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# Characteristics of Adult General Education Learners and Courses: A Correlational Study on the Elements of Success

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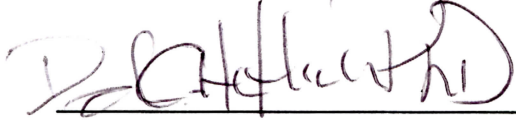
by  
Daniel J. Stackhouse

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for the Degree of Doctor of Education

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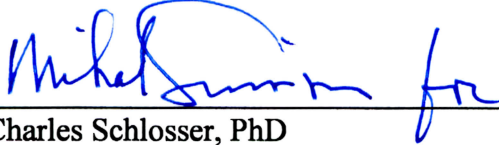
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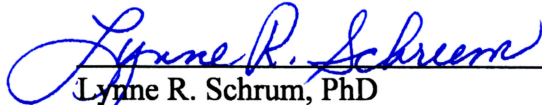
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## Statement of Original Work

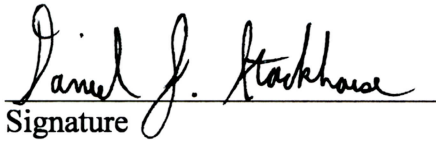
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To my father, Dr. Kenneth A. Stackhouse, who was a Professor of Foreign Languages at Virginia Commonwealth University in Richmond, Virginia from 1971 until his passing in 2001. He was well known and respected in his field. I know my father will continue to guide me as I continue the journey through my education, career, and life.

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## Abstract

Characteristics of Adult General Education Learners and Courses: A Correlational Study On the Elements of Success. Daniel J. Stackhouse, 2016: Applied Dissertation, Nova Southeastern University, Abraham S. Fischler College of Education. ERIC Descriptors: Adult Education, Career Education, Distance Education, Correlation, Predictive Validity, Statistical Analysis

The purpose of this study was to determine if a correlation exists among characteristics common to successful adult career and technical students in the traditional classroom setting, the online mode of instruction, and a hybrid of the traditional and distance mode of instructional delivery. A gap in the literature exists, resulting in a lack of knowledge specific to the reasons for success or failure of these adult career and technical students, specifically in relation to mode of instructional delivery: traditional classroom, online, or a hybrid of both.

This study is a quantitative correlation study of explanatory and predictive design using archival data from a large and diverse school district in the state of Florida. The dependent variables included the level of student success as indicated by the student's withdrawal codes; achievement as measured by the difference between initial Test of Adult Basic Education pretest score and final post-test score required to gain admittance to career and technical education program of student choice; length of time required for the Adult Basic Education student to achieve his or her highest level of success as determined by the pre- and post-test TABE score; and number of courses repeated before required post-test scores are attained during the duration of the coursework.

The results of the study indicate that a greater number of factors displayed predictive value in distinguishing successful from non-successful face-to-face students. For these students, nine factors could be included in a predictive model that accurately classified approximately 58.5% of the students in terms of success versus non-success. Four factors were found to make unique contributions: age, ethnicity, the number of course attempts, and the difference between the students' first and last math TABE scores. For the online students, five factors were included in a predictive model that accurately distinguished roughly 64.4% of the students. In the final analysis, only one factor maintained a unique predictor of program success: the number of course attempts.

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## **Chapter 1: Introduction**

### **Statement of the Problem**

Career and technical education (CTE) has focused on teaching technical competencies and related academic skills that prepare students to enter and advance in an assortment of career fields and postsecondary education. Each career and technical education platform has associated the rudimentary academic skills of reading, mathematics, and language that are required for completion. The state of Florida, in accordance with the United States Department of Education, suggests that all adult education students enrolling in a career and technical education (CTE) program be evaluated using the Test of Adult Basic Education (TABE) to determine the level of academic literacy of the student and, if necessary, placement in an appropriate remediated Adult General Education (AGE) program of study. Contingent upon TABE scores, the student may choose to take remediated coursework in a traditional classroom setting or as a distance learner. The educational leadership of the CTE program has expressed an interest in determining if an association exists between the mode of instructional delivery and student achievement (Personal communication, May 17, 2012). Additionally, there is a lack of evidence regarding the relationship between student achievement through the successful completion of remedial AGE coursework in a CTE program and the mode of instructional delivery. The focus of this study is to determine to what extent a correlation exists between the mode of instructional delivery and impact on learning gains of students enrolled in Adult General Education coursework.

### **The Research Problem**

According to the 2013 Florida Statute 1004.91 *Requirements for career education basic skills*: “Any student found to lack the required level of basic skills for such [CTE]

program shall be referred to applied academics instruction or another adult general education program for a structured program of basic skills instruction. A student may not receive a career or technical certificate of completion without first demonstrating the basic skills required in the state curriculum frameworks for the career education program” (s. 1004.91(2) Florida Statutes, 2013). Therefore, Broward County Public Schools in coordination with Workforce Florida, Inc. and Broward County’s Career, Technical, Adult, and Community Education (CTACE) contracted with McGraw Hill Publishing to create the Test of Adult Basic Education (TABE), which is a placement test that satisfies Florida Statute 1008.30 *Common placement testing for public postsecondary education* (s. 1008.3 Florida Statutes).

The State of Florida decrees that learners registered in a postsecondary program comprised of 400 or more clock hours should adhere to a minimum basic skill level in reading, mathematics, and language. The State Curriculum outlines a set of minimum standards that a student should achieve before entering a CTE program of study. The administration of the TABE is used to place the student directly into a CTE program of study or in a remedial course of study. Students who do not meet the minimum basic skills level must remediate and be re-tested before being authorized to obtain a postsecondary Applied Technology Diploma or an adult certification of program completion.

Remediation is given in the form of Applied Academic Adult Education (AAAE) for those students who score higher than 6.0 on the TABE. Further remediation in the form of Adult Basic Education (ABE) is required for those students who score below a 5.9 on the TABE. AAAE and ABE coursework is delivered both online for distance learners as well as in a more traditional classroom setting. As of yet, no study has been

conducted to determine if a correlation exists between variables that could affect the achievement levels of distance learners and those of a more traditional classroom setting in Adult Basic Education or Applied Academic Adult Education programs. Additionally, there is a lack of research in characteristics of online and traditional learners in the context of this study. The problem then is to determine if one or more common characteristics are prevalent in Adult General Education (AGE) students who demonstrate the greatest amount of learning gains after completion of AGE coursework as determined by pretesting and post-testing of the student by the norm-referenced TABE, and if those advantageous characteristics are unique to the student's choice of mode of course delivery.

### **Significance of Problem**

According to Clark (1983), "The best current evidence is that media are mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in our nutrition" (Clark, 1983, p. 446). This often cited statement acknowledges the economic but not instructional benefits of instructional technology and media in learning and performance.

On the other hand, Kozma (1994) contends, "while some students will learn a particular task regardless of delivery device, others will be able to take advantage of a particular medium's characteristics to help construct knowledge" (p. 3). Exemplifying this statement is the education of adult students utilizing various modes of instruction. The option of online education for adult students of remedial Adult General Education (AGE) in the forms of Adult Basic Education (ABE) and Applied Academic Adult Education (AAAE) exists to prepare adult students for education in a technical field.

Simonson, Schlosser, and Orellana (2011) noted that students enrolled in

pioneering educational programs such as those of distance education tend to be highly motivated, which may influence achievement results. In addition, most distance educational research has focused on adult learners. Documentation on the effectiveness of distance education is extensive. Research shows that traditional educational platforms such as those of the classroom setting are just as effective as that of distance education in regard to student achievement. Regarding student satisfaction, “distance learners feel they learn as well as if they were in a regular classroom” (Simonson et al., 2011, p. 125).

Success in online education remains debatable. Successful adult learners have traditionally been “white-collar” due to their ease of access to distance learning opportunities. Additionally, while both genders identify self-discipline and self-pacing as important characteristics, more females suggest that this is a quality essential for success in an online program. In addition, while most adult learners consider themselves as self-starters, they have little tolerance for extraneous activities or information that does not lead them to their intended outcomes (Simonson, Smaldino, Albright, & Zvacek, 2012, pp. 220-221).

### **Background and Justification**

In response to the effects of the national economic downturn on the state of Florida, Florida’s legislature developed an overwhelming interest in developing Florida residents into talented individuals who are trained and ready to enter the workforce. Workforce Florida Inc. constitutes the principal workforce policy organization for the state and designs and implements strategies that aid residents in entering, remaining in, and advancing through the workplace, continually becoming more highly skilled and successful. This aids these Floridians, Florida businesses, and the entire state, and supports in emerging the state’s business outlook (Florida Legislature, 2013; s.

445.004(2) Florida Statutes).

**Legislation and governing bodies.** The 2009 strategic planning process, pursuant to s. 445.004, Florida Statutes, and at the direction of the Workforce Florida Board, commissioned its Strategy Council to commence a process titled *Creating the Strategy for Today's Needs and Tomorrow's Talent*. Updated in January 2010, one tenet of The Strategic Plan calls on Workforce Florida to ensure a speedy and effective formative process by creating a Talent Supply Chain Team for Florida as a way to train and certify Career and Technical Education (CTE) providers and counselors (Fairfield Index, Inc., 2011).

The Career and Professional Education (CAPE) Act (s. 1003.491 Florida Statutes) was formed by the Florida Legislature with the directive to attract and retain directed, high-value industries and to improve a knowledge-based economy. It pursues the reassurance that industry, workforce, education, and economic development partners in every municipality are collaborating to produce new and significant opportunities for students. The primary purposes of the Florida CAPE Act are to improve middle and high school academic performance by providing rigorous and relevant curriculum opportunities, as well as provide rigorous and relevant career-themed courses that articulate the postsecondary-level coursework and lead to industry certification. The CAPE Act supports local and regional economic development, responds to Florida's critical workforce needs, and provides state residents with access to high-wage and high-demand careers (Workforce Florida, Inc., 2010; s. 1003.491 Florida Statutes).

Workforce Florida, in partnership with the Florida Department of Education and the Florida Department of Economic Opportunity, annually supports and issues the state's Comprehensive Industry Certification List. This list is used by school districts in

planning and designing platforms that maintain regional economies. Additions to the list are deliberated for professions that are either tied to emerging industries or are in demand (Workforce Florida, Inc., 2010).

Career, Technical, Adult, and Community Education (CTACE) is the governing body within the Broward County Public School system that is responsible for the interpretation and implementation of the Florida state policies and statutes. In accordance with the Workforce Florida, Inc. s. 445.004 and the Strategic Plan, the school district of Broward county developed a Career and Technical Education (CTE) 5-year strategic plan that was implemented in 2008 and updated in 2013. *The 5 Year Strategic Plan for Secondary and Postsecondary Career & Technical Education in Broward County* is an essential portion of the District Strategic Plan Goal Areas and the National High School Reform Initiative. The CTE 5 Year Plan bring into line both federal and state legislation including the Elementary and Secondary Education Act, the Carl D. Perkins Career and Technical Education Act of 2006, and the Florida Career and Professional Education (CAPE) Act. The CTE 5 Year Plan, alongside the District Strategic Plan and legislative necessities, is enabling substantial changes in the distribution of instruction and possible outcomes for students of the CTE programs in Broward County (Florida Legislature, 2013; s. 1003.491 Florida Statutes).

The Career and Technical Education (CTE) 5 Year Plan seeks to ensure that all graduates are scholastically and technologically equipped for higher education and to enter the workforce, including apprenticeship-training programs. Additionally, students following the CTE course of study will receive a college-ready diploma that includes high rigor academics and a career and technical education program of study. Moreover, the student will receive a technical program certificate. Furthermore, students following

the CTE program will acquire postsecondary or college credits at recognized institutions of higher learning in the State of Florida, and one or more certifications recognized by business and industry (Florida Department of Education, 2013).

**Test of adult basic education.** The Workforce Investment Act (WIA), enacted by Congress in 1998, requires states to launch an inclusive accountability structure for adult general education programs. The WIA decrees that states must collect data on several core measures, including the educational advances of adult students. In order to meet this obligation, the United States Department of Education (USDOE) established the National Reporting System (NRS). In order to ensure that Adult General Education (AGE) programs in Florida are in compliance, the Florida Department of Education (FLDOE) has established the use of a statewide assessment tool that is standardized and has parallel forms for pre- and post-testing to determine educational gains (The School Board of Broward County, 2012).

The State of Florida requires every adult general education student to be pretested within the first 12 hours of instruction using proper testing procedure. The directive of this pretest is to determine the educational level in which the learner should be placed. The state also necessitates post testing to decide if a student has made an educational improvement and is ready to move to a higher level of instruction, complete a program, or go on to higher education (The School Board of Broward County, 2012). Rule 6A-6.014, *General Requirements for Adult General Education Program* (Florida State Board of Education, 2011) specifies that an initial academic skills valuation be administered to determine the initial operational level and for educational assignment.

The TABE is the state-approved and locally accepted assessment appropriate for administration to the adult student used to determine proper operational level and placement. The TABE is a battery of norm-referenced assessments designed to measure entry-level skills in order to place a student at the proper level in an ABE or AAAE program. In order to award the final ABE or AAAE Literacy Completion Points (LCP) in Math, Reading, and Language, the student must achieve a score of 8.9 or higher on the Level D or A of the TABE. An adult student who scores 5.9 or lower on the TABE must enroll in the ABE program, while a student scoring 6.0 or higher on the TABE places in the AAAE program (Council on Occupational Education, 2012).

### **Deficiencies in the Evidence**

According to Simonson et al. (2011) distance education is effective. However, further research in the variables unique to distance education and traditional education should be completed regarding populations other than adults enrolled in four-year university undergraduate and graduate programs. Little research has been conducted in K-12 education, career and technical education, impact of distance education on organizations other than universities, and the contribution of media to learning outcomes (Simonson et al., 2011). Research is continually conducted at the college level but little investigation of distance education has been conducted with adult students who take remedial courses in Adult Basic Education for Career and Technical Programs.

Within the last six years, Adult General Education courses have been offered in the form of distance education as well as the traditional classroom setting. A student scoring 5.0 or more literacy completion points, as determined by the Test of Adult Basic Education, has the option to complete AAAE or ABE coursework either online as a distance learner or in person using a more tradition classroom setting. Information is



incomplete regarding mode of instructional delivery and student achievement in remedial pre-technical adult education. Giguere (2009) states, “other institutions that make extensive use of independent study delivery should review their completion rate statistics...and research the suitability of Subject Matter and Course level classifications to optimize their course delivery platforms” (p. 67).

**Method of course delivery.** Giguere (2009) studied adult correspondence distance education courses with alternative online versions to increase course completion rates and to establish a strong online existence in a rapid and cost effective manner. The researchers were presented with the problem of course completion rates at British Columbia Open University (BCOU). Distance education course completion rates were low compared to traditional face-to-face courses. BCOU’s solution to this problem was to develop “course-twinning” to ensure that students who did not have access to, or did not wish to use online technology, reserved access to an equivalent off-line, print-based course version. By benchmarking BCOU online and off-line independent study course completion rates, the researchers assessed the impact of online delivery on independent study course completion rates and kept track of BCOU’s progress towards its goal of increasing course completion rates (Giguere, 2009).

The target population consists of students in academic areas who completed an independent-study distance education course in previous years at BCOU. Course completion rates were calculated for each course delivery method and stepwise linear regression was used with independent variables to identify which were most strongly associated with course completion (dependent variable). Results demonstrated that students with stronger academic abilities preferred online delivery. However, the researchers were not able to find evidence that student success with online course

versions was linked to demographic characteristics or academic ability. An important gap in the research that corresponds with the findings of Simonson et al., (2011) was that Adult Basic Education (ABE) course performance statistics were considerably lower than that of undergraduate and graduate students. This difference in performance adds to the body of evidence confirming the need for additional research conducted with remedial adult students who desire to enter a technical program. Giguere (2009) suggests, “Other institutions that make extensive use of independent study delivery should review their completion rate statistics in light of this study and research the suitability of Subject Matter and Course Level classifications to optimize their course delivery platforms” (p. 67).

**Student achievement in career and technical education.** Research in distance education in postsecondary career and technical education shows that community colleges are actively involved in the delivery of Career and Technical Education (CTE) through distance education to meet the needs of a diverse student body. Additionally, community colleges offer few CTE programs that are fully online (Benson et al., 2012). The researchers sought to determine how prominent distance education is in postsecondary career technical education, and which institutions and students participate in postsecondary CTE distance courses and programs. The researchers used qualitative descriptive analysis to conduct their research. It was determined that the least often cited reasons for offering CTE at a distance were reducing the institutions cost and having to replace existing campus-based courses (Benson et al., 2012). Again, the research lacked a determination of the success of remedial Adult Basic Education students who were preparing for career technical education coursework. The study focused on students who

were already enrolled in CTE.

### **Organizational Setting**

The Technical Centers of the school district in which the research will be conducted were established as area postsecondary technical centers within the state of Florida to offer technical education to both adults and secondary students in over 20 program areas. Industry-validated curriculum, accompanied by state of the art laboratories and equipment, were intended to meet current and future employment needs of Florida business and industry (Florida Department of Education, 2013-2014). The curriculum and specific applied laboratory proficiencies have enabled students to obtain, improve, and upgrade industrial skills on a full-time or part-time basis in day or evening classes (Florida Department of Education, 2011).

The technical center's "mission is to provide a safe and secure environment which fosters individualized focus, technical preparation and successful transition into postsecondary work or study" (Council on Occupational Education, 2012, p. 5). Studied technical schools strive "to instill the attitudes and skills necessary to produce motivated, self-sufficient individuals who are able to function effectively in our every-changing complex society" (Council on Occupational Education, 2012, p. 5).

### **Audience**

The stakeholders of Adult General Education associated with the research sites including the Director, Assistant Director of Adult Education, Adult Education Department Chair, Adult Admissions Director, and Coordinator of Distance Education, have expressed a need for an evaluation of current distance and traditional education delivery modes of the Applied Academic Adult Education and Adult Basic Education program coursework. The information attained as a result of this study is paramount for

stakeholders to evaluate and update current best practices used in the education of AGE students. Additionally, the information gained as a result of this study could aid other educational institutions in evaluating, updating, and implementing distance educational ABE and AAAE programs.

### **Purpose of Study**

The purpose of this quantitative correlational study is to determine to what extent, if any, a relationship exists between the predominant variables common among successful students who complete remedial adult basic education (ABE) coursework in either online or traditional classroom modes of course delivery. The focus of this study is to address the gap in the current knowledge base regarding successful distance educational settings for adult career and technical education (CTE) students who require remedial coursework. Furthermore, this study may help others develop and revise related adult and technical education policies.

### **Definition of Terms**

The following terms are relevant to the context of this study.

**Adult basic education (ABE).** This term means a student in adult basic education programs. The Adult Basic Education program helps remediate basic skills in Reading, Math, and Language for students preparing to enter a technical career or a General Education Diploma. The program is designed for adult students performing below sixth (6th) grade level. Once the student has met sixth (6th) grade level they will advance to Applied Academics for Adult Education. Adult Basic Education is an individualized self-paced program (U.S. Department of Education, 2007-2008).

**Adult general education (AGE).** This term means instruction below the postsecondary level for individuals who have attained 16 years of age; who are not

required to be enrolled in secondary school under State law; and who lack sufficient mastery of basic educational skills (U.S. Department of Education, 2007-2008).

**Applied academic adult education (AAAE).** The Applied Academics for Adult Education program is designed to remediate basic skills in Reading, Math, and Language for students preparing to enter a technical career. The program is designed for adult students performing above sixth (6th) grade level. Once the minimum basic skills standards are achieved, the students may enroll in their technical program. Applied Academics for Adult Education is an individualized self-paced program (U.S. Department of Education, 2007-2008).

**Career and technical education (CTE).** Career and technical educational programs are aligned with business and industry standards (Florida Department of Education, 2013-2014).

**Distance education.** Simonson and Schlosser (1995) offered a comprehensive definition of distance education:

Distance education implies formal institutionally-based educational activities where the teacher and student are normally separated from each other in location but not normally separated in time, and where two-way interactive telecommunication systems are used for sharing video, data, and voice instruction. (p. 13)

**Test of adult basic education (TABE).** A tool used in adult basic education and career technical education used to evaluate student academic skills (CTB/McGraw-Hill LLC, 2004).

## **Summary**

This study was determined significant and relevant to current trends, needs, and

demands in education today due to the lack of evidence within the existing body of published literature on the subject of remediation of adult general education students who want to pursue career technical education, and as a result of personal communication with educational leadership in a large and diverse school district in the state of Florida. The focus of this study is to determine to what extent a correlation exists between the mode of instructional delivery and impact on learning gains of students enrolled in Adult General Education coursework.

The problem then is to determine if one or more common characteristics are prevalent in Adult General Education (AGE) students who demonstrate the greatest amount of learning gains after completion of AGE coursework as determined by pretesting and post-testing of the student by the norm-referenced TABE, and if those advantageous characteristics are unique to the student's choice of mode of course delivery.

