of identifying project outcomes as well as requirements for project completion. No effort is made to differentiate instruction. The use of research-based best practices focuses on basic classroom routines (e.g., providing homework and practice, setting objectives and providing feedback, students summarizing and note taking, providing adequate wait time).

CIP Intensity Level 2 (Not True of Me Now)
At a CIP Intensity Level 2, the participant supports instructional practices consistent with a subject-matter based approach to teaching and learning, but not at the same level of intensity or commitment as a CIP Intensity Level 1. Teaching strategies tend to lean toward lectures and/or teacher-led presentations. The use of curriculum materials aligned to specific content standards serves as the focus for student learning. Learning activities tend to be sequential and uniform for all students. Evaluation techniques focus on traditional measures such as essays, quizzes, short-answers, or true-false questions with the resulting data used to guide instruction.

Student projects tend to be teacher-directed in terms of identifying project outcomes as well as requirements for project completion. No effort is made to differentiate instruction. The use of research-based best practices focuses on basic classroom routines (e.g., providing homework and practice, setting objectives and providing feedback, students summarizing and note taking, providing adequate wait time).
Appendix B

CIP Resource
Current Instructional Practices

CIP Intensity Level 3 (Somewhat True of Me Now)
At a CIP Intensity Level 3, the participant supports instructional practices aligned somewhat with a subject-matter based approach to teaching and learning—an approach characterized by sequential and uniform learning activities for all students, teacher-directed presentations, and/or the use of traditional evaluation techniques. However, the participant may also support the use of student-directed projects that provide opportunities for students to determine the “look and feel” of a final product based on their modality strengths, learning styles, or interests.

Evaluation techniques continue to focus on traditional measures with the resulting data serving as the basis for curriculum decision-making. The use of research-based best practices expands beyond basic classroom routines (e.g., providing opportunities for non-linguistic representation, offering advanced organizers).

CIP Intensity Level 4 (Somewhat True of Me Now)
At a CIP Intensity Level 4, the participant may feel comfortable supporting or implementing either a subject-matter or learning-based approach to instruction based on the content being addressed. In a subject-matter based approach, learning activities tend to be sequential, student projects tend to be uniform for all students, the use of lectures and/or teacher-directed presentations are the norm as well as traditional evaluation strategies. In a learner-based approach, learning activities are diversified and based mostly on student questions, the teacher serves more as a co-learner or facilitator in the classroom, student projects are primarily student-directed, and the use of alternative assessment strategies including performance-based assessments, peer reviews, and student reflections are the norm.

Although traditional learning activities and evaluation techniques are used, students are also encouraged to contribute to the assessment process when appropriate to the content being addressed. The amount of differentiation is moderate based on the readiness level, interests, and learning styles of the students. The use of research-based best practices expands beyond basic classroom routines (e.g., providing opportunities for non-linguistic representation, offering advanced organizers).

CIP Intensity Level 5 (Somewhat True of Me Now)
At a CIP Intensity Level 5, the participant’s instructional practices tend to lean more toward a learner-based approach. The essential content embedded in the standards emerges based on students “need to know” as they attempt to research and solve issues of importance to them using critical thinking and problem-solving skills. The types of learning activities and teaching strategies used in the learning environment are diversified and driven by student questions. Both students and teachers are involved in devising appropriate assessment instruments (e.g., performance-based, journals, peer reviews, self-reflections) by which student performance will be assessed.
Appendix B

CIP Intensity Level 5 (Somewhat True of Me Now) (cont.)
Although student-directed learning activities and evaluations are the norm, the use of teacher-directed activities (e.g., lectures, presentations, teacher-directed projects) may surface based on the nature of the content being addressed and at the desired level of student cognition. The amount of differentiation is substantial based on the readiness level, interests, and learning styles of the students. The use of research-based best practices delves deeper into complex classroom routines (e.g., students generating and testing hypotheses, implementing cooperative learning, students identifying similarities and differences).

CIP Intensity Level 6 (Very True of Me Now)
The participant at a CIP Intensity Level 6 supports instructional practices consistent with a learner-based approach, but not at the same level of intensity or commitment as a CIP Intensity Level 7. The essential content embedded in the standards emerges based on students “need to know” as they attempt to research and solve issues of importance to them using critical thinking and problem-solving skills. The types of learning activities and teaching strategies used in the learning environment are diversified and driven by student questions.