The purpose of this quantitative correlational study is to determine to what extent, if any, a relationship exists between the predominant variables common among successful students who complete remedial adult basic education (ABE) coursework in either online or traditional classroom modes of course delivery. The intent of this study is to address the gap in the current knowledge base regarding successful distance educational settings for adult career and technical education (CTE) students who require remedial coursework. Furthermore, this study may help others develop and revise related adult and technical education policies.

## Chapter 2: Literature Review

Since the start of the new millennium, interest in distance education has grown significantly. Annual reports published by the Sloan Consortium since 2003 attest to the flourishing popularity of online courses and programs in postsecondary education. In the fall of 2003, scarcely 10% of the students attending 2-year or 4-year institutions in the United States were taking an online course (Allen & Seaman, 2013). By the fall of 2009, the figure was close to 30%, with dramatic increases reported for every year. A constant trend emerged that every year the growth rate for online enrollments far exceeded the expansion of higher education in general (Allen & Seaman, 2003, 2008, 2013). Although it appeared for a while in 2007 that the growth rate of online enrollment was tapering off, it rebounded again, with a growth rate of 21% in 2009 compared to the overall growth rate for higher education that year of less than 2%.

One presumed reason for the recent upsurge in online education was the economic recession, which was expected to generate increasing online enrollment, particularly in institutions that offer programs for working adults (Allen & Seaman, 2008). While this prediction turned out to be accurate, the increase in postsecondary enrollments was not limited to any type of educational institution or to online education, although online programs and courses still procure the bulk of the growth. According to college officials, the demand for face-to-face courses and programs increased by almost 50% and for online programs and courses by 75% (Allen & Seaman, 2013).

Community colleges are in the forefront of distance education, consistent with their mission to expand educational opportunities to all individuals, especially those who might not otherwise be able to pursue their educational and career goals (Allen & Seaman, 2007, 2008, 2013; Liu, Gomez, Khan, & Yen, 2007). With a high proportion of

students in need of remediation, community colleges are also the most likely to offer remedial courses online (Johnson, 2009). However, very few studies explore the effectiveness of online adult remediation programs. Remediation in the form of adult basic education (ABE) and applied academic adult education (AAAE) are the prerequisites for Florida students entering a technical education program who lack the skills necessary to succeed, academically.

Similarly, while community colleges also offer a variety of programs in career and technical education (CTE), research on distance education for teaching CTE courses is limited (Benson et al., 2005; Johnson et al., 2004). Although the site of this study is not part of the Florida community college system, the lack of research on distance learning for either adult general education programs or CTE programs makes it necessary to extrapolate from research conducted in other settings. The adult learners who comprise a substantial proportion of community college students represent the most demographically similar population to students who enroll in the CTE programs at the Technical Centers, which offer industry-validated courses in more than 20 program areas.

Furthermore, meta-analyses of studies of distance learning disclose remarkably similar outcomes across different student populations (Zhao, Lei, Yan, Lai, & Tan, 2005). The outcome of distance education depends upon characteristics of the student, the instructor, and the course design (Harrell, 2008; Li & Irby, 2008). Some students are more likely to persist and perform well in online courses than others (Cross, 2008; Harrell, 2006, 2008). However, the attributes of a successful learner can be found in students in all program types. In fact, the one factor that continually emerges as a predictor of online success is age, with adults having the advantage over traditional age students. Offering remedial education courses online can help adults surmount obstacles



to achieving their career goals such as competing demands on time, work and family responsibilities, transportation and parking, and childcare (Carpenter, Brown, & Hickman, 2004). In addition, the online courses provide adult learners with opportunities to sharpen their technology skills and become part of a learning community.

### **Documentation**

To obtain literature relevant to this review, searches were conducted of the following EBSCO databases: Academic Search Premier, MasterFILE Premier, Business Source Premier, ERIC, PsycINFO, and PsycARTICLES. Keywords used either individually or in conjunction include: adult general education, adult basic education, remedial education, developmental education, distance education, distance learning, online learning, online courses, technology, training, career and technical education, community colleges, adult learners, andragogy, students, teachers, instructors, academic, achievement, performance, motivation, and learning environment. The following section will provide background information on the evolution of distance education.

### **Theoretical Frameworks**

**Andragogy and experiential learning.** Perhaps the most common characteristic of adults (age 25 and older) pursuing vocational or associate degrees as first-time students is that most are unprepared for the experience and many are lacking in basic skills (Chaves, 2006). Indeed, these students are the focus of this study. Chaves advocates synthesizing Knowles' (1990) principles of andragogy with Kolb's (1984) experiential learning theory in order to provide adult learners with "a dialectical learning experience where students' old knowledge and experiences are used to create new knowledge and application, which can then lead to greater involvement, personal significance, and a heightened sense of commitment" (Chaves, 2006, p. 151). Chaves has the ambitious goal

of transforming adult education entirely. He views Kolb's (1984) experiential learning as a key to transcending the gap between Tinto's (1993) theory, which was originally formulated for traditional age students in residential 4-year colleges and universities, and the social and academic integration needs of adult learners (Chaves, 2006). While there is some debate over the applicability to Tinto's (1993) theory to nontraditional and online students, there is virtually no dispute of the importance of academic and social integration in the persistence of students regardless of demographic or academic characteristics.

**Learning communities.** Tinto's recent work has focused on learning communities, which have documented success in promoting the educational advancement of ethnically diverse, low-income, first generation, and academically underprepared community college students (Barbatis, 2010; Engstrom & Tinto, 2008). A hallmark of learning communities is that they synthesize academic and social integration. According to Wilmer (2009), who explored the effectiveness of learning communities for developmental English students, the powerful sense of community that developed among the students and between the students and instructor can be especially critical for underprepared students "who need the security of a welcoming, emotionally safe environment as they transition into their first college experience" (p. 64). Wilmer's statement is reminiscent of the mission statement of the district Technical Centers (Council on Occupational Education, 2012). McGivney (2004) favors supportive learning groups with strong tutorial assistance for promoting persistence among adult learners.

For academically underprepared students, learning communities have an advantage even apart from the academic and social support they offer the students: they do not carry the stigma attached to remedial courses (Engstrom & Tinto, 2008). There is compelling evidence that the more intensive and extensive the learners' needs for

remediation, the lower the probability that they will successfully complete the requisite remedial coursework (Bahr, 2007; Bettinger & Long, 2005). One proposed explanation for this phenomenon is that placement in a low ability group has a negative impact on students' self-perceptions, their perceptions of the subject matter, and consequently, their academic outcomes (Bahr, 2007). By implication, one might surmise that "the lower a student's placement in the remedial hierarchy, the greater the stigma attached to that placement" (p. 699). Thus being placed in a course with "Basic" in the title would be more stigmatizing than, for example, being assigned to Intermediate Algebra.

The negative impact of stigma is recognized and in fact, some institutions label courses to mask the student's remedial status (Bahr, 2007). Bahr considers most explanations for the problems experienced by students with multiple basic skills deficits to be too simplistic and instead has created a model based on the interaction of deficits in reading and mathematics. However, this line of research highlights the challenges faced by students with deep, multiple skills deficiencies, and the lack of clear understanding of how to meet their remedial needs.

With respect to the learning community model, DiRamio and Wolverson (2006) raise the question of how to effectively integrate learning community principles into online education. Indeed, creating a sense of community online is a persistent but often elusive goal. Harrell (2008) is a strong advocate of learning communities for fostering a sense of community among online learners. DuCharme-Hanson and Dupin-Bryant (2005) stress the importance of building a sense of community in planning courses for online adult learners. DiRamio and Wolverson (2006) devised a diagnostic tool for evaluating the extent that online courses incorporate learning community principles. The tool is divided into the three components of Connections, Experience, and Responsibility, with

evaluative statements outline for the students and the instructor for each category. A connection is the essential element for forging a sense of community in the online learning environment. Experience is consistent with Kolb's (1984) experiential learning. Virtual tours and online simulations are examples of Experience in online learning (DiRamio & Wolverton, 2006). Responsibility denotes "motivation and maturity, students being responsible for their own learning, and empowered to learn in a manner that is best for them" (DiRamio & Wolverton, 2006, p. 109). Responsibility is highly congruent with Knowles' (1990) theory of andragogy and thus is especially relevant to the situation of adult online learners. Deci and Ryan's (2008) self-determination theory is often invoked in relation to distance learning and has been applied to distinguishing characteristics of online students from traditional classroom students (Wighting, Liu, & Rovia, 2008). Students who are higher in intrinsic motivation are more apt to succeed in online courses. While more intrinsically motivated students may be more attracted to online courses and more disposed to persist, it is also possible to design a virtual learning environment with features that stimulate and reinforce intrinsic motivation to learn.

Schuetz (2008) used Deci and Ryan's (2008) theory as a basis for creating a theory-driven model of community college student engagement. The model, which was tested on adult and non-adult student samples, is based on the premise that students who experience a powerful sense of belonging, competency, and autonomy will be more engaged and therefore, more likely to persist. Belonging, competency, and autonomy are all integral features of the learning models proposed by Chaves (2006), McGivney (2004), and DiRamio and Wolverton (2006). Although the authors approach the issue of meeting adult learners' needs from different perspectives, they all recognize that certain characteristics, which can be encouraged, supported, and reinforced by the learning

environment, are all important to the learning experience of adults.

**Persistence and dropout in online courses.** Liu et al. (2007) conducted an extensive review of theoretical and empirical literature to examine the factors involved in community college students' decisions to drop out of online courses. Their goal was the development of a framework that could be used to guide a comprehensive retention strategy. The theoretical models included those of Tinto, Bean, and Kember, and the studies were drawn from research on attrition from traditional and online courses. Motivational factors such as self-regulation, self-efficacy, and goal orientation were among the foremost contributors to the students' persistence or withdrawal from online courses. Competence and autonomy, two of the three pillars of Schuetz's (2008) model of engagement, are derived from motivational theories.

Also included in the review undertaken by Liu et al. (2007) were surveys from 30 community colleges that utilize self-assessment questionnaires designed for early identification and intervention for students at risk for dropping out. There were certain common factors across the various surveys. Those factors under the students' control were organized into four main categories: psychological, technological, social, and other. Cross (2008) is critical of the surveys commonly used to assess students' readiness for online coursework for lacking a sound empirical basis. According to Puzziferro's (2008) research, these skills are irrelevant to online learning success. Paradoxically, Harrell (2006) found that students with more computer expertise were more likely to withdraw from online courses. One plausible explanation, based on the students' relatively high self-assessments, was that some students overestimated their proficiency. Another explanation is that the students with the greatest degree of computer experience were using technology for activities unrelated to their coursework when they should have been

devoting time to their studies. Although both reasons are speculative, Harrell (2008) considers proficiency with technology an important factor in understanding persistence in online learning. Participants in student and faculty focus groups support the claim that students might be adept with technology but not necessarily in ways that support their learning (Center for Community College Student Engagement, 2009). Their opinion is that educational institutions “should not assume that students—even the Net Generation—understand how to use the technology they need for an online course” (p. 9).

Liu et al. (2007) synthesized the psychological, technological, and social factors derived from their research into a framework for informing institutional policies and practices for boosting retention in online courses. The multifaceted model encompasses early identification via learner assessment; targeted, continuous intervention including the development of effective blended learning programs; psychological counseling and advising; available, prompt technical support; and the development of social and learning communities. For the last element, the framework of Liu et al. could be used in conjunction with the diagnostic tool designed by DiRamio and Wolverton (2006).

**Readiness for online learning.** Ideally, the early identification of students in need of assistance to complete online courses should be conducted before the students enroll in the course and appropriate help provided to prepare them for success in the course (Harrell, 2008). Cross (2008) examined the characteristics of adult learners from three community colleges to discern whether there was a specific profile that could credibly predict persistence in online courses. A panel of experts analyzed a pool of 100 questions drawn from existing readiness surveys and 40 questions were devised from their evaluation. The questions were divided into four dimensions: technical knowledge,

reading as a preferred mode of learning, social needs, and self-discipline. The students were assessed at four intervals: the first week and subsequently at weeks 4, 7, and 10. The analysis revealed significant differences between the students who persisted and those who withdrew from the course on the four dimensions covered by the questionnaire.

In attempting to determine characteristics linked with the persistence of community college students in online courses, Harrell (2006) focused on learning style, locus of control, computer experience, prior online experience, and demographic characteristics. The research was conducted in Florida community colleges, with one institution used for the pilot study and five additional campuses used for the complete study. Out of 25 possible factors, three proved significant in predicting persistence. Locus of control was not a significant factor, nor was it significant in other research involving a large sample of students from 18 online course sections (Levy, 2007). As previously stated, computer experience was inversely related to persistence, though the reason for this seemingly contradictory finding is speculative (Harrell, 2006). Higher GPA was positively linked with persistence. GPA has been associated with persistence in other research on online learning (Aragon & Johnson, 2008) and has been central to persistence research for decades (Tinto, 1993). By implication, this common finding should signify the need to carefully analyze the effectiveness of distance learning for students in need of intensive remediation. However, Porter (2004) found that students at the basic and intermediate levels were most successful in the distance learning courses. Motivational factors, which are integrated into the model proposed by Liu et al. (2007), may be especially important for adults with limited skills who decide to pursue vocational training.

The third important factor identified by Harrell (2006) was auditory learning style, which was inversely related to persistence in online coursework. It is not difficult to understand why students who perform better in processing verbal rather than visual information might be frustrated by a medium where information is communicated through writing. Harrell noted that a previous study reported that students' who felt their learning styles were not congruent with the virtual learning environment were more prone to anxiety and less likely to succeed in the course. Chaves (2006) advocates paying more attention to learning styles in adult learning. Zavarella and Ignash (2009), who conducted one of the few studies of distance learning in remedial education, argue that learning styles should play a more prominent role in studies of online learning. However, Zavarella and Ignash utilized a different learning style assessment than did Harrell (2006), which precludes comparison.

Harrell (2006) recommended providing targeted intervention for students who might be at risk for withdrawing from online courses, which also heightens the risk that they will not complete their degree or certificate program. Harrell (2008) subsequently identified five sets of factors that affect the success of online students: student readiness, student orientation, student support, preparation, and support of instructors, and course design. The first factor covers student characteristics such as self-efficacy, locus of control, and technological expertise. These attributes can be developed through the other four factors, which all refer to mechanisms within the control of the educational institution. Harrell (2006) made a point of stating that online students may be pursuing a certificate or a degree, or taking courses for their own enrichment, consistent with Bahr's (2010) typology of community college students. Students enrolled in career and technical education programs are neglected in research and especially in research on the topic of



online learning.

### **Evolution of Distance Education**

Distance education today has its roots in programs that began more than 150 years ago. In North America the Pitman Shorthand training program began in 1852 where dissemination of learning materials, assignments, and assessments were disseminated via the United States Postal Service. Across the Atlantic, the same correspondence program was introduced in 1858 by the University of London (Casey, 2008; Power & Gould-Morven, 2011). Women taking secretarial correspondence courses comprised the majority of the early distance learners in the U.S. They were joined by more men in 1890 with the inception of a delivery system for teaching mine safety, an enterprise that became the International Correspondence Schools (ICS), which offered training for railroad and iron workers as well as miners (Casey, 2008). By 1923, the ICS had more than 2.5 million students (Casey, 2008). In 1892, the University of Chicago became the first institution to offer a college-level correspondence program.

With the advent of radio broadcasting in the 1920s, the field of distance education gained the power to expand the delivery of instruction far beyond classroom walls and provided distance students with the means of hearing their instructors' voice (Casey, 2008). The Universities of Minnesota, Wisconsin, and Salt Lake City were granted the first educational radio licenses in 1921, making them pioneers of radio classes in the U.S. Within two years, more than 10% of all radio stations were owned by educational institutions for the purpose of providing educational programming but by 1940 there was only one radio course offered for college credit. However, the radio classes had paved the way for the new medium: television. The University of Iowa broadcast the first television courses in 1934. Televised courses increased in the 1960s when the FCC created the

Instructional Television Fixed Service (ITFS) in 1963. The ITFS consisted of 20 channels that offered to educational institutions on a subscriber basis, a low-cost, fixed range medium for the provision of educational programs. California State University system was the first educational system to apply for a license, followed in 1964 by the University of Wisconsin, one of the innovators in radio classes.

The University of Wisconsin was also an innovator through its development of the Articulated Instructional Media (AIM) Project, which was created to systematically identify, classify, and publicize best practices in designing and packaging multimedia instruction for independent learning (Casey, 2008). Part of AIM's legacy is that it served as a blueprint for Britain's Open University, authorized by Royal Charter in 1969 and in the 21st century, the provider of 21% of higher education in England. The Open University is renowned as a model for distance education and has made a substantial contribution to the sizable body of literature on distance education. The scholarly literature abounds with studies from Open University programs in Hong Kong, Israel, France, Italy, Portugal, Greece, Belgium, Luxembourg, Malaysia, Germany, and the Netherlands. Ironically, the U.S. is one of the few countries where the Open University model failed to attract a large following. The U.S. Open University was short-lived, closing in 2002 due to insufficient enrollments and revenues.

Distance education was transformed in 1971 when Intel Corporation created the first microprocessor (Casey, 2008). For instructional purposes, radio and television are limited by one-way communication with no mechanism for interaction. In addition to the use of the telephone, the computer represented "the missing piece of the educational puzzle" with the capacity to enable "the free flow of information between teacher and learning as well as introduce the previously absent interpersonal aspects of

communication” (Casey, 2008, p. 47). The dynamic capabilities of computer-mediated learning were further advanced by the development of the World Wide Web in 1991. With its ability to transcend geographic and temporal boundaries, asynchronous communication provided unparalleled opportunity for the growth and expansion of distance education.

A decade later, in 2002, the Sloan Consortium began documenting the proliferation of online courses and programs offered by 2-year, 4-year, and graduate institutions throughout the U.S. (Allen & Seaman, 2007, 2008, 2013). A substantial majority (70%) of the college officials surveyed stated that there was competition for students in online courses and programs, and the competition continues to escalate. Virtually all the institutions regard the expansion of online course offerings as an essential element of their strategic plan for the future. This is especially true of institutions with courses and programs that appeal to working adults.

Beyond the remarkable growth of online education, a consistent and striking finding is the high satisfaction of students who enroll in online courses (Allen & Seaman, 2007, 2008, 2013). College officials have been more circumspect in endorsing online education. However, a sizable majority agrees that online courses provide students with a high quality learning experience. In 2003, 57% of college leaders rated the learning outcomes of online courses as equivalent or superior to traditional classroom instruction. The overall picture is of an inexorable upward trend for the appeal of distance education courses, especially among adults.

Educational institutions that offer multiple modes of course delivery are faced with a paradoxical situation: While online courses are generally the first to fill during registration, they also have the highest rates of attrition (Power & Gould-Morven, 2011).

College officials cite students' lack of self-discipline as the paramount obstacle to the expansion of online education (Allen & Seaman, 2013). However, it can also be argued that the institutions fail to provide students with supports that would help them succeed in the less structured online learning environment. Course design and delivery are critical elements in the effectiveness of online instruction (Diaz & Entonado, 2009; Li & Irby, 2008). Surveys designed to assess the readiness of prospective students can be easily administered, and appropriate intervention provided in areas such as technology skills or self-regulation skills (Cross, 2008; Harrell, 2006, 2008). Technical difficulties heighten the probability of attrition in online courses and interfere with the learning experience of even the most technically proficient students (Sitzmann, Ely, Bell, & Bauer, 2010).

The Sloan Consortium classifies courses according to the amount of content presented online (Allen & Seaman, 2013). In a traditional class, no course content is delivered online. All material is presented in the classroom. In web-facilitated courses, from 1% to 29% of the content is delivered online. Some courses make use of a course management system while others simply provide web pages for posting the syllabus and assignments online. For the purpose of this chapter, the terms *traditional class*, *face-to-face class*, and *on-campus class* (or course) will be used interchangeably. Based on the Sloan typology most courses would fall under the heading of web-facilitated courses, at least by virtue of posting course syllabi online. The third category, blended or hybrid courses, combine online and face-to-face delivery methods with 30% to 79% of the course content delivered online. Distance education career and technical education courses might best be called hybrid courses because they include a hands-on skills training component (Benson et al., 2005). However, while online CTE students are typically offered access to on-campus laboratories, the hands-on component takes the

form of an apprenticeship or internship whereby students work in the field. Online courses are defined by their delivery of at least 80% of the course content over the Internet (Allen & Seaman, 2013).

As the broad ranges indicate, there is a substantial degree of variation with each category. As in on-campus courses, there is a great deal of variation in the teaching styles of individual instructors. As educational institutions are engaged in expanding their online course offerings, a persistent barrier has been the resistance of many faculty members to teaching courses online (Allen & Seaman, 2007, 2008, 2013; Li & Irby, 2008). Records of course retention and attrition rates reveal that some instructors appreciate high rates of retention while others may have unduly high rates of attrition (Gorsky & Blau, 2009). Instructor proximity, based on the theory that instructors' verbal and nonverbal interactions play a powerful role in shaping students attitudes toward the course and subsequent learning outcomes is a particularly important concern in the virtual learning environment where there is no face-to-face contact (DuCharme-Hansen & Dupin-Bryant, 2005). To DuCharme-Hanson and Dupin-Bryant, instructor immediacy behaviors humanize the online learning experience. Knowledge of what makes an instructor effective in engaging and retaining students in the course provides a useful tool for improving the quality of online instruction.

There are ongoing efforts to improve workforce skills by combining adult basic education with career and technical education (Illowsky, 2008; Jacobs, 2004). Postsecondary institutions are also acutely aware of the increasing numbers of students who enter their programs lacking adequate skills in reading, writing, and mathematics. Mandatory testing and placement of entering students, tutoring, and requisite remedial or developmental coursework have the most powerful impact on retention in community

colleges (ACT, 2010). Students with basic skills deficits have the highest risk for dropping out (Bahr, 2007). The Center for Community College Student Engagement (Center for Community College Student Engagement, 2009) advises that institutions seeking to invest in online remedial and developmental courses employ a data-driven approach to determining their effectiveness. At present, the effectiveness of online courses for teaching adult basic education students is virtually unknown.

### **The Question of No Significant Difference**

In a book with the same name, Russell (1999) introduced the concept of the no significant difference phenomenon, which has since become ingrained in the lexicon of distance education literature. Russell's comprehensive analysis of distance education begins with a 1928 doctoral dissertation on correspondence courses and ends with research on instruction delivered over the Internet. His conclusion was that there was no significant difference in learning outcomes between distance education and traditional face-to-face classroom instruction. However, distance learning has improved and expanded tremendously since the last study in Russell's work was conducted in 1999. A meta-analysis of research on distance education documented that the outcomes of distance education programs improved markedly in studies published after 1998 (Zhao, Lei, Yan, Lai, & Tan, 2005). A more recent meta-analysis and review of research on online learning conducted by the U.S. Department of Education (U.S. Department of Education, 2010) and covering 50 effects found that on average, students in online courses performed somewhat better than their counterparts who enrolled in traditional classes.

The USDOE review forms part of a more extensive research project on online learning conducted by SRI International for the Policy and Program Studies Services of

the USDOE (2010). The overarching goal of the project is providing policy makers, education administrators, and teachers with empirically based guidance for implementing online learning in K-12 education and teacher preparation. One thing the researchers did not anticipate was the miniscule number of studies involving K-12 students.

Consequently, their research review and meta-analysis was based on studies of older learners, spanning a gamut of programs drawn from higher education, career technology, medical education, corporate training, and military training. While the researchers acknowledge that caution is warranted in generalizing the findings from these settings to K-12 students, they view their findings as having definite implications for the development and design of online programs beyond their original setting. Based on that premise, the studies selected for review in this chapter seem sufficiently suitable for applying to students enrolled in adult general education courses as preparation for career and technical education. Adult learners represent a substantial proportion of the participant samples in studies of distance learning.

Zhao et al. (2005) and the USDOE (2010) both reached a common conclusion, namely that blended courses constitute the most effective mode of distance education. The USDOE (2010) study (which excluded any research where the technology was not web-based instruction) reported a mean effect size of +0.35 favoring blended learning compared to traditional classroom instruction, far exceeding the +0.05 effect size for studies comparing exclusively online instruction to exclusively face-to-face instruction. However, it is important to note that the authors of the USDOE study clearly state that students in blended courses devote significantly more time to their coursework than those students who take the same course in a purely online or traditional classroom setting. Therefore, a student who spends more time engaged in coursework, regardless of course

delivery process, will show a greater level of understanding of course material.

Regardless of the method used to educate the student, the learning outcomes represented the “no significant differences phenomenon” assuming that the time spent on learning the material by the student is held constant.

According to the USDOE (2010) report, the effect sizes were larger for studies involving collaborative or instructor-directed online instruction than for studies where online students worked independently. There is abundant evidence that many students lack the self-discipline and self-regulation skills essential to success in the virtual learning environment (Allen & Seaman, 2007; Cross, 2008; Harrell, 2006, 2008; Li & Irby, 2008; Puzziferro, 2008). Online career and technical education (CTE) courses are highly structured, which appears to be a factor in their success (Benson et al., 2005). The instructor can provide students with excellent motivation, or alternately undermine the learning experience so they are inclined to drop out of the course (Gorsky & Blau, 2009). Two types of instructors are considered ideal candidates for teaching online classes: those who are fully comfortable with the technology and those who enjoy taking risks and expanding the boundaries of education (Li & Irby, 2008).

Power and Gould-Morven (2011) advocate BOLD (blended online learning design), which “implements a fully online, combined synchronous- and asynchronous-based learning environment with advanced knowledge-sharing and - creation tools,” thus providing students with access to “a community learning experience as well as 24/7 accessible resources” (p. 29). The repertoire of technologies available for integration into distance learning is continually expanding. BOLD may well represent the future of online learning. For the present, it is illustrative that improvements in learning outcomes have concurred with advances in technology (Zhao et al., 2005). It is also important to



recognize that while meta-analysis is valuable for its scope, there are numerous variations in the outcomes of individual courses and programs. Regardless of setting, educational outcomes depend upon the interplay of characteristics of the students, the instructor, and the learning environment. Adult general education courses represent a relatively novel setting for studying the effectiveness of online instruction.

### **Adult Education**

The decisive trend in adult education is linking adult basic education with career training enabling workers with minimal skills to increase their earning power and have a secure future in a labor market where the demand is for workers with increasingly sophisticated skills and competencies (Illowsky, 2008; Jacobs, 2004). Notable examples include Northern Virginia Community College, which collaborated with local medical facilities to align adult basic education with Allied Health degree programs, and the Community College of Denver, which transformed a failing city job training program for entry level healthcare workers into a successful curriculum producing college-ready workers (Jacobs, 2004). The mission of the Technical Centers being studied is aligned with the goals of those programs. The Center's mission is "to provide a safe and secure environment which fosters individualized focus, technical preparation and successful transition into postsecondary work or study" (Council on Occupational Education, 2012, p. 5). The programs are designed with the aim of indoctrinating "the attitudes and skills necessary to produce motivated, self-sufficient individuals who are able to function effectively in our every-changing complex society" (Council on Occupational Education, 2012, p. 5).

Over the last 10 years, efforts to transform adult basic education have been marked by increasing emphasis on program accountability, the expansion of program

options, and a greater degree of program flexibility (Porter, 2004). According to Porter, these changes should inspire the states to explore the use of distance learning as part of their programs. This was the case in California, the site of Porter's study and in Florida, the site of the present study. However, given the dearth of published research, the success of such programs is uncertain. On the one hand, distance learning is extremely advantageous for adults with work and family obligations and adults tend to do well in distance course. On the other hand, skills deficits, especially in reading, may be an obstacle in the online learning environment where a preference for reading as a learning mode increases the probability of success (Cross, 2008). According to Porter (2004), adult educators tend to be skeptical of the efficacy of distance learning for students in adult basic education.

**Distance learning programs.** Porter (2004) described the bulk of adult education instruction as "classroom centered, but not necessarily learner centered" (p. 150). Learner centered instruction is central to Knowles' (1990) model of andragogy. Knowles based his vision of andragogy on four key assumptions of how adults learn. First, adults exhibit a preference for self-directed learning. Second, adults bring with them to the learning environment a wealth of experience; therefore, they learn most effectively through experiential strategies. Third, adults are attuned to specific learning needs that arise from real life events. Fourth and finally, adults are competency-based learners who want to gain knowledge or skills they can put to practical use. CTE distance courses appear to be built on these principles, though they are still largely instructor centered (Benson et al., 2005). Knowles may have been somewhat naive in his assumption that adults are self-directed learners. However, it is probably appropriate to say that most adults prefer some degree of autonomy and independence. This may be especially true of adults who opt to

take courses online, although in some cases the decision may be driven by necessity rather than personal preference (Harrell, 2008; Li & Irby, 2008).

The massive California Community Colleges (CCC) system is the site of a good deal of research on developmental, remedial, and distance education. Some 70% to 80% of students entering the CCC require remediation in reading, writing, or mathematics, or need English as a second language (ESL) coursework as a prerequisite for an associate degree or vocational certificate program (Illowsky, 2008). The California Basic Skills Initiative was developed to meet the need of students whose proficiency in language and mathematics falls below the designated levels. Porter's (2004) study of distance learning for adult basic education students grew out of the California Basic Skills Initiative. The study is based on the California Distance Learning Project (CDLP), which evaluated the students' progress and learning gains over three program years to determine the effectiveness of two programs. The data were drawn from two sources and compiled by the Comprehensive Adult Student Assessment System (CASAS) and covered all five CASA ABE/adult secondary education (ASE) reading levels.

A caution about the study is that most of the distance learning activities were "low tech," primarily involving video checkout (79%). Telecourses accounted for roughly 7% of instruction and online instruction accounted for 13.5% of instruction (Porter, 2004). As online instruction proliferated, outcomes for distance learning improved (Zhao et al., 2005). Furthermore, ABE students comprised less than 2% of the students, who were overwhelmingly enrolled in ESL courses (Porter, 2004). Nonetheless, the students enrolled in the distance education courses made substantial gains, with the strongest effect observed among students in the beginning ABE and ESL courses. A notable finding is that learners with lower level skills and from underserved groups comprised the

majority of students taking the distance education courses. Porter cites the flexibility of distance learning as a major selling point for establishing distance learning as a viable option for adult education. Each program adopted its own unique approach, ostensibly tailored to the needs of the learners and the resources of the program. In addition to being effective for advancing the students' skills, Porter noted that the programs were also cost efficient. Some had been in operation for 8 years and they would have suspended their operation if they were not. It seems probable that a more recent study would find online instruction the dominant mode of course delivery. However, as the USDOE (2010) researchers concluded, albeit with caution, the findings of online learning studies seem to be applicable across settings.

Community college students enrolled in vocational programs (nontransferable credit certificate or degree programs) represent only a small proportion of students but they are more likely than the student population as a whole to earn their intended degree (Bahr, 2010). On the other hand, students in associate degree programs have high rates of attrition. In response, the institutions provide an array of services and supports, with placement in appropriate courses based on assessment at the center (ACT, 2010). Institutions with intensive investment in distance education have a powerful incentive to determine the most effective strategies for curbing their high rates of attrition. What appears to be lacking is a sound theoretical framework for understanding persistence in adult learners and in students enrolled in online courses. Tinto's (1993) interactional model remains the most popular model for examining student persistence and serves as a basis for newer and more sophisticated theories that take into account the increasing numbers of adults and online learners in postsecondary education.

## **Career and Technical Education**

Community colleges play a prominent role in workforce preparation and play a central role in the development of a skilled workforce whose competencies match the demands of business and industry (Johnson, et al., 2004). Indeed, community colleges are known for adaptability that enables them to respond to ever changing demands. The accelerated expansion of online course offerings by community colleges underscores their powerful role in shaping the 21st century workforce (Allen & Seaman, 2007, 2008, 2013). However, despite their enthusiastic acceptance of technology driven learning, Johnson et al. (2004) noted that there was actually minimal knowledge of the impact of advanced technologies on CTE.

The first nationwide survey of community college distance learning career and technical education (CTE) programs was conducted in 2002-2003 (Johnson, et al., 2004), concurrent with the time frame of the first Sloan Consortium online education survey (Allen & Seaman, 2013). More than three-quarters of the institutions responding to the CTE survey had implemented distance learning CTE courses (Johnson, et al., 2004). The institutions were asked to cite exemplary CTE distance learning courses they offered and analysis of the information disclosed skill-based distance education in a vast range of fields ranging from electronics, computers, and technology, to hotel and hospitality management, to agriculture. By analyzing information presented on the websites of the exemplary programs, the researchers identified three models employed to deliver skills training: on-campus training, a blended model where the students received hands-on training in a campus laboratory; internships or clinical experience in which the students work under authorized supervision; and virtual skills training provided via computer simulation.

Benson et al. (2005) further explored the nature of online career and technical education (CTE) and compared them with on-campus courses in a study that arose in response to the scarcity of research on the effectiveness of providing CTE courses via distance learning. The two types of courses were compared on three key indicators: students' performance and skill development, students' motivation and learning strategies, and course structure, interaction, support, and transactional distance, defined as the perception of closeness to the instructor and the program. The participants in the mixed methods study were 193 students (112 on campus and 81 online) in five courses offered by three community colleges. The three programs were Funeral Service Education (FSE; Embalming II and Advanced Restorative Arts), Veterinary Technology (VT; 2 laboratory courses attracting relatively experienced students), and Landscape and Horticultural Technology (LHT). The instrument utilized was the Motivated Strategies for Learning Questionnaire (MSLQ), with the motivation segment administered at the onset of the semester and the learning strategies segment, along with the Course Interaction, Structure, and Support (CISS) questionnaire administered at the end. Other sources of information included the students' demographic and academic data, teachers' evaluations of course projects, final exam results, and synchronous and asynchronous communication logs.

The FSE students were all involved in apprenticeships and both groups of students devoted the same amount of hours to work in the funeral industry (Benson, et al., 2005). The online learners were significantly higher in self-efficacy than the on-campus students were while the classroom students were more prone to test anxiety. There were no significant differences in learning styles; both groups had high scores. On the CISS, the only distinction between the two groups was that the on-campus students felt closer to

the instructor, the program, and the institution than did the online students. This finding was not surprising in view of the online course design, which lacked mechanisms for promoting interaction and collaboration. In contrast, the on-campus students had regular opportunities for interacting with their peers and the instructor. There were no significant differences in academic performance as assessed by exam grades between the two groups.

The Veterinary Technology students were overwhelmingly female and Caucasian (Benson et al., 2005). While the online and on-campus students were similar on most demographic features there were some notable differences: On average, the online students were 3 to 4 years older than their on-campus counterparts. Additionally, these students had earned 3 to 4 more credit hours and they had more hours of experience working in veterinary clinics, in some cases roughly double the number of hours. The classroom students, in contrast, spent more hours working in fields that were totally unrelated to their field of study and at the same time took almost twice as many credit hours as the online learners. Both groups of students were highly motivated, with strong goal orientation, awarding high value to the class, and scoring high on control of learning and self-efficacy. Despite their strong motivation, or perhaps because they invested so much in the program, both groups of students also displayed a substantial degree of test anxiety.

In terms of learning strategies, the only distinction was that the online students in one of the laboratory courses relied much more on learning strategies related to time management and the study environment (Benson et al., 2005). However, there is no clear reason for this effect, which could be related to the course or the mode of delivery. Much more striking was that there were no significant differences in course experience between

the two groups, which may be attributable to the cohesive and coordinated structure of the VT program, which transcends the particular mode of delivery. The instructors rotate through several courses within the program, and Benson et al. (2005) noted that while the program does have formal cohort structure, the synchronous and asynchronous communication logs revealed that the students frequently interacted with one another. As described by Benson et al (2005), there appeared to be something of an informal learning community, thus the students in the two groups were quite similar in their sense of belonging. The academic achievement measures showed no significant differences overall between the online and on-campus students, but there was evidence of individual differences. To some extent, the online students' greater experience in the field gave them an advantage. More striking was that there was a much greater degree of individual variation in the performance of the online students on all performance indicators.

In the LHT program, the online learners have the opportunity to attend the on-campus lab sessions that the classroom students attend twice a week; in fact, all of the on-campus resources are available to the online learners (Benson et al., 2005). However, primarily online students with less experience in the field and less experience with technology participate in them. Unlike the on-campus students who have regular interactions with the instructor and other students, the online students have no such structured interactions, though they can attend campus activities and schedule meetings with the instructor. Women outnumber men, though not to the same extent as in the VT program. The only difference between the two groups was the higher number of credit hours taken by the on-campus students. Both groups had comparable experience in the field. Both groups of LHT students were strong in most measures of motivation and low in test anxiety, distinguished only by higher extrinsic motivation among the on-campus



students. The two groups of students were also comparable in their sense of belonging, probably due to online students' access to the campus facilities as well as their involvement in online discussion forums.

In comparing the three programs, Benson et al. (2005) noted that each program was unique in its approach to offering distance education. The programs used an array of technologies, provided the students with various opportunities for hands-on learning as well as online tutorials and discussion forums, and used several types of tests for academic and performance assessment. The students in the online courses had the dual advantage of the convenience of asynchronous learning combined with opportunities to make use of campus resources and facilities. One distinction between the CTE programs and online academic programs was that the CTE programs were more structured and instructor-driven. Additionally, the students were required to work in the field for 20-30 hours per week and two of the courses had a synchronous component requiring the students to be online at the same time each week. As described by Benson et al., the online programs were designed for the foremost purpose of skills training. That purpose might have been compromised by a less formal structure.

There were minimal differences in the motivation, satisfaction, and performance of the students in the online and face-to-face classes (Benson et al., 2005). This could be attributable both to the self-selection of students into the two respective modes of delivery as well as the design of the courses. Benson et al. (2005) noted that workplace experience was an essential part of the courses, commenting that the integration of workplace experience into online or face-to-face courses and programs offers students opportunities to cultivate their skills through real world, hands-on experience. It is interesting that while the programs used simulations to teach skills, the simulations were

held in the on-campus laboratories or as part of the workplace training rather than online. Online simulations are often used to develop skills and were found in some of the exemplary programs in the community college survey (Johnson, et al., 2004).

In addition to the convenience of online courses, a major advantage of distance education is that it enables students to take courses that are not available in their area. Many of the online students resided outside the state of the host institution (Benson A. D., et al., 2012). The delivery of career and technical education courses via distance learning is a manifestation of community colleges' investment in distance education in order to expand educational and career opportunities to a broader and often previously untapped candidate pool (Allen & Seaman, 2007, 2008, 2010).

### **Empirical Research on Distance Learning**

Donavant (2009) used Knowles' theory of andragogy as a framework for exploring online learning as a vehicle for delivering continuing professional education to police officers. Underscoring the powerful influence of intrinsic motivation in adult learners, Donavant (2009) cited a study in which police officers felt their organizations were unsupportive of their interest in professional education and their superiors were unappreciative of their educational endeavors. Yet despite these perceptions, the overwhelming majority (89%) of the officers chose to take professional training on their own initiative. Most of the officers were satisfied with their jobs. To Donavant, the officers' overriding interest in pursuing professional education not only in the absence of extrinsic motivators such as a work requirement but even in the absence of recognition, has powerful implications in light of Knowles' (1990) theory.

Nursing and education are the focus of most studies of online learning for continuing professional education and even then, such studies are few. Donavant's 2009

study was conducted in three stages (Donavant, 2009). The first stage was a quasi-experimental exploration of historical data of professional development courses delivered online and via traditional instruction by the Florida Regional Community Policing Institute to use as background information on online versus traditional instruction. In the second stage, the researcher utilized the Test of Online Learning Success (TOOLS), designed to assess the potential of police officers to learn through online training and examine whether the performance of adult learners is associated with different demographic characteristics. The third stage consisted of a qualitative exploration using open-ended questions. The participants in stage 2 were 188 police officers (85.6% male) with a mean age of 36.9 years and a mean of 10.9 years of police work. More than half the officers had some college (53.7%). The stage 3 participants were 150 officers with similar demographic profiles. Most had not taken part in the TOOLS survey.

A comparison of the effectiveness of professional police education delivered online or in a traditional setting once again illustrated the “no significant difference” phenomenon (Donavant, 2009). Both settings were equally effective for delivery of instruction. Of all the demographic factors analyzed, only the level of formal education affected the potential for learning online. The qualitative data are more informative. A slight majority of the respondents (55%) favored traditional classroom instruction, 38.8% preferred online learning, and the remaining respondents had no preference. The dominant reason among those who preferred traditional instruction was the lack of face-to-face interaction with the facilitator and other learners in the virtual learning environment. A small proportion (8.4%) criticized the inability of online learning to provide opportunities for the practical application of hands-on skills: the reason that career and technical education distance courses employ blended learning (Benson, et al.,

2005). Nine respondents felt they lacked sufficient self-discipline for online learning (Donavant, 2009). Some 10% of the respondents disliked nothing about the online experience. The most attractive feature of online learning was the convenience and scheduling flexibility, cited by more than two-thirds of the officers (68.7%), and routinely cited as the main appeal of online education for adult learners.

The respondents could voluntarily offer additional comments. Among the 44 respondents who did so, the most prevalent comment was that online education increases opportunities for training and is appropriate for specific areas of training (Donavant, 2009). Overall, the results of the quantitative analysis and the responses of the police officers are similar to the findings of studies conducted with college students. The main distinction was in comments specifically related to professional training; for example, several respondents thought their employer should provide opportunities for online education. The officers' main critique of online training, namely that they missed opportunities to interact with others is ubiquitous in the literature and a major focus of efforts to improve the online learning experience by creating a sense of community (DiRamio & Wolverton, 2006; DuCharme-Hanson & Dupin-Bryant, 2005). BOLD addresses this issue by blending synchronous and asynchronous technologies (Power & Gould-Morven, 2011), but few programs offer hybrid courses of that type.