Students, teacher/facilitators, and occasionally parents are all involved in devising appropriate assessment instruments (e.g., performance-based, journals, peer reviews, self-reflections) by which student performance will be assessed. The amount of differentiation is substantial based on the readiness level, interests, and learning styles of the students. The use of research-based best practices delves deeper into complex classroom routines (e.g., students generating and testing hypotheses, implementing cooperative learning, students identifying similarities and differences).

CIP Intensity Level 7 (Very True of Me Now)
At a CIP Intensity Level 7, the participant’s current instructional practices align exclusively with a learner-based approach to teaching and learning. The essential content embedded in the standards emerges based on students “need to know” as they attempt to research and solve issues of importance to them using critical thinking and problem-solving skills. The types of learning activities and teaching strategies used in the learning environment are diversified and driven by student questions.

Students, teacher/facilitators, and occasionally parents are all involved in devising appropriate assessment instruments (e.g., performance-based, journals, peer reviews, self-reflections) by which student performance will be assessed. The amount of differentiation is seamless since students completely guide the pace and level of their learning. The use of research-based best practices delves deeper into complex classroom routines (e.g., students generating and testing hypotheses, implementing cooperative learning, students identifying similarities and differences).
Appendix C

LoTi Digital Age Survey Resource

Personal Computer Use

Intensity Level 0 (Not True of Me Now)
A PCU intensity Level 0 indicates that the participant does not possess the inclination or skill level to use digital tools and resources for either personal or professional use. Participants at intensity Level 0 exhibit a general disinterest toward emerging technologies relying more on traditional devices (e.g., use of overhead projectors, chalkboards, paper/pencil activities) than using digital resources for conveying information or classroom management tasks.

Intensity Level 1 (Not True of Me Now)
A PCU intensity Level 1 indicates that the participant demonstrates little fluency with using digital tools and resources for student learning. Participants at intensity Level 1 may have a general awareness of various digital tools and media including word processors, spreadsheets, or the internet, but generally are not using them. Participants at this level are generally unaware of copyright issues or current research on the impact of existing and emerging digital tools and resources on student learning.

Intensity Level 2 (Not True of Me Now)
A PCU intensity Level 2 indicates that the participant demonstrates little to moderate fluency with using digital tools and resources for student learning. Participants at intensity Level 2 may occasionally browse the internet, use email, or use a word processor program; yet, may not have the confidence or feel comfortable using existing and emerging digital tools beyond classroom management tasks (e.g., grade book, attendance program). Participants at this level are somewhat aware of copyright issues and maintain a cursory understanding of the impact of existing and emerging digital tools and resources on student learning.

Intensity Level 3 (Somewhat True of Me Now)
A PCU intensity Level 3 indicates that the participant demonstrates moderate fluency with using digital tools and resources for student learning. Participants at intensity Level 3 may begin to become “regular” users of selected digital-age media and formats (e.g., internet, email, word processor, multimedia) to (1) communicate with students, parents, and peers and (2) model their use in the classroom in support of research and learning. Participants at this level are aware of copyright issues and maintain a moderate understanding of the impact of existing and emerging digital tools and resources on student learning.
Appendix C

Intensity Level 4 (Somewhat True of Me Now)
A PCU Intensity Level 4 indicates that the participant demonstrates moderate to high fluency with using digital tools and resources for student learning. Participants at Intensity Level 4 commonly use a broader range of digital-age media and formats in support of their curriculum and instructional strategies. Participants at this level model the safe, legal, and ethical uses of digital information and technologies and participate in local discussion forums that advocate the positive impact of existing digital tools and resources on student success in the classroom.

Intensity Level 5 (Somewhat True of Me Now)
A PCU Intensity Level 5 indicates that the participant demonstrates a high fluency level with using digital tools and resources for student learning. Participants at Intensity Level 5 are commonly able to use an expanded range of existing and emerging digital-age media and formats in support of their curriculum and instructional strategies. Participants at this level advocate the safe, legal, and ethical uses of digital information and technologies and participate in local and global learning that advocate the positive impact of existing digital tools and resources on student success in the classroom.