Based on the effect of educational attainment, Donavant (2009) suggested that online learning might be a better investment for police organizations with high proportions of more educated officers, while traditional instruction would be better advised for organizations where high proportions of officers have lower educational levels. The influence of educational level in this study and of GPA in studies of college students might suggest that adult learners who currently lack the basic skills to advance

their education would do better in the traditional classroom. This is one area where the scarcity of research on distance learning in adult general education presents a challenge for extrapolating from other studies. Proficiency with technology and psychosocial factors such as self-efficacy, self-regulation, and locus of control can override academic preparation in predicting success in online coursework but on the other hand, academic factors cannot be discounted.

The learners in the study of Dobbs, Wald, and del Carmen (2009) probably included some future police officers, as they were criminal justice and criminology students. The study examined the effect of previous experience with online learning in the students' perceptions of taking courses online. Although it might not have been the original intent of the study, Dobbs et al. deemed a comparison of the attitudes of students who had and who had not taken an online course to be more valid than a comparison of the online and the face-to-face learning groups. A notable finding was that difference of opinion between the two groups was typically a matter of degree than of complete disagreement. It is also noteworthy that the more online courses the students had taken the more strongly they endorsed the quality of distance education. In fact, the only area of dispute between the two groups was that the students with no online learning experience felt online courses were inferior, while those with online experience disagreed. In a somewhat paradoxical finding, however, both groups of students said that traditional courses are easier than online courses and that they learned more in traditional courses. The reason for this was not clear, but with a majority of students having experience with online courses, the perception that they learned more in the classroom cannot be dismissed.

Dobbs et al. (2009) describes this effect to the preference for self-directed

learning among adults. With regard to the preference for online or face-to-face classes, the responses of the students were the reverse of the police officers' (Donavant, 2009). That is, slightly more than half the students preferred online learning (Dobbs, Wald, & del Carmen, 2009). The reasons cited for the attraction of online learning were similar in both studies, with convenience and flexibility at the top. Other reasons cited by the criminal justice and criminology students for taking courses online included work and family responsibilities, distance from the campus, and the ability to work at one's own pace (Dobbs, et al., 2009). These are essentially the same reasons presented in support of providing remedial education online (Carpenter, Brown, & Hickman, 2004).

Aragon and Johnson (2008) investigated differences in the characteristics of students who dropped out of or successfully completed online courses provided by a rural community college. Out of 305 students, 189 course students completed the course and 116 did not. The students were primarily female (71%) and White (81%). The only demographic feature to significantly affect the learning outcome was gender; women were more likely to complete the course than men were. Dobbs et al. (2009) observed that the influence of experience on attitudes toward online learning was somewhat stronger in women but the effect was minor. The students who completed the course took significantly more hours than the non-completers and had a higher mean GPA at the start of the semester (Aragon & Johnson, 2008). Contrary to the common assumption, self-directed learning was not a significant predictor of course completion.

Aragon and Johnson (2008) contacted 65 students who withdrew from the course to explore their reasons for dropping out. Roughly one-third of the students (34%) dropped out for personal reasons. Research conducted with Open University and distance-learning students in the U.K. routinely find that adult learners frequently leave

due to “fact of life” reasons related to work, family, caregiving responsibilities, or personal health (McGivney, 2004). Distance learning can help to alleviate pressures from competing demands on time, childcare, transportation time, and similar issues but these issues still remain an obstacle for some adult learners. Time constraints emerged as the foremost obstacle to completing online courses in a review of research on working adults (Park, 2007). Park and Choi (2009) recommend including family factors in frameworks for understanding persistence in adult online learners (Park & Choi, 2009).

A significant 28% of the students who dropped out of the course cited course design and communication issues as their reasons for leaving, 18% cited tutorial issues, and 11% cited institutional errors or procedures (Aragon & Johnson, 2008). The remaining students said that online learning was incompatible with their learning preferences. Taken together, most students dropped out due to course design, delivery, or institutional issues, all under the control of the educational institution. Aragon and Johnson recommend that students receive accurate information regarding the demands of online learning and possibly taught strategies such as time management skills prior to beginning a distance educational course of study. They also recommend improving and expanding support services with facilities such as a student help desk for technical support and WebCT tutorials. Common complaints about course design and communication were that the instructor failed to respond to communication, materials were not always available, and the course was confusing (Aragon & Johnson, 2008).

Aragon and Johnson (2008) delineated several features of an effective online learning environment: (1) attention to individual differences, (2) use of motivational strategies, (3) avoiding information overload, (4) creating a real life context for learning, (5) facilitating social interaction, (6) providing hands-on learning activities, and (7)

encouraging students to reflect on what they are learning. At the institutional level, the authors recommend the implementation of quality control protocols and the provision of support and assistance for instructors in developing online courses individually and collaboratively. The students' criticism of their online courses is not unique to any educational setting, and in the same way their recommendations for improving program quality are just as applicable to adult education.

Liu (2007) examined academic achievement and persistence among 108 community college students enrolled in online courses. The instruments used for the study were the Learner Autonomy Profile (LAP), designed to assess psychological readiness, the Social Presence and Privacy Questionnaire (SPPQ), which captures social readiness, and the Online Technologies Self-Efficacy Scale (OTSES). Psychological and social readiness both proved to be significant factors in the students' final exam grades and course completion. Technological readiness had no significant influence on success, consistent with Puzziferro's (2008) findings. Liu's (2007) recommendations for improving persistence and performance in courses are incorporated in the learner-oriented framework developed by Liu et al. (2007).

**Working adults.** Working adults enrolled in a baccalaureate program offered by a Midwestern university on 16 military installations and one community education center in different parts of the U.S. were the focus of Calvin and Freeburg's (2010) research. Many of the courses take place in the classroom but the students are also required to take a number of courses online. The study was designed to explore the students' perceptions of technology competence in relation to course persistence and in addition to solicit ideas for improving online learning. A number of issues arose that interfered with online learning: More than one-third of the respondents said the directions for course



assignments were confusing, similar to some complaints reported by Aragon and Johnson (2008). In a study of community college students enrolled in online courses, the students expressed an overwhelming preference for clear and comprehensive explanations, ideally supported with visual and audio media (Kilic-Cakmak, Karatas, & Ocak, 2009). Calvin and Freeburg (2010) acknowledged that problems with unclear directions and explanations are not uncommon in distance learning.

In addition, one-fifth of the respondents reported problems with time management; almost half said their experience would have been better with counseling or advising, and more than one-third that they would have benefited by additional technical training (Calvin & Freeburg, 2010). Overall, these issues are quite similar to the problems reported by the course dropouts interviewed by Aragon and Johnson (2008), but these learners persisted despite these problems (Calvin & Freeburg, 2010). Calvin and Freeburg were surprised to find that the students appraised themselves as having low levels of competence with technology. However, their proficiency with technology had no relationship to their intent to persist or take future online courses. To the students, the overarching issue for improving the quality of online learning was the need to provide clearer instructions.

Park and Choi (2009) explored the factors affecting decisions to drop out or persist in online courses among adults taking job-related courses offered by a large university. The sample of 147 respondents included individuals who had dropped out and who had persisted in the course. The items used to assess satisfaction and relevance were adapted from Keller's Instructional Materials Motivation Survey (IMMS). The survey included questions related to family and organizational support. There was some support for the effect of age on persistence. There were more dropouts than those who persisted

between the ages of 20 and 29, though the difference was not significant. None of the individual characteristics were significantly linked with dropping out or persisting.

The main difference between dropouts and those who persisted was that the dropouts reported significantly lower levels of support from their families and their employer (Park & Choi, 2009). McGivney (2004) emphasizes the importance of family and partner support on the persistence of adult learners. Those who persisted were also substantially more satisfied with the course and found it more personally relevant (Park & Choi, 2009). Persistence in online learning is strongly linked with course satisfaction (Levy, 2007). The preference of adult learners for material they find relevant is consistent with Knowles' (1990) theory.

**Self-regulatory learning strategies.** Puzziferro (2008) observed a relationship between the use of self-regulatory learning strategies and academic performance in a sample of 815 community college students taking online liberal arts courses. The students were drawn from 163 course sections and assessed with the Online Technologies Self-Efficacy Scale (OTSSES) augmented by items from the Motivated Strategies for Learning Questionnaire (MSLQ). Most of the students were very confident in their technology skills, thus self-efficacy had virtually no effect on their course performance.

Ironically, Calvin & Freeburg (2010) found a similarly negligible effect for technology skills on persistence, but with students with relatively low technology competence. Effort regulation and time and study environment were significantly associated with the students' final grades (Puzziferro, 2008). In addition, metacognitive self-regulation, rehearsal, elaboration, and time and study environments were all linked with the students' satisfaction with learning online. Barnard, Paton, and Lan (2008) also examined the influence of self-regulatory learning behaviors on the academic

performance and perceptions of online learners. The sample was composed of 628 students attending a large public university who were presented with the Online Self-Regulated Learning Questionnaire. There was no direct relationship between self-regulatory learning behaviors and academic performance. However, the self-regulatory behaviors mediated the association between the students' perceptions of communication and collaboration in the online course and their course GPA. The relationship between the learners' self-regulatory behaviors and their perceptions of their learning experience were probably bidirectional. According to Puzziferro (2008), orientation programs, support services, and advising for online learners should be designed to address the critical importance of self-regulatory learning strategies. Puzziferro (2008) also suggests that the OTSES be reviewed, refined, and expanded.

**Barriers to persistence.** Most studies identify barriers to persistence as part of their exploration. Muilenburg and Berge (2005) focused directly on barriers by conducting an exploratory factor analysis of constructs that act as barriers to success in the online learning environment. The large sample consisted of 1,056 students from a wide variety of educational institutions. A pilot study with a small sample yielded six factors: (1) time/interruptions, (2) infrastructure/support services, (3) motivation, (4) prerequisite skills, (5) technical, and (6) social. After the questionnaire was modified for clarity and elimination of redundancies, the revised version of 47 items was presented to the respondents.

Based on the survey responses, the foremost barriers to online success were social interaction, administrative and instructor issues, learning motivation, and time and support for studies (Muilenburg & Berge, 2005). Five independent factors had the strongest effect on each of the four barriers. Those factors with medium to large effect

sizes were: ability and confidence with online learning technology, effectiveness of online learning, enjoyment of online learning, online courses completed, and the probability of taking an online course in the future. The demographic factors of gender, age, ethnicity, and type of educational institution also influenced the respondents' perceptions of barriers to learning online.

A number of dynamic interactions emerged in the analysis (Muilenburg & Berge, 2005). The respondents who were the most at ease and adept with using technology reported significantly fewer barriers related to social interaction, administrative and instructor issues, motivation, and time and support for studies. Those who saw online learning as equal or superior to traditional classroom learning had a moderate amount of barriers. The degree of the students' perceived barriers was inversely linked to their enjoyment of online learning; that is, the more they enjoyed online learning the fewer barriers they perceived. It is interesting that the strongest relationship in the analysis was between online learning enjoyment and social interaction. This interaction adds support to the need for building a sense of community and belonging among online learners (DiRamio & Wolverton, 2006; DuCharme-Hanson & Dupin-Bryant, 2005; Harrell, 2008).

Three respondents who had no previous experience with online courses perceived significantly stronger barriers to online learning than those who had taken at least one online course (Muilenburg & Berge, 2005). Indeed, having taken a single online course produced a dramatic decrease in perceived barriers. Dobbs et al. (2009) observed a dramatic effect for experience among students who took several online courses. Finally, social interaction (or its absence), followed by motivation, emerged as the most formidable obstacles to taking an online course in the future (Muilenburg & Berge,

2005). While findings are inconsistent for factors such as demographics and technology expertise, a lack of opportunities for social interaction is almost invariably cited as an issue in online learning.

### **Developmental and Remedial Education**

The CCSSE report (2009) raised the question of whether online courses present an effective modality for delivering developmental and remedial education. In view of the growing numbers of students with varying degrees of remediation needs, the authors acknowledged that “it may be tempting to declare online coursework the definitive solution” (Center for Community College Student Engagement, 2009, p. 9). The report is also circumspect about recommending online learning for remedial purposes. Effective design and delivery may be especially vital in designing courses for students with marked basic skills deficiencies. In addition, the CCSSE report recommends that the educational institution employ a data-driven approach for determining the effectiveness of delivering developmental and remedial education online by diligently monitoring students’ engagement, learning, and persistence as well as overall outcomes. Porter (2004) recommends a similar data-driven approach to using distance learning for adult basic education. The California Basic Skills Initiative is heavily data-driven (Illowsky, 2008).

Carpenter, Brown, and Hickman (2004) explored the subsequent performance of 256 community college students who chose to take developmental writing via an online course rather than in a traditional classroom. The students attended an urban community college that had set prerequisite basic skill levels for enrolling in courses leading to a degree or transfer. According to Carpenter, the College Board’s ACCUPLACER Computerized Placement Tests (CPT) bases most decisions related to reading and writing on review of the students’ scores. Students whose English language skills are very low

are assessed with the *Levels of English Proficiency*. At the time of the study, students who scored from 65 to 85 on the writing portion of the CPT would be assigned to Developmental Writing 117 and a grade of at 2.5 in the course would earn them the designation of “college ready” in writing. In addition, the students would submit an “exit portfolio” for evaluation by two external readers; earning a “pass” on the portfolio was also requisite for advancing to college level writing (Carpenter, et al., 2004, p. 15). All of the course sections utilized the same syllabus and tests as well as the exit portfolio. All students assigned to the developmental writing course were given the option of taking the course online or face-to-face. From the 1999 fall semester through summer 2003, 256 students selected the online option, representing about 10% of the students who took the course.

Demographically, the online writing courses attracted more women and adult learners than did the face-to-face courses, reflecting the overall profile of online learners (Carpenter, Brown, & Hickman, 2004). One-third of the online students were over age 25, compared with roughly 18% of the on-campus group and more than two-thirds were female (68.2% versus 54.2% on campus). There were fewer full-time students in the online courses (33.3% versus 52.2%) and fewer minority students (26.7% versus 41%). A notable distinction was that the students who chose the online developmental courses began the course with higher scores on the reading and writing placement tests. Carpenter et al. (2004) emphasized that students who withdraw from classes can have many reasons that are not necessarily academic. Although the study examined course completion, the focus was on the outcomes of students who completed the developmental writing course, with success defined as a grade of 2.5 or higher.

In fact, different characteristics influenced course completion and course success.

The students' placement test scores were related to their success in the developmental course but not to whether they completed the course (Carpenter, et al., 2004). Conversely, credit load was not associated with success in the course but it did affect course completion. More students withdrew from the online sections, consistent with the trend (Power & Gould-Morven, 2011). At the same time, the students who took the developmental course online attained more success in the course (Carpenter, et al., 2004). The mean CPT writing scores of the online students was 78.9 compared to 77.2 for the students in the on-campus course. An interesting pattern emerged when Carpenter et al. (2004) compared the CPT placement scores of the students in the modes of instruction in relation to course withdrawal. The students with lower CPT writing scores were more disposed to withdraw from the online courses but the opposite pattern occurred for the face-to-face courses where the students who entered with higher placement scores were more inclined to withdraw. Students with CPT lower reading scores were also more likely to drop out of the online course although the reading scores did not influence whether the on-campus students completed the course. Although these differences fell short of statistical significance, they nonetheless raise questions about the extent that the online learning environment is conducive to the needs of underprepared students.

The higher attrition rate of the online students could have contributed to the more successful outcomes by eliminating students who were at higher risk for failing the course. It is not surprising that students who began the online course with higher reading and writing scores would be more successful in the developmental course, but it is also possible that these students were better suited to online learning. By implication, students who test at the lowest levels and require basic skills remedial courses might lack in other attributes that help students succeed online such as self-determination and self-efficacy.

Self-regulation learning strategies could be especially valuable for basic and remedial students (Barnard et al., 2008; Puzziferro, 2008). Given that the differences in the academic profiles of the successful online and on-campus students were not that substantial, Carpenter et al. (2004) indicated that the importance in identifying traits that contribute to the success of the adult learner is paramount. Regardless of the mode of instruction, implementation of effective remediation is necessary for the success of the Adult Basic Education student (Chaves, 2006; Liu et al., 2007; Schuetz, 2008).

Johnson (2009) investigated the relative merits of three modes of remedial course delivery on the subsequent success of underprepared community college students: traditional face-to-face classes, online classes, and hybrid classes. The type of instruction had no discernible impact on the students' success in college level coursework. Rather, the overarching factors in the students' performance in future courses were gender, the subject of the remedial course, and the grade the student received in the course.

Zavarella and Ignash (2009) also included students enrolled in face-to-face, online, and hybrid classes in a study of community college students' success in developmental mathematics courses. Zavarella and Ignash (2009) approached their study from the perspective that there had been no previous research on the learning styles of students taking developmental education distance courses. The students were an ethnically diverse group drawn from two campuses of a large, urban Florida community college system. The students were predominantly female (71%) with similar proportions of White (35%), African American (34%), and Latino (28%) students and small numbers of Asian and Pacific Islander and Native American students. Traditional age students (under 25) accounted for two-thirds of the sample and these students were more prevalent in the hybrid (72%) and traditional (65%) classes, making up slightly less half of the



online students (48%). Zavarella and Ignash (2009) selected the Grasha-Reichmann Student Learning Styles Scales (GRSLSS) to assess learning styles because the six learning styles types emphasize social interaction, which the researchers deem especially relevant to the study of distance learning in comparison to face-to-face learning environments. The six learning styles are competitive, collaborative, avoidant, participant, dependent, and independent.

Consistent with other studies, the attrition rates for the online and hybrid courses exceeded the rate for the traditional class. However, in this case the withdrawal rates for the hybrid and online courses were roughly twice the withdrawal rate for the face-to-face class: 42%, 39%, and 20%, respectively (Zavarella & Ignash, 2009). Thirty students were contacted out of the 64 students who withdrew from the course (all three sections). Eleven students who had taken the online or hybrid courses said that the course presented problems they had not anticipated. The other students left due to generic reasons outside the scope of the institution such as family, employment, or health issues. When queried about their reasons for taking the developmental course, the students who cited personal reasons were more likely to complete the course than those students who took the course in response to perceived learning needs. In other words, the students who were intrinsically motivated were more likely to complete the course, a finding that raises the question of boosting persistence in students who are required to take developmental or remedial courses to further their educational goals.

Comments made by the students who dropped out of the technology-based courses led Zavarella and Ignash (2009) to surmise that these students might have thought that the online course materials would be easier to comprehend or less time-intensive than the classroom lessons. The students also appeared to be unaware of the

assistance available to them. Despite being told during a mandatory orientation session that the instructor was available for tutoring sessions and being encouraged to make appointments for tutoring, several students complained that the course lacked tutoring support. The students availed themselves of the on-campus computer lab but did not ask the instructor or others for assistance. There would appear to be a gap in communication that needs to be addressed and clarified. In contrast to the findings of Carpenter et al. (2004) for the developmental writing students' CPT scores, the students' College Placement Test mathematics scores did not seem to influence course completion for the students in any of the three modes of delivery (Zavarella & Ignash, 2009). Despite the apparent utility of the learning styles framework, learning styles were not a significant factor in course completion.

The findings of Zavarella and Ignash (2009), in particular the comments of the students who were interviewed, support the assertion that students who take distance courses need to be prepared for studying in the online learning environment (Harrell, 2008). According to Zavarella and Ignash (2009), educational institutions could create a website that students are required to access prior to enrolling in a technology-based course, outlining the expectations for the course and the attributes of students who are successful in those courses. In particular, developmental students might require training and preparation before taking online courses. Additionally, developmental students may be less aware of their own learning needs and abilities; that could explain why they did not seek tutoring support even when it might have made the difference between dropping out or completing the course. The findings add further support to the need for assessing students' potential to success in an online course (Cross, 2008; Harrell, 2006, 2008) and to the claim that community colleges should conducted ongoing, thorough evaluation

before making substantial investment in online developmental and remedial courses (Center for Community College Student Engagement, 2009).

Rey (2011) explored the success and persistence of California community college students taking basic skills mathematics courses online and in the classroom. Rather than demonstrating superiority for either mode of delivery, the results seemed to support the “no significant differences phenomenon” (Russell, 1999). Rey (2011) noted that there was no evidence of the presumed difficulties of communicating mathematical concepts in an online course format. At first glance it appeared the online instruction was superior; the students who entered basic skills mathematics with an online pre-algebra course tended to earn higher grades and have higher rates of persistence than those taking the same course in a traditional classroom. However, the advantage of online coursework quickly dissipated and was ultimately neutralized. Of the five course components analyzed, only one, requisite discussion board participation, was linked with success and persistence. The exclusive reliance on multiple-choice exams, use of mathematics display software, and video lectures had no significant influence on success or persistence. The fifth component, proctored examinations, was a recent innovation and thus there were no longitudinal data for charting its effects.