Intensity Level 6 (Very True of Me Now)
A PCU Intensity Level 6 indicates that the participant demonstrates high to extremely high fluency level with using digital tools and resources for student learning. Participants at Intensity Level 6 are sophisticated in the use of most, if not all, existing and emerging digital-age media and formats (e.g., multimedia, productivity, desktop publishing, web-based applications). They begin to take on a leadership role as advocates for technology infusion as well as the safe, legal, and ethical uses of digital resources in the schools. Participants at this level continually reflect on the latest research discussing the impact of digital tools on student success.

Intensity Level 7 (Very True of Me Now)
A PCU Intensity Level 7 indicates that the participant possesses an extremely high fluency level with using digital tools and resources for student learning. Participants at Intensity Level 7 are sophisticated in the use of any existing and emerging digital-age media and formats (e.g., multimedia, productivity, desktop publishing, web-based applications). Participants at this level set the vision for technology infusion based on the latest research and continually seek creative uses of digital tools and resources that impact learning. They actively participate in global learning communities that seek creative uses of digital tools and resources in the classroom.
Re: permission for a dissertation, NETS.T, Judy Moore, univ
1 message

Tina Wells <twells@iste.org>  
To: Judy Moore <jmooore@gaston.k12.nc.us>

Mon, Feb 25, 2013 at 3:08 PM

Dear Judith Moore,

Thank you for your request for permission to use ISTE's NETS (National Educational Technology Standards) for Teachers.

As long as your usage is noncommercial, not for profit, and for educational purposes only, you have our permission to use the NETS.T for the appendix in your dissertation as described below. The rights granted herein are non-exclusive, non-transferable, print rights only.

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Please let us know if we can be of additional assistance. We wish you every success with your dissertation.

Best regards,

Tina Wells
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541.434.8925
twells@iste.org
Effective teachers model and apply the NETS-S as they design, implement, and assess learning experiences to engage students and improve learning; enrich professional practice; and provide positive models for students, colleagues, and the community. All teachers should meet the following standards and performance indicators.

1. Facilitate and Inspire Student Learning and Creativity
   Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments.
   a. Promote, support, and model creative and innovative thinking and inventiveness
   b. Engage students in exploring real-world issues and solving authentic problems using digital tools and resources
   c. Promote student reflection using collaborative tools to reveal and clarify students’ conceptual understanding and thinking, planning, and creative processes
   d. Model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments

3. Model Digital Age Work and Learning
   Teachers exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society.
   a. Demonstrate fluency in technology systems and the transfer of current knowledge to new technologies and situations
   b. Collaborate with students, peers, parents, and community members using digital tools and resources to support student success and innovation
   c. Communicate relevant information and ideas effectively to students, parents, and peers using a variety of digital age media and formats
   d. Model and facilitate effective use of current and emerging digital tools to locate, analyze, evaluate, and use information resources to support research and learning
Appendix D

4. Promote and Model Digital Citizenship and Responsibility
Teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices.

a. Advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright, intellectual property, and the appropriate documentation of sources.
b. Address the diverse needs of all learners by using learner-centered strategies providing equitable access to appropriate digital tools and resources.
c. Promote and model digital etiquette and responsible social interactions related to the use of technology and information.
d. Develop and model cultural understanding and global awareness by engaging with colleagues and students of other cultures using digital age communication and collaboration tools.

5. Engage in Professional Growth and Leadership
Teachers continuously improve their professional practice, model lifelong learning, and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources.

a. Participate in local and global learning communities to explore creative applications of technology to improve student learning.
b. Exhibit leadership by demonstrating a vision of technology infusion, participating in shared decision making and community building, and developing the leadership and technology skills of others.
c. Evaluate and reflect on current research and professional practice on a regular basis to make effective use of existing and emerging digital tools and resources in support of student learning.
d. Contribute to the effectiveness, vitality, and self-renewal of the teaching profession and of their school and community.