Rey (2011) determines the level of understanding and participation of the student by requiring students to participate in discussion board posts. Observation of the depth, breadth, frequency, and enthusiasm of student posts enables the instructor to make an informed judgment of the students’ level of mastery of required coursework. Therefore, requiring discussion board activity may be a consideration when designing a basic skills mathematics course. According to Rey, the quality of the teacher presenting the course is probably much more important to the quality of the learning experience than is the

system of delivery (Rey, 2011). There are certain attributes that distinguish effective and ineffective online instructors (Gorsky & Blau, 2009). Teachers who are adept in teaching online and face-to-face classes know how to adapt their teaching strategies to the unique features of each type of learning environment (Diaz & Entonado, 2009).

### **Critique of the Existing Literature**

Significant gaps exist in the literature related to the present study, namely the scarcity of research that addresses online learning in career and technical education. Additionally, little evidence exists that relates to the effectiveness of online learning for adult learners who are required to take remedial coursework in the form of Adult Basic Education courses. This remediation is a requirement that must be met before an adult learner can pursue a degree or certification offered after completing a career and technical education program. Porter's (2004) study was conducted a decade ago and only a small proportion of the distance education courses were delivered online. In addition, adult basic education (ABE) students accounted for less than 2% of the population of students of adult education. Among the studies of students in remedial education, only Rey's (2011) study, which was conducted for a doctoral dissertation, focuses on basic skills courses. The most significant finding for the purpose of developing effective online basic skills courses was the utility of the discussion board requirement for securing the students' active engagement.

Courses like mathematics that involve quantitative thinking are thought to be more difficult to deliver online. Lack of clarity is a persistent problem in online learning (Aragon & Johnson, 2008; Calvin & Freeburg, 2010; Kilic-Cakma et al., 2009). Clear explanations are essential for helping students comprehend mathematics, and especially vital for students in remedial courses. Indeed, some of the developmental mathematics

students surveyed by Zavarella and Ignash (2009) said they dropped out of the online course because they thought the course would be easier to comprehend in person.

However, though research is limited, online remedial and developmental mathematics courses, including basic skills courses, appear to be effective. Good design and instruction are essential for all online courses.

In the study by Carpenter et al. (2004), online instruction proved effective for teaching developmental writing. At the same time, the students who chose to take the course online performed at higher levels of reading and writing before taking the course and the more skilled students were more likely to persist. In addition, while the online course produced superior outcomes it also had high rates of attrition, suggesting that students who did poorly were more apt to drop out of the course, leaving the higher performers.

The most striking gap is the lack of research on students in need of basic education in reading in online courses. Students who learn well by reading have an advantage in online courses where the course content and discussions are presented in written form (Cross, 2008; Harrell, 2006). Thus, it would seem that students who lack basic reading skills would be seriously disadvantaged. In the California adult education study, the basic and intermediate students were successful in distance learning (Porter, 2004). Once again, however, most were not taking the course online. There is a clear and compelling need for research on the efficacy of distance learning for adult basic education students in order to understand whether or how their learning deficits present a problem for online instruction and how courses can be designed and taught to minimize problems unique to that population.

## **Conclusion**

The USDOE (2010) research review and meta-analysis showed that findings can be extrapolated from studies involving different populations. Indeed, the findings tend to be remarkably similar across settings. Demographic characteristics and even technology expertise tend to have minimal impact on learning outcomes. On the other hand, factors related to motivation and self-regulation tends to exert a marked impact on persistence and performance (Harrell, 2008; Liu et al., 2007; Puzziferro, 2008). Theoretically and empirically based frameworks such as those outlined by Harrell (2008), Liu et al. (2007), and Park and Choi (2009), along with adult learning models (Chaves, 2005; Knowles, 1990; Schuetz, 2008) are useful for understanding the dynamic interaction of factors that influence the success of adult learners in online courses.

Course design and delivery play a particularly powerful role in the effectiveness of online learning (Diaz & Entonado, 2009; Harrell, 2008; Liu et al., 2007). Career and technical education (CTE) courses are unique in that most rely on blended learning for the provision of hands-on training (Benson et al., 2005). They also tend to be more structured than online courses in academic subjects. The most effective courses are tailored to the unique characteristics of the subject matter, the target audience, and the virtual learning environment. While successful courses and programs have many common features there are limits to the extent that finding from one setting can be applied to another. This study will help to fill in substantial gaps in the literature related to the effectiveness of online courses for adult learners enrolled in basic education courses as a precursor to a degree or certificate program in career and technical education.

## **Research Questions**

Several research questions are applicable to this quantitative correlational study:

**Research Question 1.** What characteristics are common among students who show the greatest learning gains in an online Adult General Education program at Florida state and local district Career and Technical Centers?

**Research Question 2.** What characteristics are common among students who show the greatest learning gains in a more traditional face-to-face Adult General Education program at Florida state and local district Career and Technical Centers?

**Research Question 3.** What, if any, characteristics are shared by students who show the greatest learning gains in both the online and more traditional face-to-face Adult General Education program at Florida state and local district Career and Technical Centers?

**Research Question 4.** Can a specific characteristic or combination of characteristics be used to predict the success of a student who plans to take an online or more traditional face-to-face Adult General Education program at Florida state and local district Career and Technical Centers?

## **Chapter 3: Methodology**

### **Primary Goal and Objective**

The objective of this correlational research design is to determine common characteristics of success between modes of course delivery and effectiveness of Adult Basic Education (ABE) coursework at Florida District Technical Centers. Evaluation of success was determined using the Test of Adult Basic Education (TABE) as the instrument to which student achievement is measured. Student success in ABE coursework depends on many factors such as (a) years of separation from school, (b) years of prior schooling, (c) motivation, (d) unforeseen personal problems, and (e) determination for success (see Appendix B). There is no set time for the completion of the ABE coursework, nor is there a set minimum number of times an Adult General Education (AGE) or Applied Academic Adult Education (AAAE) student can take the TABE post-test. ABE programs are self-paced and run on a continuous basis in both online and traditional face-to-face modes.

### **Participants**

A complete set of previous student data from a specific school district's technical schools was selected. The anonymous student information was collected for use for this study, specifically, and is representative of all adult basic education (ABE) students across the state of Florida. The data were collected on all Adult General Education students who were enrolled in both Applied Academic Adult Education and Adult Basic Education remedial coursework since the inception of the online programs for AAAE and ABE courses in mathematics, reading, and language began (2009-2010 school years). Permission to use the data, as well as permission to conduct this research on-site has been obtained from the director of the educational site where the



data are housed (see Appendix A). The data for the sample population includes information from students who took the Test for Adult Basic Education (TABE) and enrolled in either online or face-to-face coursework at a district Technical Centers. All students who attempted AGE coursework with the option of taking courses online or in a more traditional setting was utilized for this research study. Only data from students who took the TABE pretest, completed AGE coursework as defined below, and took the TABE posttest were considered successful. Additionally, as mentioned in both the research questions and hypotheses, a student who shows the greatest learning gains will be regarded as a successful student. For this research, a student with the greatest learning gains is synonymous with a successful student. Conversely, a student who enrolled in and AGE program but did not finish the program for whatever reason will not be considered a student who made learning gains or was successful.

Specific demographic data was made available after Institutional Review Board approval was attained. The researcher evaluated only existing data. The researcher did not participate in the administration of the TABE test. The sample was representative of all adult general education students in the State of Florida who were pretested by the test of adult basic education exam, enrolled in adult general education (AGE) coursework, and post tested by the test of adult basic education exam. The data for this quantitative study were provided by target technical centers in a large and diverse school district within the state of Florida. The study used anonymous student record information from the school years of 2009-2014. These years correspond with the years that which ABE coursework has been offered in *both* online *and* face-to-face modes of instruction. Data were collected confidentially and ethically, and did not impact any past or current individual's ability to gain knowledge, or harm or hinder

any individual's livelihood or employment. No contact was made between the researcher and any past or present student. Therefore, informed consent was not required.

### **Applied Academic Adult Education Purpose**

Applied Academic Adult Education prepares the student for academic as well as technical and personal success. "This program strives to inspire and motivate students to become productive, self-sufficient members of society. The AAAE system is based upon the assessed needs of the individual and the academic and employability requirements (of Florida)" (Florida Department of Education, 2011, p. 1).

### **Adult Basic Education Purpose**

"The purpose of this program is to give students an opportunity to apply knowledge and skills related to the area of basic literacy and life skills for adults who are performing at or below the ninth-grade level. The content develops basic literacy skills in all areas of knowledge" (Florida Department of Education, 2012, p. 1).

### **Instruments**

The State of Florida has adopted an instrument for assessment of students enrolled in career, technical, and adult education programs. The Test of Adult Basic Education (TABE) is the approved instrument for assessing the Basic Skills Requirement for Adult General Education (The School Board of Broward County, 2012). All adult basic education (ABE) and applied academic adult education (AAAE) students enrolled in career and technical education programs within the state of Florida complete the TABE. Their scores on the TABE place them in one of four levels of ABE courses. The TABE is a family of standardized tests generated by CTB/McGraw-Hill and approved by the State of Florida to measure specific skills. The most recent version, 9-10, was put into use in

2003.

When the Test of Adult Basic Education (TABE) was first published in 1967, there was a need for a comprehensive, relevant, carefully researched, and statistically sound product to test adults who were seeking a General Education Development (GED) credential, a high school diploma, or post-high school vocational training. TABE provided a tool that allowed ABE instructors, administrators, and researchers to evaluate student academic skills.

### **TABE Validity and Reliability**

It is imperative that assessment instruments are both reliable and valid and are only utilized with the students for whom they were designed. The State of Florida has approved a standardized test to meet the conditions of Florida Statute and Florida School Board Rules (The School Board of Broward County, 2012). “TABE focuses on assessing the basic literacy and numeracy skills that will help a person function well in society. The test combines the most important characteristics of norm-referenced and criterion-referenced tests” (Florida Department of Education Division of Career and Adult Education, 2010-2011, p. 27). Additionally, “these tests provide information about the relative ranking of examinees against a norms group, as well as specific information about the instructional needs of examinees. In addition, TABE results provide prescriptive information about individual students allowing instructors to easily identify and implement meaningful remediation strategies” (Florida State Board of Education, 2011, p. 27).

### **TABE Norming Information**

According to the Florida State Board of Education (2011), “Norming data were collected from adult basic education programs, including alternative high schools...and

vocational/technical institutions. The tests enable teachers and administrators to evaluate and successfully place examinees in adult education programs” (Florida State Board of Education, 2011, p. 28). Additionally, “Other uses of TABE include pre- and post-testing to measure educational growth, correct placement of new examinees in instructional programs, and evaluation of adult education programs. The TABE, 9-10, national norming sample was drawn from more than 400 institutions...from 46 states” (Florida State Board of Education, 2011, p. 28).

### **TABE Development Information**

Each assessment in the TABE, 9-10, is defined in an account relating a set of skills called category objectives. Items in TABE, 9-10, are categorized in terms of three process dimensions: recall and recognition, inference, and evaluation. The Survey version of TABE, 9-10, assesses the same objectives as the Complete Battery.

The State Adult Education Office retains test developer contact information from CTB-McGraw Hill. TABE is based on current national standards, including the National Council of Teachers of Math (NTCM), National Council of Teachers of English (NTCE), International Reading Association (IRA), and the 2002 GED Tests.

### **Research Questions and Hypotheses**

Several research questions advance applicability to this study. The following hypotheses were formulated for this study based on the research questions below and are stated in both null and alternative forms.

**Research Question 1.** What characteristics are common among students who show the greatest learning gains in an online Adult General Education program at Florida State and local district Career and Technical Centers?

**Null Hypothesis 1 (H10).** There are no common characteristics of statistical

significance shared among students who show the greatest learning gains in an online Adult General Education program at Florida state and local district Career and Technical Centers.

**Alternative Hypothesis 1 (H1a).** There are common characteristics of statistical significance that are shared among students who show the greatest learning gains in an online Adult General Education program at Florida state and local district Career and Technical Centers.

**Research Question 2.** What characteristics are common among students who show the greatest learning gains in a more traditional face-to-face Adult General Education program at Florida state and local district Career and Technical Centers?

**Null Hypothesis 2 (H20).** There are no common characteristics shared among students who show the greatest learning gains in a more traditional face-to-face Adult General Education program at Florida state and local district Career and Technical Centers.

**Alternative Hypothesis 2 (H2a).** There are common characteristics of statistical significance that are shared among students who show the greatest learning gains in a more traditional face-to-face Adult General Education program at Florida state and local district Career and Technical Centers

**Research Question 3.** What, if any, characteristics are shared by students who show the greatest learning gains in both the online and more traditional face-to-face Adult General Education program at Florida state and local district Career and Technical Centers?

**Null Hypothesis 3 (H30).** There are no statistically significant common characteristics shared between students who students who show the greatest learning

gains in both the online or more traditional face-to-face Adult General Education program at Florida state and local district Career and Technical Centers.

**Alternative Hypothesis 3 (H3a).** There are common characteristics of statistical significance shared between students who show the greatest learning gains in both the online and more traditional face-to-face Adult General Education program at Florida state and local district Career and Technical Centers.

**Research Question 4.** Can a specific characteristic or combination of characteristics be used to predict the success of a student who plans to take an online or more traditional face-to-face Adult General Education program at Florida state and local district Career and Technical Centers?

**Null Hypothesis 4 (H40).** There is no specific characteristic or combination of characteristics that can be used to predict the success of a student who plans to take an online or more traditional face-to-face Adult General Education program at Florida state and local district Career and Technical Centers.

**Alternative Hypothesis 4 (H4a).** A specific characteristic or combination of characteristics can be used to predict the success of a student who plans to take an online or more traditional face-to-face Adult General Education program at Florida state and local district Career and Technical Centers.

### **Research Design and Procedures**

**Design.** A predictive correlational design with pre- and posttest was utilized using the TABE as the instrument of measurement for the independent variable. Fraenkel and Wallen (2003) define correlational research as “research done to determine relationships among two or more variables and to explore their implications for cause and effect” (p. 12).

**Procedure.** The following procedures were utilized to select population, sample

size, measurements, and statistical treatments for this study.

1. Initial approval from the Institutional Review Board of Nova Southeastern University, as well as all necessary approvals and permissions, were obtained from the School Board of Broward County prior to beginning this study. In addition, all school and district personnel were informed of the study procedures and assured anonymity in the reporting of data and results of this study. Only data from the probability cluster sampling encompassed by this study were included in the analysis. All population sample data remain anonymous to the researcher.

2. The population being studied included all of the students who enrolled in ABE courses who took the TABE pretest and TABE posttest across the state of Florida between 2009-2013.

3. Data-sets from the identified population were studied with no need for sample selection required. Nearly 15,000 student samples were analyzed in this study. The sample included only those students who enrolled in ABE coursework between the academic years of 2009-2014 when the option to choose traditional face-to-face or online instructional modalities was made available to students enrolling in a CTE/ABE program.

### **Data Analysis**

Quantitative data analysis was obtained from the Test of Adult Basic Education (TABE) instrument, and successful completion of an Adult General Education program as determined by the withdrawal code of W28, W33, W40, or W44. Together these were used to categorize adult basic education (ABE) student success. A withdrawal code of W28 refers to “any adult student who left the postsecondary adult job preparatory program as a program completer.” A withdrawal code of W33 refers to a student who “achieved personal objective.” A withdrawal code of W40 signifies “any student who left the

class/program because of other known reasons,” and a withdrawal code of W44 signifies “any adult student who left school with a certificate of completion” (Florida Department of Education, 2013-2014, p. 3). For the purpose of this study any student who received a withdrawal code of W28, W33, W40, or W44 was considered a successful student. The independent variable for this study was the mode of course delivery; being either a traditional classroom setting, online instructional delivery, or a hybrid of both traditional and online instructional delivery. The dependent variables included the level of student success as indicated by the student’s withdrawal codes, achievement as measured by the difference between initial TABE pretest score, and final posttest score required to gain admittance to career and technical education (CTE) program of student choice, length of time required for the ABE student to achieve his or her highest level of success as determined by the pre- and posttest TABE score, number of courses repeated before required posttest TABE scores are attained during the duration of the AGE remedial coursework.

**Level of Significance.** Each of the above null hypotheses was tested at the level of significance of 0.05. The rejection region for all the hypotheses was one-tailed.

**Statistical Tests.** For the first null hypothesis, descriptions of the sample profile and the characteristics common among students who show the greatest learning gains in an online AGE program, descriptive univariate analyses were performed to determine the frequency distributions of the variables (*n*, percentage, and 95% confidence interval). According to Green and Salkind (2014), the objective of descriptive statistics “is to portray accurately and succinctly data on a variable” with summaries of distributed scores in tabular or graphical representation (p.130). Descriptive univariate analyses were performed on each of the following characteristics for the sample: (a) student achievement as



measured by difference between pre-test and post-test TABE scores, (b) Length of time to complete program, (c) number of courses repeated while enrolled in program, (d) age, (e) gender, (f) number of attempts the TABE test was taken prior to achieving a passing score. Scores for each characteristic was transformed to  $z$  scores to facilitate comparison and analysis. The values of the descriptive univariate analyses, along with critical values and probabilities, were considered for the acceptance or rejection of the null hypothesis.

For the second null hypothesis, descriptions of the sample profile and the characteristics common among students who show the greatest learning gains in a more traditional face-to-face Adult General Education (AGE) program, descriptive univariate analyses were performed to determine the frequency distributions of the variables ( $n$ , percentage, and 95% confidence interval). Descriptive univariate analyses were performed on each of the following characteristics for the sample: (a) student achievement as measured by difference between pre-test and post-test TABE scores, (b) Length of time to complete program, (c) number of courses repeated while enrolled in program, (d) age, (e) gender, (f) number of attempts the TABE test was taken prior to achieving a passing score. Scores for each characteristic was transformed to  $z$  scores to facilitate comparison and analysis. The values of the descriptive univariate analyses, along with critical values and probabilities, were considered for the acceptance or rejection of the null hypothesis.

For the third null hypothesis, the statistical test used was the  $t$ -test for comparing means of independent samples. The standard  $t$ -test for comparing means of independent samples assuming equal variances was used to calculate the values of the  $t$  ratios. The means and standard deviations for each group were reported for the third null hypothesis. The values of the  $t$ -test, along with critical values and probabilities, were considered for the acceptance or rejection of the null hypothesis. Additionally, ANOVA was performed to test

the significance of group differences between online and traditional face-to-face learners.

For the fourth null hypothesis, the statistical test used was correlation analysis with two variables to determine a relationship or association between the two variables. Pearson's product-moment correlation and Spearman's rho were employed. Finally, multiple regression analysis tests were implemented for use with the previously mentioned characteristics and dependent variable. The hypothesis was used for prediction and identified the best set of predictor variables that when combined could determine if a predicative correlation exists among the characteristics (a) student achievement as measured by difference between pre-test and post-test TABE scores, (b) Length of time to complete program, (c) number of courses repeated while enrolled in program, (d) age, (e) gender, (f) number of attempts the TABE test was taken prior to achieving a passing score and mode of course delivery.

### **Limitations**

Limitations are discussed in the context of this study as they arise. Statistical and procedural limitations existed. Possible limitations included adequate sample size for hypothesis testing, misinterpretation about the direction and magnitude of the association between variables, missing or inaccurate assessment of the magnitude of the relationship based on the coefficient of determination, effect size, or the size of the coefficient, inappropriate choice of statistical assessment, and inappropriate selection of predictor or criterion variables (Creswell, 2008).

### **Summary**

To identify the effective characteristics of students of Adult Basic Education, a research study was developed and implemented to determine if a correlation exists between Test of Adult Basic Education scores and mode of instruction; specifically, the

determination if a correlation exists between learning gains of the student as determined by Test of Adult Basic Education (TABE) scores and educational setting. Additionally, differences in the time spent by students of Adult Basic Education to successfully complete their program online, in the traditional classroom, or a hybrid of both was analyzed. Furthermore, retention rate and mode of course instruction was evaluated. Quantitative data was obtained from the TABE instrument, analyzed, and used to quantify correlations in Adult Basic Education student success. The analysis of learning gains, time to complete program of study, retention rates were looked at in terms of mode of course delivery.

## Chapter 4: Results

In accordance with the United States Department of Education, all adult education students in the state of Florida enrolling in a career and technical education (CTE) program must be evaluated using the Test of Adult Basic Education (TABE). The TABE is administered to determine the level of academic literacy of the student and, if necessary, placement in an appropriate remediated Adult General Education (AGE) program of study. Contingent upon TABE scores, the student may choose to take remediated coursework in a traditional classroom setting, as a distance learner, or a combination of both traditional and online instruction. The educational leadership of the CTE program has expressed an interest in determining if an association exists between the mode of instructional delivery and student achievement (Personal communication, May 17, 2012). Additionally, there is a lack of evidence regarding the relationship between student achievement through the successful completion of remedial AGE coursework in a CTE program and the mode of instructional delivery.

Prior to this quantitative correlational research design, no study had been conducted to determine if a correlation exists between variables that could affect the achievement levels of distance learners and those of a more traditional classroom setting in Adult Basic Education or Applied Academic Adult Education programs. The problem was to determine if one or more common characteristics are prevalent in Adult General Education (AGE) students who demonstrate the greatest amount of learning gains after completion of AGE coursework as determined by pretesting and post testing of the student by the norm-referenced TABE, and if those advantageous characteristics are unique to the student's choice of mode of course delivery.

## **Data Treatment**

A complete set of archival student data from a specific school district's technical schools was selected for analysis. The student information was collected anonymously for use in this study, and was representative of all adult basic education (ABE) students across the state of Florida who were enrolled since the inception of the online programs for AAAE and ABE courses in mathematics, reading and language (i.e., from 2009).

Quantitative predicative correlational design with pre- and post-test using de-identified adult general education student records between the years of 2007-2014. Quantitative data analysis was obtained from the Test of Adult Basic Education (TABE) instrument, and successful completion of an Adult General Education program as determined by specific withdrawal codes. Together these were used to categorize adult basic education (ABE) student success.

Access to the Florida Department of Education's Education Information and Accountability Services/Workforce Development Information System (WDIS) where Adult General Education student records are housed/archived was granted through a moderator who provided the researcher with specific requested information from the WIDIS system for all three Technical Schools within the School district of Broward County. Electronic records of all Adult General Education students who were enrolled in Adult Basic Education and Applied Academic Adult Education at all three technical schools in this Florida school district between the years 2007-2014 were provided. All data were supplied without any identifying information.

The first data sheet included student identification numbers, school year of enrollment, date of enrollment in a course, gender, and ethnicity for each student. For this data set, each observation represented a student who was enrolled in the program between

the years of 2009 and 2013. These data could be matched to subsequently calculated variables (i.e., from the schedule data or TABE data) using student identification numbers.

In the second data sheet, student schedules were identified. For this set of data, each observation (i.e., row) represented an instance where a student enrolled in a course. Thus, student observations were repeated for each time that they enrolled in a different course. This data set included the course number in which a student enrolled (repeated for each course), the student's ID number, and the course start and end date. For each course, a corresponding withdrawal code was included. These data were used to determine the length of time spent in a course (i.e., end date minus start date), and the reason for leaving the class (withdrawal code). These data were also used to calculate the total amount of time spent in the program, which was calculated as the sum of time spent in courses. Success was calculated from these data as well, and students were specified as "successful" if at least one of their courses were matched with one or more of the following withdrawal codes; W28, W33, W40, or W44. Because student TABE scores could not be matched to a specific course (i.e., students had multiple TABE scores but no indication of the relevant course for any) these scores could not be used in the determination of a success variable. This is because different courses have different TABE requirements for success.

In the final set of data, TABE scores were presented. This data set included student identification numbers, which were used to match data back to a participant, and a separate observation for each TABE assessment taken. Thus, student observations were repeated for each time a TABE assessment was taken for any course. However, as stated above, TABE data did not include relevant course identifiers, and could not be matched

with the relevant course. These data included administration dates, as well as TABE scores, and was used to calculate the number of times any of the three assessments (i.e., math, language, or reading) were administered to a student, as well as the difference between their first and last TABE score for each of the three assessment types. Once calculated, these variables were all matched back to the appropriate student, such that the final data set did not include repeat observations for any student based on courses taken or TABE assessments administered. The final data set included a total of 12,257 students.

### **Descriptive Statistics**

Of the final cleaned data set of 12,257 students, 43% consisted of males ( $n = 5254$ ) and 57% females ( $n = 7003$ ). Of the 12,257 students, 7,016 (57%) identified as Black or African American, 4,354 (36%) identified as White, while the remaining students identified as American Indian (343, 3%), Multiracial (266, 2%), Asian (259, 2%) or Pacific Islander (19, 0.2%). The majority of participants were traditional face-to-face students (7817, 64%), while 3,177 were online students (26%), and 1,263 took both classroom and online courses (10%). The majority of participants were enrolled in the program of interest in 2009 (4375, 36%), while the smallest percentage of the sample was enrolled in 2013 (1616, 13%). Of all participants, 6,614 (54%) succeeded during the year in which they were enrolled while 5,643 (46%) did not succeed. These frequencies and percentages are presented in Table 1.

The students' ages ranged from 17 to 93, with a mean age of 34.48 ( $SD = 11.56$ ). The average number of times students attempted the program of interest was 3.53 ( $SD = 2.97$ ). The average number of attempts for each individual program was 2.46 ( $SD = 1.61$ ) for Math, 2.57 ( $SD = 1.61$ ) for Language, and 2.66 ( $SD = 1.90$ ) for Reading. The average total time students spent in the program was 518.73 days ( $SD = 589.77$ ). These means

and standard deviations are presented in Table 2.

Table 1  
*Frequencies & Percentages for Categorical Demographic Information*

Demographic	<i>n</i>	%
Gender		
Male	5,254	43
Female	7,003	57
Ethnicity		
Black or African American	7,016	57
White	4,354	36
American Indian	343	3
Multiracial	266	2
Asian	259	2
Pacific Islander	19	0
Year of Enrollment		
2009	4,375	36
2010	2,413	20
2011	1,831	15
2012	2,022	17
2013	1,616	13
Student Type		
Traditional	7,817	64
Online	3,177	26
Hybrid	1,263	10
Student Success in Program		
Succeeded	6,614	54
Did not Succeed	5,643	46

*Note.* Due to rounding error, some percentages may not sum to 100%.

Table 2  
*Means & Standard Deviations for Continuous Variables*

Measure	<i>M</i>	<i>SD</i>
Age	34.48	11.56
Attempts	3.53	2.97
Math Attempts	2.46	1.61
Language Attempts	2.57	1.61
Reading Attempts	2.66	1.90
Total Time	518.73	589.77

## Summary of Results

The preceding results are based on four research questions. The findings suggest that for face-to-face students, age, ethnicity, and number of course attempts, time spent in



the program, differences in first and last TABE scores in math, language, and reading, as well as the number of attempts for the language and reading TABE assessments all had significant bivariate relationships with success. However, a binary logistic regression conducted to include all of these variables indicated that only age, ethnicity, and the number of course attempts were significantly correlated with success when controlling for each of the six other factors.

For online students, age, the number of course attempts, time spent in the program, as well as the differences in first and last TABE scores in math, and language all had significant bivariate relationships with success. However, a binary logistic regression conducted to include all of these variables indicated that only the number of course attempts was significantly correlated with success when controlling for each of the four other factors.

For hybrid students, the number of course attempts, time spent in the program, as well as the number of attempts for math, language, and reading TABE assessments all had significant bivariate relationships with success. However, a binary logistic regression conducted to include all of these variables indicated that this set of variables could not be used in combination to accurately predict placement in a success or non-success group. These results are detailed in the following sections.

### **Detailed Analysis**

**Research Question 1.** To address research question one, the researcher examined the descriptive statistics of online learners from the current sample in order to identify any common characteristics of this population. Both demographic features and scholarly characteristics were examined on this subsample of 3,177. Among the online learners there were 1,074 males (34%) and 2,103 females (66%). As with the whole sample of all

student types, the two largest ethnic groups represented among online learners were those who identified as Black or African American (1494, 47%) and White (1455, 46%).

Demographic features of this subsample are presented in Table 3.

Table 3  
*Categorical Demographic Information of Online Students*

Demographic	<i>n</i>	%
Gender		
Male	1074	34
Female	2103	66
Ethnicity		
Black or African American	1494	47
White	1455	46
American Indian	49	2
Multiracial	86	3
Asian	91	3
Pacific Islander	2	0

*Note.* Due to rounding error, some percentages may not sum to 100%.  $N = 3,177$

The online students' ages ranged from 18 to 77, with a mean age of 35.79 ( $SD = 11.30$ ). The average number of times online students attempted a class, either online, face-to-face, or hybrid was 2.80 ( $SD = 2.28$ ). The average total time online students spent in the program was 531.29 days ( $SD = 583.48$ ). The average number of attempts by online students for each individual TABE assessment was 2.25 ( $SD = 1.32$ ) for Math, 2.13 ( $SD = 1.12$ ) for Language, and 2.18 ( $SD = 1.42$ ) for Reading. Additionally, the researcher examined the difference scores for participant evaluations at the beginning and end of their programs. For online learners, the average difference score for math programs was 3.87 ( $SD = 16.94$ ), the average difference score for language programs was 5.20 ( $SD = 18.89$ ), and the average difference score for reading programs was 4.37 ( $SD = 18.18$ ). These means and standard deviations are presented in Table 4. Figures 1 and 2 provide the average TABE findings for each group, including the number of attempts, and the difference between the first and last assessment for each form (i.e., math,

language, and reading).

Table 4  
*Continuous Variables for Online Students*

Measure	<i>M</i>	<i>SD</i>
Age	35.79	11.30
Class attempts	2.80	2.28
Total time in the program	531.29	583.48
TABE attempts		
Math Attempts	2.25	1.32
Language Attempts	2.13	1.12
Reading Attempts	2.18	1.42
Difference between TABE pre and post		
Math TABE Difference Score	3.87	16.94
Language TABE Difference Score	5.20	18.89
Reading TABE Difference Score	4.37	18.18

Note.  $N = 3,177$

**Research Question 2.** To address research question two, the researcher examined the available data from the subsample of face-to-face learners in order to identify any common characteristics of this population. Because they were available, demographic features were examined as well as the scholarly features for this subsample of 7,817. Among the face-to-face learners there were near equal groups of males (3744, 48%) and females (4073, 52%). The two largest ethnic groups represented among face-to-face learners were those who identified as Black or African American (4805, 62%) or White (2456, 31%). Demographic features of this subsample are presented in Table 5. Figures 1 and 2 provide the average TABE findings for each group, including the number of attempts, and the difference between the first and last assessment for each form (i.e., math, language, and reading).

The traditional face-to-face students' ages ranged from 17 to 93, with a mean age of 33.80 ( $SD = 11.64$ ). The average number of times face-to-face students attempted their program of interest was 3.77 ( $SD = 3.21$ ). The average total time face-to-face students spent in the program was 477.47 days ( $SD = 563.63$ ). The average number of attempts by

face-to-face students for each individual program was 2.39 ( $SD = 1.53$ ) for Math, 2.62 ( $SD = 1.60$ ) for Language, and 2.71 ( $SD = 1.82$ ) for Reading. Additionally, the researcher examined the difference scores for participant evaluations at the beginning and end of their programs. For face-to-face learners, the average difference score for math programs was 3.90 ( $SD = 14.22$ ), the average difference score for language programs was 4.14 ( $SD = 11.85$ ), and the average difference score for reading programs was 3.54 ( $SD = 11.83$ ). These means and standard deviations are presented in Table 6.

**Table 5**  
*Categorical Demographic Information of Face-to-Face Students*

Demographic	<i>n</i>	%
Gender		
Male	3744	48
Female	4073	52
Ethnicity		
Black or African American	4805	62
White	2456	31
American Indian	251	3
Multiracial	154	2
Asian	137	2
Pacific Islander	14	0

*Note.* Due to rounding error, some percentages may not sum to 100%.  $N = 7,817$

**Table 6**  
*Continuous Variables for Face-to-Face Students*

Measure	<i>M</i>	<i>SD</i>
Age	33.80	11.63
Class attempts	3.77	3.21
Total time in the program	477.47	563.63
TABE attempts		
Math Attempts	2.39	1.53
Language Attempts	2.53	1.60
Reading Attempts	2.71	1.82
Difference between TABE pre and post		
Math TABE Difference Score	3.90	14.22
Language TABE Difference Score	4.14	11.85
Reading TABE Difference Score	3.54	11.83

*Note.*  $N = 7,817$

### **Additional Analysis of Hybrid Learners**

Because hybrid learners were not expected, no research question was created to examine this subsample of 1,263. As such, an additional descriptive analysis was

conducted to examine the descriptive statistics for hybrid learners (i.e., those who enrolled in both online and traditional face-to-face courses) in order to better understand the characteristics of this group. Among the hybrid learners there were 436 males (35%) and 827 females (66%). As with the other groups, the two largest ethnic groups represented among hybrid learners were those who identified as Black or African American (717, 57%) and White (443, 35%). Demographic features of this subsample are presented in Table 7.

Table 7  
*Categorical Demographic Information of Hybrid Students*

Demographic	<i>n</i>	%
Gender		
Male	436	35
Female	827	66
Ethnicity		
Black or African American	717	57
White	443	35
American Indian	43	3
Multiracial	26	2
Asian	31	3
Pacific Islander	3	0

*Note.* Due to rounding error, some percentages may not sum to 100%.  $N = 1,263$

The hybrid students' ages ranged from 19 to 74, with a mean age of 35.39 ( $SD = 11.33$ ). The average number of times hybrid students attempted their program of interest was 3.86 ( $SD = 2.67$ ). The average total time hybrid students spent in the program was 1,035.98 days ( $SD = 719.49$ ). The average number of attempts by hybrid students for each individual program was 3.34 ( $SD = 2.33$ ) for Math, 3.32 ( $SD = 2.25$ ) for Language, and 3.57 ( $SD = 2.84$ ) for Reading. Additionally, the researcher examined the difference scores for participant evaluations at the beginning and end of their programs. For hybrid learners, the average difference score for math programs was 4.14 ( $SD = 13.39$ ), the average difference score for language programs was 5.53 ( $SD = 15.10$ ), and the average

difference score for reading programs was 4.10 ( $SD = 12.30$ ). These means and standard deviations are presented in Table 8. Figures 1 and 2 provide the average TABE findings for each group, including the number of attempts, and the difference between the first and last assessment for each form (i.e., math, language, and reading).

Table 8  
*Continuous Variables for Hybrid Students*

Measure	<i>M</i>	<i>SD</i>
Age	35.39	11.33
Class attempts	3.86	2.67
Total time in the program	1035.98	719.49
TABE attempts		
Math Attempts	3.34	2.33
Language Attempts	3.32	2.25
Reading Attempts	3.57	2.84
Difference between TABE pre and post		
Math TABE Difference Score	4.13	13.39
Language TABE Difference Score	5.53	15.10
Reading TABE Difference Score	4.10	12.30

Note.  $N = 1,263$

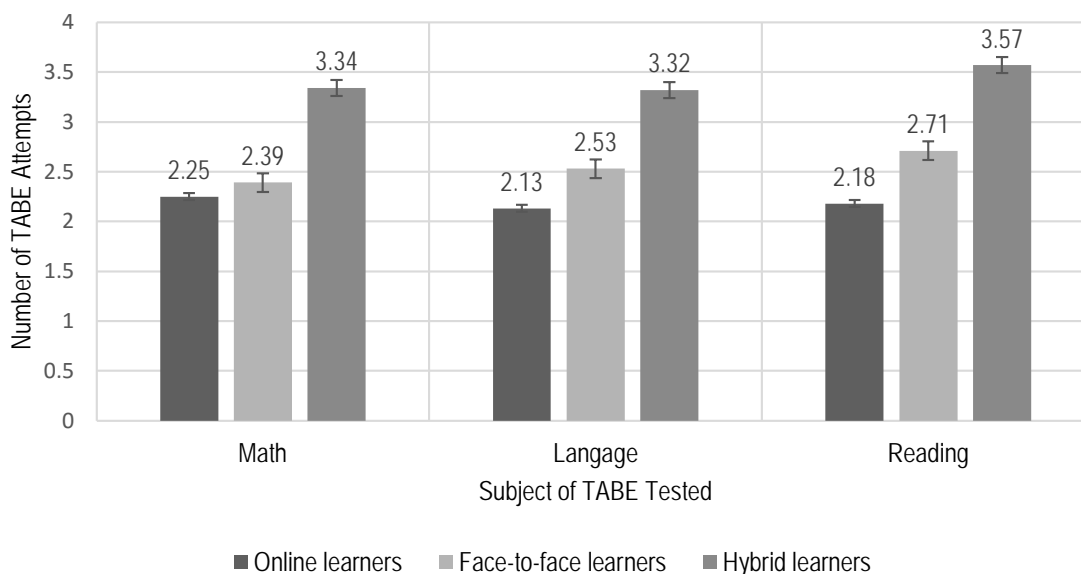


Figure 1. Average number of attempts for each TABE among online, traditional, and hybrid learners.

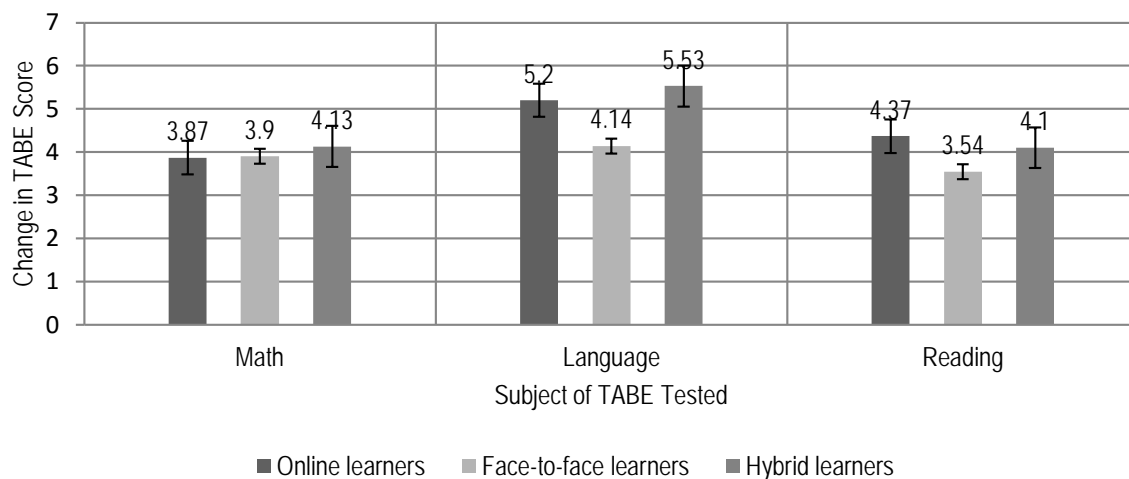


Figure 2. Average change in TABE score for each assessment among online, traditional, and hybrid learners.

**Research Question 3.** In order to assess the characteristics similar to all three types of learners, a series of comparative analyses were conducted between successful and non-successful students. For any continuous variables, including TABE difference scores, the number of times a course was attempted, the total number of days spent in the program, and age the number of times each TABE was taken, *t* tests were proposed. For categorical variables, such as gender and ethnicity, a chi-square analysis was conducted. These analyses were all split such that separate analyses were conducted for either online, traditional, or hybrid students and the independent variable were set as “success” so that these factors could be compared between successful and non-successful students.

The series of *t* tests were conducted first. Prior to analysis, the assumptions of the *t* test were assessed. These assumptions include normality and homogeneity of variance. To assess for normality, one Kolmogorov Smirnov (KS) test was conducted for each continuous dependent variable. Results of these analyses indicated that data were non-normally distributed for each of the continuous variables of interest for all learner types (i.e.,  $p < .001$  for all). As such, this assumption was violated. Homogeneity of variance was assessed using Levene’s test, with one test for each continuous dependent variable,

repeated for each learner type. Levene's test results indicated that the assumption of homogeneity of variance was violated for many of the dependent variables, though this violation varied from one group to the next. Because both of these assumptions were not met for most of the analyses, the non-parametric equivalent of these analyses was conducted. The non-parametric equivalent of the independent sample  $t$  test is the Mann Whitney  $U$ , and this analysis does not require that the same restrictive assumptions of the  $t$  test be met (Lehmann, 2006).

**Traditional face-to-face students.** Results of these analyses indicated significant differences for many of the variables, indicating that the corresponding variable was significantly different between the successful and non-successful groups. For the traditional students, the students' age ( $z = -5.55, p < .001$ ), number of course attempts ( $z = -19.06, p < .001$ ), time spent in the program ( $z = -11.98, p < .001$ ), change in math TABE score ( $z = -2.43, p = .015$ ), change in language TABE score ( $z = -5.39, p < .001$ ), change in reading TABE score ( $z = -5.61, p < .001$ ), number of language TABE attempts ( $z = -3.98, p < .001$ ), and the number of reading TABE attempts ( $z = -4.22, p < .001$ ) were significantly different. This indicates that for all of the variables except math TABE attempts, the successful students were all found to have statistically different values from the non-successful students, and the null hypothesis could be rejected in favor of the alternative.

After interpreting these findings based on mean values for either group (i.e., successful versus non-successful), the following determinations could be made. Successful students tended to be significantly younger than non-successful students, attempted significantly fewer courses, and spent significantly less time in the program overall. Successful students also had much smaller changes in each of their first to last



TABE, but tended to attempt the language and reading TABE assessments approximately one time more on average. These findings are presented in Table 9 below.

**Online students.** For the online students, the students' age ( $z = -2.89, p = .004$ ), number of course attempts ( $z = -13.88, p < .001$ ), time spent in the program ( $z = -8.03, p < .001$ ), change in math TABE score ( $z = -3.64, p < .001$ ), change in language TABE score ( $z = -5.72, p < .001$ ), were significantly different. This indicates that for all of these variables, the successful students were found to have statistically different values from the non-successful students, and the null hypothesis could be rejected in favor of the alternative for age, course attempts, time spent in the program, change in TABE score, and change in language TABE score.