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Appendix E

NOTIFICATION OF IRB ACTION

Date: August 13, 2012
Principal Investigator(s): Ronald Brown
Judith M. Moore
Department: Doctor of Education Program
College of Professional Studies
Address: 20 Belvidere
Northeastern University
Title of Project: Shifting the Paradigm from Teacher to Facilitator
Participating Sites: School County Superintendent’s Permission Letter on file
School Site Principal’s Permission Letter on file
DHHS Review Category: Expedited #6, #7
Exempt #3 – applies to classroom observation
Informed Consents: One (1) signed consent form
Monitoring Interval: 12 months

APPROVAL EXPIRATION DATE: AUGUST 12, 2013

Investigator’s Responsibilities:

1. The informed consent form bearing the IRB approval stamp must be used when recruiting participants into the study.
2. The investigator must notify IRB immediately of unexpected adverse reactions, or new information that may alter our perception of the benefit-risk ratio.
3. Study procedures and files are subject to audit any time.
4. Any modifications of the protocol or the informed consent as the study progresses must be reviewed and approved by this committee prior to being instituted.
5. Continuing Review Approval for the proposal should be requested at least one month prior to the expiration date above.
6. This approval applies to the protection of human subjects only. It does not apply to any other university approvals that may be necessary.

C. Randall Colvin, Ph.D., Chair
Northeastern University Institutional Review Board

Manuel Regna, Director
Human Subject Research Protection

Northeastern University FWA #4630
Appendix E

Judith M. Moore
Northeastern University; Boston, Massachusetts
College of Professional Studies
Doctor of Education Program

To: Certified Faculty Members at W.C. Friday Middle School
From: Judith M. Moore, student researcher, Northeastern University
Re: Technology Integration professional learning opportunity

Dear Certified Faculty,

My name is Judy Moore. You may know me as the Principal of North Gaston High School. However, I’m communicating with you as a student, rather than an administrator.

I am seeking individuals who are willing to participate in a research study. I am conducting this study as a part of my dissertation requirements for Northeastern University. I’m conducting a technology integration professional learning study that will start at the beginning of the 2012-2013 school year and end at approximately Thanksgiving break. This research is intended to determine whether an Instructional technology integration professional learning plan, grounded in the theory of andragogy (adult learning principles) will successfully help participating teachers shift their instruction from directive teaching to facilitated student learning.

This study will take approximately ten hours of your time and, upon completion, afford at least 1.0 technology CEUs for your licensure renewal but does not involve and monetary compensation. It is entirely voluntary and there is no expectation that you participate and also no consequence if you choose not to.

I’ve enclosed a consent form that should answer all of your questions regarding this study and allow you the opportunity to join if you so desire. Should you choose to participate, please sign the attached form (keep one for your records) and return one to me through the courier.

If there are additional questions not addressed here, please feel free to contact me by phone (704) 922-5285 x224, or via email, moore.jud@husky.neu.edu and I’ll be happy to answer those. It is my hope you’ll consider participating in this study.

Sincerely,

Judith M. Moore
Appendix E

Signed Informed Consent Document

Northeastern University; College of Professional Studies; Department of Education

Researchers: Judith M. Moore, Dr. Ronald Brown

Research Study Title: Shifting the Paradigm from Teacher to Facilitator

Informed Consent to Participate in a Research Study

We are inviting you to take part in a research study. This form will tell you about the study. You may ask the researchers any questions you may have. When you are ready to make a decision, you may tell the researcher if you want to participate or not. You do not have to participate if you do not want to. If you decide to participate, you should sign this consent form, keep a copy for your records, and return the signed copy in the courier.

Why am I being asked to take part in this research study?

You are being asked to be a part of this study because you are a certified classroom teacher at the middle school level.

Why is this research study being done?

This research is intended to determine whether an instructional technology integration professional learning plan, grounded in the theory of andragogy (adult learning principles), will successfully help participating teachers shift their instruction from directive teaching to facilitated student learning.

What will I be asked to do?

If you decide to take part in this study, over the course of 45 school days, you will be asked to do the following:

- Participate in an online initial survey (approximately 20 minutes long) and initial focus group (limited to one hour after school) measuring classroom technology integration
- Working with the researcher, develop a short-term technology integration development plan
- Allow formative observations from the researcher
- Be given personalized feedback and resources adapted to your development plan and work with the researcher to tailor that plan to your needs
- Participate in a formal observation and exit focus group (limited to one hour after school) regarding the professional development program
- Participate in an online post survey lasting approximately 20 minutes
- Both focus groups will be audio taped for transcription and data analysis purposes only
Appendix E

Where will this take place and how much of my time will it take?