After interpreting these findings based on mean values for either group (i.e., successful versus non-successful), the following determinations could be made. Successful students tended to be significantly younger than non-successful students, attempted significantly fewer courses, and spent significantly less time in the program overall. Successful students also had much smaller changes in their first to last math and language TABE assessment scores. These findings are presented in Table 9 below.

**Hybrid students.** For the hybrid students, the students' number of course attempts ( $z = -4.71, p < .001$ ), time spent in the program ( $z = -2.12, p = .034$ ), number of math TABE attempts ( $z = -2.36, p = .018$ ), number of language TABE attempts ( $z = -2.48, p = .013$ ), and number of reading TABE attempts ( $z = -2.95, p = .003$ ) were significantly different between successful and non-successful students. This indicates that for all of these variables, the successful students were found to have statistically different values from the non-successful students, and the null hypothesis could be rejected in favor of the alternative for the number of course attempts, time spent in the program,

number of math TABE attempts, number of language TABE attempts, and number of reading TABE attempts.

Table 9

*Results of Mann Whitney Test for Group Differences Based on Success*

Variable	z statistic	p	Successful		Unsuccessful	
			M	SD	M	SD
<b>Traditional students</b>						
Age	-5.55	.001	33.10	11.24	<b>34.77</b>	12.11
Attempts	-19.06	.001	3.19	2.63	<b>4.57</b>	3.73
Time Total	-11.98	.001	411.63	540.20	<b>552.22</b>	580.22
Math TABE difference score	-2.43	.015	3.78	13.87	<b>4.08</b>	14.69
Language TABE difference score	-5.39	.001	4.01	11.86	<b>4.32</b>	11.84
Reading TABE difference score	-5.61	.001	3.52	12.15	<b>3.57</b>	11.35
Math TABE attempts	0.84	.403	2.34	1.34	2.48	1.77
Language TABE attempts	-3.98	.001	2.51	1.38	<b>2.80</b>	1.84
Reading TABE attempts	-4.22	.001	2.56	1.54	<b>2.92</b>	2.13
<b>Online students</b>						
Age	-2.89	.004	35.10	11.00	<b>36.32</b>	11.50
Attempts	-13.88	.001	2.19	1.65	<b>3.27</b>	2.57
Time Total	-8.03	.001	430.24	552.86	<b>587.17</b>	592.60
Math TABE difference score	-3.64	.001	3.17	13.15	<b>4.41</b>	19.33
Language TABE difference score	-5.72	.001	4.11	14.80	<b>6.04</b>	21.47
Reading TABE difference score	-0.37	.714	3.96	15.25	4.69	20.14
Math TABE attempts	-1.72	.085	2.16	1.14	2.32	1.44
Language TABE attempts	0.48	.635	2.11	1.02	2.15	1.20
Reading TABE attempts	1.82	.069	2.14	1.15	2.21	1.60
<b>Hybrid students</b>						
Age	-0.55	.584	35.22	11.25	35.57	11.43
Attempts	-4.71	.001	3.57	2.62	<b>4.17</b>	2.70
Time Total	-2.12	.034	981.41	724.02	<b>1,090.56</b>	712.58
Math TABE difference score	0.22	.827	5.03	16.31	3.15	9.07
Language TABE difference score	-1.14	.255	6.92	19.21	4.01	8.31
Reading TABE difference score	-1.78	.075	4.32	13.63	3.86	10.66
Math TABE attempts	-2.36	.018	3.15	2.11	<b>3.56</b>	2.54
Language TABE attempts	-2.48	.013	3.13	2.05	<b>3.54</b>	2.45
Reading TABE attempts	-2.95	.003	3.25	2.30	<b>3.92</b>	3.31

*Note.* Highlighted rows indicate areas of significant difference, while bolded means are the higher of the two groups.

After interpreting these findings based on mean values for either group (i.e., successful versus non-successful), the following determinations could be made. Successful students tended to attempt significantly fewer courses, and spent significantly less time in the program overall. Successful hybrid students also had much smaller changes in their first to last math, language, and reading TABE assessment scores. These

findings are presented in Table 9 above.

A series of six chi-square analyses were conducted to determine if success was independent of gender or ethnicity. For either variable, three analyses were conducted to analyze traditional, online, or hybrid students independently. Traditional students were examined first, followed by online students, and finally hybrid students. Results of the chi-square for gender indicated no significant difference in the distribution of males versus females for successful versus non-successful students ( $p > .05$ ). These findings held true for all three groups. This indicates that gender was independent of success, and the null hypothesis could not be rejected for this characteristic in either the traditional, online, or hybrid students. Results of these analyses are presented in Table 10 below.

Table 10  
*Chi Square Test for Gender and Success for Each Learner Type*

Variable	Unsuccessful	Successful	$\chi^2(1)$	$p$
Traditional students			0.13	.722
Female	1698 [1690.3]	2375 [2382.7]		
Male	1546 [1553.7]	2198 [2190.3]		
Online students			0.10	.752
Female	1186 [1190.2]	917 [912.8]		
Male	612 [607.8]	462 [466.2]		
Hybrid students			2.96	.085
Female	379 [393.5]	448 [433.5]		
Male	222 [207.5]	214 [228.5]		

*Note.* Bracketed values indicate expected counts for a cell.

Next, a series of three chi-squares were conducted in order to determine if success was independent of ethnicity. For this variable, three analyses were conducted to analyze traditional, online, or hybrid students independently. Traditional students were examined first, followed by online students, and hybrid students. Results of the chi-square for

ethnicity indicated no significant difference in the distribution of ethnicities successful versus non-successful students ( $p > .05$ ). These findings held true for all three groups.

This indicates that ethnicity was independent of success, and the null hypothesis could not be rejected for this characteristic for either traditional, online, or hybrid students.

Results of these analyses are presented in Table 11 below.

Table 11

*Chi Square Test for Ethnicity and Success for Each Learner Type*

Variable	Unsuccessful	Successful	$\chi^2(5)$	$p$
Traditional students			80.17	.001
White	879 [1019.2]	1577 [1436.8]		
Black	2179 [1994]	2626 [2811]		
Native American	94 [104.2]	157 [146.8]		
Asian	42 [56.9]	95 [80.1]		
Pacific Islander	4 [5.8]	10 [8.2]		
Multiracial	46 [63.9]	108 [90.1]		
Online students			3.68	.596
White	839 [823.4]	616 [631.6]		
Black	832 [845.5]	662 [648.5]		
Native American	27 [27.7]	22 [21.3]		
Asian	56 [51.5]	35 [39.5]		
Pacific Islander	1 [1.1]	1 [0.9]		
Multiracial	43 [48.7]	43 [37.3]		
Hybrid students			4.84	.436
White	218 [210.8]	225 [232.2]		
Black	340 [341.2]	377 [375.8]		
Native American	14 [20.5]	29 [22.5]		
Asian	15 [14.8]	16 [16.2]		
Pacific Islander	2 [1.4]	1 [1.6]		
Multiracial	12 [12.4]	14 [13.6]		

*Note.* Bracketed values indicate expected counts for a cell.

**Research Question 4.** To assess research question four, three binary logistic regressions were conducted, with one analysis for online learners, one for traditional learners, and one for hybrid learners. For each analysis, the binary dependent variable was success (yes versus no), and the independent variables included any of the characteristics that were significantly related to success for the relevant learner group.

**Traditional face-to-face students.** The first binary logistic regression was conducted to determine the correlational relationship between the characteristic related to success for the subgroup of traditional students. Based on the results of research question three, nine variables were selected to act as the predictor variables in the equation. The resultant predictor variables included age, ethnicity, number of course attempts, total time spent in the program, math TABE difference scores, language TABE difference scores, reading TABE difference scores, the number of language TABE attempts, and the number of reading TABE attempts. Because ethnicity was nominal, it had to be transformed into a dichotomous variable for use in a regression equation (Tabachnick & Fidell, 2012). This was done based on a majority split, so that the two groups created included 1 = Black (i.e., the majority) and 0 = other; this method allowed the two resultant groups to be nearly equal sized. All other variables remained untransformed and were entered directly into the regression equation. Results of the binary logistic regression indicated a significantly predictive model ( $\chi^2(9) = 221.59, p < .001$ , *Nagelkerke*  $R^2 = .05$ ) and the null hypothesis could be rejected in favor of the alternative. Based on a classification plot, approximately 58.5% of cases were accurately placed into the correct “success” versus “non-success” group based on data from the nine independent variables.

Because the model was significant, individual predictors were assessed further. Of

the nine predictor variables, four provided unique predictive ability beyond what was provided from the remaining five variables. Age ( $p < .001$ ,  $OR = 0.99$ ), the dichotomously transformed ethnicity variable ( $p = .001$ ,  $OR = 0.82$ ), and the number of course attempts ( $p < .001$ ,  $OR = 0.90$ ), and differences between the first and last math TABE score ( $p = .048$ ,  $OR = 1.00$ ) were all significant factors to predict success. For each of these variables except the math TABE difference score, a negative association was determined, where an increase in the predictor variable's value corresponded with higher odds of placement in the "non-successful" group. For age, each year increase corresponded with a 0.99 increase in the odds of not being successful in the program. For ethnicity, the "Black or African American" group had 0.82 greater odds of not being successful in the program. In addition, each time an additional course was taken, the odds of being unsuccessful in the program increased by a factor of 0.88. For the math TABE difference score, results indicated that as the difference between the first and last score increased by a unit of one, the odds of being successful in the program increased by a factor of 1.00. None of the other variables were found to contribute any information to the regression that allowed greater predictive ability than the aforementioned three.

Results of this regression are presented in Table 12 below.

Table 12  
*Binary Logistic Regression to Predict Success for Traditional Face-to-Face Students*

Predictor	<i>B</i>	<i>SE</i>	<i>Wald statistic</i>	<i>p</i>	<i>OR</i>
Age	-.01	0.00	14.81	.001	0.99
Black or African American (ref: other)	-.20	0.06	12.51	.001	0.82
Course attempts	-.13	0.01	117.30	.001	0.88
Time in the program	.00	0.00	0.03	.863	1.00
Math TABE difference score	.00	0.00	3.40	.065	1.00
Language TABE difference score	.00	0.00	0.91	.340	1.00
Reading TABE difference score	.00	0.00	0.38	.536	1.00
Language TABE attempts	-.02	0.02	0.68	.411	0.98
Reading TABE attempts	.01	0.02	0.15	.696	1.01

**Online students.** The second binary logistic regression was conducted to determine the correlational relationship between the characteristic related to success for the subgroup of online students. Based on the results of research question three, five variables were selected to act as the predictor variables in the equation. The resultant predictor variables included age, number of course attempts, total time spent in the program, math TABE difference scores, and language TABE difference scores. Results of the binary logistic regression indicated a significantly predictive model ( $\chi^2(5) = 84.63$ ,  $p < .001$ , Nagelkerke  $R^2 = .06$ ) and the null hypothesis could be rejected in favor of the alternative. Based on a classification plot, approximately 64.4% of cases could be accurately placed into the correct “success” versus “non-success” group based on data from the five independent variables.

Because the model was significant, individual predictors were assessed further. Of the five predictor variables, one provided unique predictive ability beyond what was provided from the remaining four variables. The number of course attempts was found to be the only significant factor to predict success in this subsample ( $p < .001$ ,  $OR = 0.78$ ). For this variable, a negative association was determined, where an increase in the predictor variable’s value corresponded with higher odds of placement in the “non-successful” group. Thus, each time an additional course was taken, the odds of being unsuccessful in the program increased by a factor of 0.78. None of the other variables were found to contribute any information to the regression that allowed greater predictive ability than the number of course attempts. Results of this regression are presented in Table 13 that follows.

Table 13  
*Binary Logistic Regression to Predict Success for Online Students*

Predictor	<i>B</i>	<i>SE</i>	<i>Wald statistic</i>	<i>p</i>	<i>OR</i>
Age	.00	0.00	0.31	.580	1.00
Course attempts	-.25	0.04	44.97	.000	0.78
Time in the program	.00	0.00	1.17	.279	1.00
Math TABE difference score	.00	0.00	0.64	.423	1.00
Language TABE difference score	.00	0.00	0.52	.471	1.00

**Hybrid students.** The second binary logistic regression was conducted to determine the correlational relationship between the characteristic related to success for the subgroup of hybrid students. Based on the results of research question three, five variables were selected to act as the predictor variables in the equation. The resultant predictor variables included the number of course attempts, total time spent in the program, number of times attempting the math TABE, number of times attempting the language TABE, and the number of times attempting the reading TABE. Results of the binary logistic regression did not indicate a significantly predictive model ( $\chi^2(8) = 8.97$ ,  $p = .110$ , Nagelkerke  $R^2 = .03$ ). This indicates that the combination of course attempts, total time spent in the program, and the number of attempts on the TABE math, language, and reading did not accurately predict placement into a success or non-success group, and the null hypothesis could not be rejected in favor of the alternative. Because the overall regression equation was not significant, the individual predictors could not be assessed. Results of this regression are presented in Table 14 below.

Table 14  
*Binary Logistic Regression to Predict Success for Hybrid Students*

Predictor	<i>B</i>	<i>SE</i>	<i>Wald statistic</i>	<i>p</i>	<i>OR</i>
Age	.00	0.05	0.00	.947	1.00
Course attempts	.00	0.00	0.06	.801	1.00
Time in the program	-.02	0.05	0.10	.758	0.99
Math TABE difference score	-.05	0.06	0.68	.410	0.95
Language TABE difference score	-.06	0.04	1.84	.175	0.94



## Summary

The problem was to determine if one or more common characteristics are prevalent in Adult General Education (AGE) students who demonstrate the greatest amount of learning gains after completion of AGE coursework as determined by pretesting and post testing of the student by the norm-referenced TABE, and if those advantageous characteristics are unique to the student's choice of mode of course delivery. A complete set of archival student data from a specific school district's technical schools was selected for analysis. The student information was collected anonymously for use in this study, and was representative of all adult basic education (ABE) students across the state of Florida who were enrolled since the inception of the online programs for AAEE and ABE courses in mathematics, reading and language (i.e., from 2009).

Quantitative predicative correlational design with pre- and post-test using de-identified adult general education student records between the years of 2007-2014. Quantitative data analysis was obtained from the Test of Adult Basic Education (TABE) instrument, and successful completion of an Adult General Education program as determined by specific withdrawal codes. Together these were used to categorize adult basic education (ABE) student success.

The findings suggest that for face-to-face students, age, ethnicity, and number of course attempts, time spent in the program, differences in first and last TABE scores in math, language, and reading, as well as the number of attempts for the language and reading TABE assessments all had significant bivariate relationships with success. However, a binary logistic regression conducted to include all of these variables indicated that only age, ethnicity, and the number of course attempts were significantly correlated with success when controlling for each of the six other factors.

For online students, age, the number of course attempts, time spent in the program, as well as the differences in first and last TABE scores in math, and language all had significant bivariate relationships with success. However, a binary logistic regression conducted to include all of these variables indicated that only the number of course attempts was significantly correlated with success when controlling for each of the four other factors.

For hybrid students, the number of course attempts, time spent in the program, as well as the number of attempts for math, language, and reading TABE assessments all had significant bivariate relationships with success. However, a binary logistic regression conducted to include all of these variables indicated that this set of variables could not be used in combination to accurately predict placement in a success or non-success group.

Predictive combinations of characteristics for traditional face-to-face students showed that for each variable, a negative association was determined, where an increase in the predictor variable's value corresponded with higher odds of placement in the "non-successful" group. For age, each year increase corresponded with a 0.99 increase in the odds of not being successful in the program. For ethnicity, the "Black or African American" group had 0.82 greater odds of not being successful in the program. In addition, each time an additional course was taken, the odds of being unsuccessful in the program increased by a factor of 0.88. For the math TABE difference score, results indicated that as the difference between the first and last score increased by a unit of one, the odds of being successful in the program increased by a factor of 1.00.

Predictive combinations of characteristics for online students showed that of the five predictor variables, one provided unique predictive ability beyond what was provided from the remaining four variables. The number of course attempts was found to

be the only significant factor to predict success in this subsample ( $p < .001$ ,  $OR = 0.78$ ). For this variable, a negative association was determined, where an increase in the predictor variable's value corresponded with higher odds of placement in the "non-successful" group. Thus, each time an additional course was taken, the odds of being unsuccessful in the program increased by a factor of 0.78. None of the other variables were found to contribute any information to the regression that allowed greater predictive ability than the number of course attempts.

Predictive combinations of characteristics for the hybrid students determined that results of the binary logistic regression did not indicate a significantly predictive model ( $\chi^2(8) = 8.97$ ,  $p = .110$ , Nagelkerke  $R^2 = .03$ ). This indicates that the combination of course attempts, total time spent in the program, and the number of attempts on the TABE math, language, and reading did not accurately predict placement into a success or non-success group, and the null hypothesis could not be rejected in favor of the alternative. Because the overall regression equation was not significant, the individual predictors could not be assessed.

## Chapter 5: Discussion

### Introduction

Two important trends shaping the landscape of 21st century postsecondary education in the United States are the phenomenal growth of online courses and programs and a concurrent upsurge of interest in career and technical education (CTE). These trends are not unrelated. Research conducted annually by the Sloan Consortium documented increases in online learning that far outpaced the growth of higher education in general (Allen & Seaman, 2007, 2008, 2010). While it appeared for a time in 2007 that the expansion of online enrollment was beginning to reach a plateau, the figures for 2009 showed that assumption to be erroneous; online education grew by 21%, compared to an overall growth rate for higher education of less than 2%.

One explanation for the rebound of online enrollment was the economic recession, which was expected to drive further growth, especially in institutions that feature programs for working adults (Allen & Seaman, 2008). In Florida, legislators responded to the economic downturn by devoting greater attention to developing a skilled and talented workforce. CTE programs serve as a major vehicle for this endeavor. In accordance with the USDOE, all adult education students enrolling in a Florida CTE program are evaluated via the Test of Adult Basic Education (TABE). Those individuals whose scores fall below the designated cutoff point are referred for remediation in an Adult General Education (AGE) program. Those who score 6.0 or higher on the TABE are assigned to Applied Academic Adult Education (AAAE), and those who score 5.9 or lower are assigned to Adult Basic Education (ABE).

This study was conducted in response to interest by CTE program leadership in determining whether there is a connection between the mode of instruction of the AGE

program and student achievement (Personal communication, May, 17, 2012). Moreover, despite an accumulating body of research on distance learning, the presence of AGE students in online education has essentially been ignored. A comprehensive research review revealed only two studies involving basic skills students in distance education programs. Porter's (2004) research was conducted more than a decade ago, before the Internet became the primary mode for delivering distance education courses.

Additionally, ABE students comprised only a small proportion (<2%) of the adult education students, who were primarily English language learners. The only recent study of adult learners taking basic skills courses online and in the traditional classroom appeared in *Dissertation Abstracts International* (Rey, 2011).

This study was designed to address the knowledge gap in the literature regarding the presence of ABE students in the two burgeoning areas of online education and CTE. The purpose of this correlational study was to determine if there are common characteristics that underlie the successful completion of AGE coursework by students attending Florida district Technical Education Centers, and whether such characteristics are unique to the particular mode of course delivery (online or the traditional classroom). The TABE, the same instrument utilized to determine placement, was used to measure the students' achievement in their remedial coursework.

Archival data representative of all AGE students enrolled in Florida ABE and AAAE courses in reading, language, and mathematics were used for analysis. Data from 2009, the year of the introduction of online courses, to 2014, were included. The final data set was composed of 12,257 students, 57% female. Ethnically, the overwhelming majority of students were African American (57%) or White (36%). Native American, Asian/Pacific Islander, and Multiracial students accounted for 2%-3% each of the total

sample. The students' ages spanned from 17 to 90 years, with a mean age of 34.48 years.

Students taking their coursework in the traditional face-to-face classroom comprised nearly two-thirds (64%) of the sample. Students taking the courses online accounted for 26% of the sample, and an additional 10% were enrolled in both online and face-to-face courses. The presence of hybrid students was unexpected and this group was not included in the research questions created to guide this study. Nevertheless, the hybrid students were included in the analyses, providing additional insight into the relationship between student characteristics and course delivery mode and its impact on students' success.

More than half the students (54%) succeeded in their coursework during the year for which they were enrolled. The average number of times the students attempted the program was 3.53, and the average number of attempts for each individual program was 2.46, with some variations based on subject (2.46 for Mathematics, 2.57 for Language, and 2.66 for Reading). On average, the students spent 518.7 days in their respective programs.

This study was driven by four research questions, which examined the significance of the students' demographic characteristics, mode of course delivery, number of course attempts, time spent in the program, and pretest and posttest scores on the TABE in mathematics, language, and reading, in determining the success of AGE students in Florida Technical Education Centers. Knowledge of what characteristics are associated with AGE students' success can be used to create a predictive model with the potential to increase the number of individuals who successfully complete the remedial program and go on to earn a degree or certificate in a chosen career field.