The observations will take place during the regular school day. The pre and post surveys will be conducted online and can be completed at a time convenient to you. We will schedule a mutually convenient time during your planning period to determine your professional development plan for this study. You will have regular informal interactions for resources, guidance and feedback through the 45 days. Each of these feedback sessions should take less than one planning period each. The initial and final exit focus group will occur after school and be limited to a one hour (3:15-4:15pm) time frame conducted at your school library. Observations by the researcher will take no additional time from your schedule.

Will there be any risk or discomfort to me?

There are no foreseeable risks or discomforts to you for participating in this study. Additionally, data collected from this research project is not applicable to any formal, required or job-related evaluation. Information from focus groups, classroom observations or surveys will not be used in any formally evaluative fashion. Therefore, choosing to, or not to, participate will have no bearing on your employment status with the school.

All personally identifiable participant information will be expunged from the data. Data will be coded numerically according the number assigned each participant. The final research report will substitute alias identities in place of actual names for ease of reading.

Will I benefit for being in this research?

There is no direct benefit to you for participating in this study. If you take part in this project you will have the opportunity to direct your own learning in the area of technology integration. It is hoped that the results of this study will help direct professional learning facilitators to build more effective and efficient teacher development programs.

Who will see the information about me?

Your part in this study will be confidential. No reports or publications will use information that can identify you, or the school, in any way. Your data will be collected and aggregated under an alias identity assigned by the researcher at the beginning of the study. While all data associated with you will be coded under that alias, only the researcher will know which alias applies to which participant. All data will be maintained in the personal laptop computer, secure online site and/or administrative iPad during the study. All personally identifiable data will be deleted upon final approval of the research project. All audio recordings will be deleted as well. This signed form will be kept on file for 3 years, as required, in a locked cabinet in the researcher’s office.

Can I stop my participation in this study?

The decision to participate in this research is up to you. You do not have to participate if you do not want to. If you do take part, you may stop at any time without penalty. You also have the right to refuse to answer any question. In addition, you may ask to have your data withdrawn from the study after the research has been conducted.
Appendix E

Who can I contact if I have questions or problems?

If you want to know more about this research project, please contact Judy Moore moore.jud@husky.neu.edu or by cell phone at (704) 718-1379. You may also contact Dr. Ron Brown, the Principal Investigator overseeing my research at 617-435-8166 or ron.brown1@neu.edu.

Who can I contact about my rights as a participant?

If you have any questions about your rights as a participant, you may contact Nan C. Regina, Director, Human Subject Research Protection, 960 Renaissance Park, Northeastern University, Boston, MA 02155. Telephone: 617-373-4588 Email: irb@neu.edu. You may call anonymously if you wish.

Will I be paid for my participation?

There is no financial compensation for participating in this research study. If you complete the study in its entirety, you will receive at least 1.0 technology continuing education credits (CEU’s) toward your licensure renewal.

Will it cost me anything to participate in this research study?

No costs are associated with this research study.

I agree to take part in this research.

__________________________________________  ______________
Signature of person agreeing to take part  Date

__________________________________________
Printed name of person above

APPROVED
NU IRB#  12-03-10
VALID  8/1/10 - 8/12/12
THROUGH:  8/12/12
Appendix F

Focus Group Interview Protocol

The final data collection will occur through a focus group of the participating teachers at the end of the professional learning program. This focus group will last for one hour and will be conducted after school. The researcher will record the group discussion in .mp3 format and take handwritten notes as well. The questions for the focus group are as follows:

Initial Group Questions:

1) For what reasons did you choose to participate in this program?
2) What are your personal goals for this program?
3) What characteristics do you think make a successful professional learning program?
4) How do you, as an adult, learn best?
5) Describe your level of classroom technology integration.
6) What questions or concerns would you like to address before the program begins?

Exit Group Questions:

1) In your opinion, what barriers exist at WCF that keep teachers from integrating technology effectively?
2) From your perspective, describe what professional learning programs are necessary to increase school-wide technology integration?
3) How was this professional learning program different from those you’ve participated in before?
4) What did you enjoy about this professional learning program? Why?
5) What did you dislike about this professional learning program? Why?
6) What, if any, characteristics of this program helped you move your instruction up the LoTi scale?
7) Why do you feel these program characteristics made/did not make a difference in your classroom?
8) What program characteristics, do you feel, if implemented school-wide would result in sustained change among the staff?
9) Describe your level of classroom technology integration.
10) What other comments, concerns or suggestions do you have, that you feel are important, about the professional learning program you just experienced?