## **Interpretation of Findings**

The results of this study will be discussed and elaborated for each of the four research questions guiding this study.

**Research Question 1.** The first research question investigated whether there are common characteristics among students who demonstrate the greatest learning gains in an online AGE program at Florida state and local district CTE Centers. The analyses for this question were based on the relevant subsample of 3,177 students, two-thirds of them female. This subset included a roughly equal proportion of African American and White students (47% and 46%, respectively). The students' mean age was 35.59 years, slightly higher than the overall mean age of 34.48 years. The average number of times the students in this group attempted a class (via any mode of delivery) was 2.80, and the average number of days spent in the program was 531.29, higher than the overall average of 518.7 days. Analyzed by subject, the average number of times the online students attempted the mathematics class was 2.25, 2.13 for language, and 2.18 for reading. As to the TABE pretest and posttest scores, the average difference for the online learners was 3.87 for mathematics, 5.20 for language, and 4.37 for reading.

In the bivariate analysis for the subgroup of online learners, age, the number of course attempts, time spent in the program, and differences in the first and last TABE scores in mathematics and language were all significantly linked with success. However, when binary logistic regression analysis was conducted encompassing all these variables, only the number of course attempts emerged as a significant independent factor in the students' successful program completion.

**Research Question 2.** The second research question focused on the students enrolled in the traditional face-to-face AGE programs. This question examined what

characteristics are common among the students demonstrating the greatest learning gains in the more traditional venue. Demographically, this subsample of 7,817 students included roughly equal proportions of male and female students (48% and 52%, respectively). However, in contrast to the group of online learners, this group included twice as many African American students (62%) as White students (31%). The mean age of the students in the traditional program was 33.88 years.

In terms of their academic profiles, the students in the face-to-face program attempted the AGE program an average of 3.77 times, spending an average of 477.47 days in the program. By subject, the students in this group attempted the mathematics class an average of 2.39 times, with 2.62 times for language, and 2.71 times for reading. Analyses of the students' first and last TABE scores revealed an average difference in mathematics scores of 3.90, for language scores 4.14, and for reading scores, 3.54.

The separate analyses of the data for the online and face-to-face learners reveal distinct differences in the demographic and academic profiles of the two groups. Indeed, a greater number of variables showed significant bivariate relationships with success among students in the face-to-face group. These were: age, ethnicity, number of course attempts, time spent in the program, and the number of times the students attempted the language and reading TABE assessments, as well as differences in the first and last TABE scores in mathematics, language, and reading. Three factors retained their significance in the binary logistic regression analyses: age, ethnicity, and the number of course attempts. Thus the combined findings of research questions one and two show there are differences in the characteristics associated with the success of students who take the AGE program online and in the traditional classroom.

In view of their unexpected presence there was no separate research question



created to address the subsample of 1,263 hybrid students. Distance education CTE courses usually fall under the heading of hybrid courses because they include hands-on skills training along with the online component (Benson et al., 2005). From this perspective, the combination of online and face-to-face AGE courses may be good preparation for students who choose to pursue a CTE program online. Furthermore, hybrid courses may also prove advantageous for students in that the face-to-face component provides opportunities for the social interaction often lacking in online courses (Muilenburg & Berge, 2005). Two meta-analyses found hybrid courses to be more effective than either online or face-to-face courses (USDOE, 2010; Zhao et al., 2005).

Additional descriptive analysis was conducted to examine the characteristics of students enrolled in both online and face-to-face courses. Women accounted for roughly two-thirds of this group (66%). African American students comprised 57% of this subsample, and White students, 35%. The mean age of the hybrid students was 35.9 years, similar to the mean age of the online learners. On average, the hybrid students attempted their program of study 3.86 times and the average time spent in the program was 1,035.98 days, a dramatic increase over the time spent by the exclusively online or traditional classroom students. The average number of attempts by the hybrid students for each individual program was 3.34 for mathematics, 3.32 for language, and 3.57 for reading. In terms of the difference between the students' first and last TABE scores, the hybrid students averaged 4.14 for mathematics, 5.53 for language, and 4.10 for reading.

The findings for the hybrid students were more ambiguous than for the other two groups. No demographic characteristics were significant in the analyses. In the bivariate analysis, the number of course attempts, time spent in the program, and the number of

times the students attempted the mathematics, language and reading TABE assessments were all significantly associated with AGE program success. In the final analysis, however, none of the variables in this set could accurately be used to distinguish between successful and non-successful hybrid AGE students.

**Research question 3.** Having examined each group of learners independently, research question three addressed the issue of what, if any, characteristics were common to students who demonstrated the greatest learning gains in both the online and traditional face-to-face AGE programs. In order to answer this question, a series of comparative analyses were conducted involving both the successful students and their non-successful counterparts. The results of the analyses revealed significant differences in the profiles of successful and non-successful students. Among the traditional students, age, number of course attempts, time spent in the program, changes in mathematics, language, and reading scores from the pretest to the last TABE, and the number of times the student attempted the reading and language tests all differed significantly in the successful and non-successful groups. Thus, academically, only the number of times the student attempted the math TABE proved insignificant, while demographically, only age was significant. Based on detailed analyses, the successful face-to-face students tended to be significantly younger than the non-successful group; they attempted significantly fewer courses and spent significantly less time in the program. On average, the successful students attempted the reading and language assessments an additional time, but their TABE scores diverged much less from the first to last try.

This last finding, showing much smaller changes in the successful students' first and last TABE scores suggests that the more successful students were better prepared at the onset of the remedial program. Higher GPA has been consistently linked with

persistence since the earliest days of higher education research (Tinto, 1993). Conversely, the need for intensive remediation has proved a perennial obstacle to success, which underscores the importance of determining the factors contributing to the success of students who enter a CTE program with limited skills. The extra attempt at the reading and language assessments by the successful students in the traditional program may reflect stronger motivation to be successful.

Motivational factors are integral to the model developed by Liu et al. (2007) to enhance the retention of online community college students. For the online students in this study, age, number of course attempts, time spent in the program, and changes in mathematics and language TABE scores differed significantly between the successful and non-successful students. Analogous to their counterparts in the traditional AGE program, the successful online students were also younger than those who were not successful. In general, older students tend to have an advantage in online learning (Park & Choi, 2009). In most studies, however, the effect of age on performance usually means that adult learners (>24 years) do better than those of traditional college age. Given the wide age span of the Florida AGE students and a mean age in the mid-30s, the younger students may be advantaged by being out of school for a shorter time and perhaps better prepared to return to the educational setting, whether a traditional classroom or in the virtual realm.

The successful online students also shared other characteristics with the successful students in the traditional program. In both groups successful students attempted significantly fewer courses and spent less time in the program. One distinction was that while the successful classroom students experienced smaller changes in TABE scores on all three subjects, only smaller changes in math and language, but not in reading, distinguished the successful and non-successful students in the online group.

For the hybrid students, the number of course attempts, time spent in the program, and the number of math, reading, and language TABE attempts proved significant in distinguishing between successful and non-successful students. On the whole, the successful hybrid students attempted significantly fewer courses and spent less time in the program, and displayed much smaller changes from the first to last mathematics, language, and reading assessment scores.

Age was significant in the profiles of the successful and non-successful classroom and online students, though not for the hybrid students. For further analysis of the prospective influence of demographic characteristics, a series of chi-square tests were conducted to determine if the students' success was independent of gender or ethnicity. Analyses were conducted separately for the traditional, online, and hybrid students. Neither gender nor ethnicity played a significant role in the students' success across all three groups.

With respect to gender, some studies have found that women appear to have an advantage in online learning. For example, in a study of rural community college students, the women were more likely to complete the program than their male counterparts (Aragon & Johnson, 2008). Both women and adult learners were more inclined to select the online option for taking a developmental writing course (Carpenter et al., 2004). The greater representation of women in the online AGE courses in this study is consistent with the overall body of research on online education.

Muilenburg and Berge (2005) found that gender and ethnicity both influenced students' perceptions of barriers to persistence in online learning. Notably, the fewer barriers the students perceived, the more they enjoyed online learning. This interaction is likely to be bidirectional. The findings of Muilenburg and Berge (2005) were consistent

with the assertion that the outcome of distance learning depends upon characteristics of the student, the instructor, and the course design (Harrell, 2008; Li & Irby, 2008). This may be the case in the traditional classroom as well, which highlights the need to identify characteristics of successful students in both settings.

Johnson (2009) explored the relative merits of online, traditional, and hybrid classes for preparing community college students in need of remedial classes for future academic success. The mode of instruction had no significant impact on the students' success in subsequent college level coursework. Rather, the pivotal factors were gender, the subject of the remedial course, and the student's grade in the course. These factors predicted future achievement independent of the method of course delivery.

**Research question 4.** The final research question examined whether a specific characteristic or combination of characteristics could be used to predict the success of a student who plans to take an online or traditional face-to-face AGE program offered by Florida state and local district Career and Technical Centers. Addressing this question involved three binary logistic regression analyses: one for online learners, one for traditional learners, and one for hybrid learners.

Based on the findings for research question three, nine variables were selected as predictor variables in the equation for the traditional learners. These were: age, ethnicity, number of course attempts, total time spent in the program, mathematics TABE difference scores, language TABE difference scores, reading TABE difference scores, the number of language TABE attempts, and the number of reading TABE attempts.

Using this approach, roughly 58.5% of cases were accurately classified in terms of "successful" and "unsuccessful." In view of the significance of the model, further analyses were conducted on individual factors. Of the nine proposed factors, four

demonstrated unique predictive abilities beyond what was predicted by the remaining five factors. Age, ethnicity, the number of course attempts, and the differences between the students' first and last TABE math scores all emerged as significant predictors of success in a traditional AGE program.

In accordance with the impact of age on the success of the traditional and online students as shown in the findings for research questions two and three, each year older in age heightened the probability (by 0.99) that the student would not succeed in the program. With respect to ethnicity, Black students had 0.82 greater probability of not succeeding. Each additional course taken decreased the probability of success by a factor of 0.88. In terms of the math TABE difference scores, as the difference between the first and last test scores increased by a unit of one, the probability of AGE program success increased by a factor of one.

The findings from research question three yielded five predictor variables for determining success in students taking the AGE program online. These were: age, the number of course attempts, total time spent in the program, mathematics TABE difference scores, and language TABE difference scores. Results of the binary logistic regression indicated that approximately 64.4% of cases could be accurately classified into the "successful" and "unsuccessful" groups.

Based on further analyses, only one factor emerged as having predictive power beyond what was discerned from the four remaining factors. The number of course attempts proved to be the only significant factor for predicting success in the subgroup of online learners. Specifically, each additional course attempt heightened the probability of not being successful by a factor of 0.78.

Five potential predictive factors were included in the analyses for the hybrid

students: the number of course attempts, the time spent in the program, and the number of times attempting the math, language, and reading TABE assessments, respectively. The results showed that this model could not be used to predict the success of the hybrid students. Given the results for the hybrid students in response to research question two, it is not surprising that the hybrid students could not be accurately placed into “successful” and “unsuccessful” groups. Intuitively, it seems that a blended group of students would be more difficult to classify than a group that fits into the category of one course delivery mode.

### **Connections to Relevant Research**

Two decades ago, Kozma (1994) declared “while some students will learn a particular task regardless of delivery device, others will be able to take advantage of a particular medium’s characteristics to help construct knowledge” (p. 3). This statement was prescient, given the explosive growth of online learning and the subsequent interest in understanding the factors that contribute to students’ success in the virtual realm. In relation to the present study, however, research on distance learning in CTE programs is limited and research involving AGE students enrolled in online courses is almost nonexistent. Porter (2004) found adult educators to be skeptical of the effectiveness of distance learning for students in need of adult basic education. In particular, deficits in reading present a potential impediment to success in online coursework, where a preference for reading as a learning modality heightens the probability of success (Cross, 2008).

Given the dearth of research on ABE students, it is difficult to discern whether adult educators have become more optimistic about their students’ prospects for success in distance education courses since Porter’s (2004) research evolved in the wake of the

California Basic Skills Initiative. Based on research involving police officers, Donavant (2009) suggested that online coursework might be more advantageous for police organizations with high proportions of more educated officers, while traditional instruction might be a better investment for organizations where more officers have lower educational levels. In view of the effect of educational attainment in Donavant's (2009) research and of GPA in studies of college students, the skepticism of adult educators regarding the efficacy of distance learning for basic skills students (Porter, 2004) may not be unwarranted. At the same time, institutions, particularly community colleges, recognize that their programs must be designed to accommodate academically underprepared students, including those who enroll in distance programs and courses. The early identification of students who need assistance to successfully complete online courses should be conducted before the students enroll in the course and appropriate help provided to prepare them for online coursework (Harrell, 2008).

In Porter's (2004) study, online courses accounted for only 13.5% of instruction, and ABE students were only a miniscule fraction of the overall sample. Nevertheless, the distance learners enjoyed significant gains, and the greatest degree of progress was made by students in the beginning ABE and ESL courses. It is not unusual in studies of remedial programs to find that students who begin with the lowest skill levels often demonstrate the most substantial gains. In the present study, the degree of improvement from the first TABE to the last had limited significance. Although the initial analyses suggested that across all three modes of instruction (face-to-face, online, and hybrid) more successful students exhibited smaller changes in TABE scores from the first to the last assessments, in the final model, a greater degree of difference between the first and last TABE scores increased the probability of students' success, but only for mathematics



and only for students in the traditional face-to-face program.

The first nationwide survey of community college distance learning CTE programs was conducted in 2002-2003 (Johnson et al., 2004), the same time as the inception of the first Sloan Consortium online education survey (Allen & Seaman, 2010). More than three-quarters of the institutions responding to the CTE survey had introduced distance learning CTE courses (Johnson et al., 2004). Through analysis of information presented on the websites of exemplary CTE programs, Johnson et al. identified three models used to deliver skills training: on-campus training, a blended model where the students received hands-on training in a campus laboratory; internships or clinical experience in which the students work under authorized supervision; and virtual skills training provided by means of computer simulation.

It is interesting to note that by 2004 a large majority of community colleges had already implemented online or hybrid CTE programs, yet a decade later there remains a dearth of evidence on the experience and achievement of students enrolled in these programs. In one of the few studies focused on CTE programs, Benson et al. (2005) investigated the nature of online CTE programs, comparing them with on-campus courses. The participants in the mixed methods study were 193 students (112 on campus and 81 online) in five courses offered by three community colleges, involving three very different fields of study: Funeral Service Education, Veterinary Technology, and Landscape and Horticultural Technology.

In comparing the three programs, Benson et al. (2005) observed that each program was unique in its approach to distance learning, although all three programs employed a variety of technologies and ensured that their students were offered ample opportunities for hands-on learning as well as online tutorials and discussion forums. As

far as the students, the study found minimal differences in the motivation, satisfaction, and performance of the students in the online and face-to-face classes. This might be ascribed to both the self-selection of students into the two modes of course delivery as well as the design of the courses.

The findings of Benson et al. (2005) are also consistent with the “no significant difference” phenomenon. Initially introduced by Russell (1999), who found no significant difference in learning outcomes between distance education and traditional face-to-face classroom instruction in studies spanning 70 years, the concept of no significant difference became embedded in the literature on distance learning. At the same time, distance education has improved and expanded dramatically since the last study in Russell’s work was conducted in 1999. A meta-analysis of research on distance education revealed that the outcomes of distance education programs improved substantially in studies published since 1998, roughly coinciding with the growth of the Internet (Zhao et al., 2005). A more recent meta-analysis and review of research on online learning undertaken by the USDOE (2010) reported that on average, students in online courses performed somewhat better than those enrolled in traditional classes.

Zhao et al. (2005) and the USDOE (2010) both reached a common conclusion, specifically that blended courses represent the most effective mode of distance education. However, the USDOE (2010) researchers attributed this finding to the fact that students in blended courses devoted significantly more time to their coursework than those who took the same course in a purely online or traditional classroom setting. In other words, a student who spends more time engaged in coursework, regardless of the mode of course delivery, will exhibit a greater degree of understanding of course material.

According to the USDOE (2010) report, the effect sizes were larger for studies

involving collaborative or instructor-directed online instruction than for studies where online learners worked independently. The assumption that adult learners are self-directed is central to Knowles' (1990) theory of andragogy. However, research involving the growing number of adults enrolled in higher learning indicates that Knowles was unduly optimistic. A large body of evidence shows that many students lack the self-discipline and self-regulation skills essential to success in the online learning environment (Allen & Seaman, 2007; Cross, 2008; Harrell, 2006, 2008; Li & Irby, 2008; Puzziferro, 2008). Online CTE courses are highly structured, which seems to be a factor in their success (Benson et al., 2005). Aragon and Johnson (2008) found that self-directed learning was not a significant factor in online learners' course completion.

This study was not designed to compare the relative efficacy of online versus classroom instruction for delivering AGE courses, but rather to identify characteristics that may predict students' success in either or both types of programs. The unexpected addition of students enrolled in both traditional and online courses adds an extra dimension to this line of research. The model proposed for each group was more effective in predicting the success of the online learners compared to the traditional program group (64.4% versus 58.5%). This may reflect a greater degree of self-selection among the students who took the AGE program online.

In the study of Carpenter et al. (2004), which focused on students taking developmental writing courses, online instruction was an effective method of course delivery. However, the students who opted to take the course online displayed higher levels of reading and writing proficiency before the course and the more skilled students were more likely to persist. Furthermore, while the online course produced superior outcomes, it also had high attrition, suggesting that students who performed poorly were

more inclined to drop out of the course, leaving the higher achievers. The findings in this study that fewer course attempts were associated with higher probability of success, suggests that students who entered the program more skilled were more likely to be successful in either the online or face-to-face course.

While it is hardly surprising that higher skilled students should have an advantage, this finding raises the issue of how ABE and AAAE instruction can be more individualized to accommodate students of different skill levels. Adult education has been described as being “classroom centered, but not necessarily learner centered” (Porter, 2004, p. 150). Learner centered instruction is pivotal to Knowles’ (1990) model of andragogy. Creating a learner-centered environment is an essential feature of effective online instruction (Harrell, 2008).

Notably, Carpenter et al. (2004) observed that while poorly prepared students were more likely to drop out of an online developmental writing class, the reverse pattern was true for the traditional face-to-face class. That is, the students who entered the class with higher scores were more inclined to drop out. It is possible that those students were dissatisfied by a didactic rather than a learner-centered environment. Personalized, learner-centered instruction is beneficial to all students, across skill and ability levels and educational settings.

Recommendations to prepare students for online learning have important implications beyond readiness in terms of technical proficiency or self-discipline. Zavarella and Ignash (2009) observed much higher rates of attrition among students enrolled in online and hybrid developmental education classes compared to that for the traditional class; in fact, attrition was roughly twice as high in the online and hybrid classes. Comments made by students who dropped out of the technology-driven courses

led the researchers to propose that some students may have assumed (erroneously) that the online course materials would be easier to understand or less time-intensive than the classroom lessons. Moreover, the students seemed to be unaware of the assistance that was available to them. Lack of clarity about what the program will entail and what resources are available for additional help are impediments to students' success regardless of the educational setting. However, misconceptions about online education may be common among students who have never taken an online course. Students with prior experience in online coursework tend to have more positive attitudes toward online learning and report greater enjoyment in online classes and fewer obstacles to success (Dobbs et al., 2009; Muilenburg & Berge, 2005).

In the lone recent study of basic skills students, Rey (2011) investigated the success and persistence of California community college students taking basic skills mathematics courses online and in the classroom. Rey's findings added to the body of research supporting the "no significant differences phenomenon" (Russell, 1999). Rey (2011) noted that there was no evidence of the presumed complexity of communicating mathematical concepts in an online course format. It initially seemed that the online instruction was superior; the students who entered basic skills mathematics with an online pre-algebra course tended to earn higher grades and have higher rates of persistence than those in the traditional classroom course. However, the advantage of online coursework rapidly dissipated. Of the five course components analyzed only one, requisite participation in discussion boards was associated with success and persistence.

Rey (2011) determined the level of understanding and participation of each student by requiring them to participate in discussion board posts. Observation of the depth, breadth, frequency, and enthusiasm of student posts allows the instructor to make an informed

judgment of the students' degree of mastery of the required coursework. Given this finding, requiring discussion board activity may be a consideration when designing a basic skills mathematics course. According to Rey (2011), the quality of the instructor presenting the course is probably much more important to the quality of the learning experience than is the system of delivery.

Rey (2011) concluded that it is not more difficult to teach basic math online than it is to teach reading or language. It is noteworthy, however, that in the present study, only the difference between the students' first and last math TABE scores (but not reading or language scores) emerged as a characteristic shared by the online and traditional students who displayed the greatest learning gains.

### **Synthesis of Findings**

This study sought to determine whether there are common characteristics that underlie the success of students enrolled in ABE and AAAE programs online and in the traditional classroom setting at Florida state and local district Career and Technical Centers. Examination of the dataset produced a subsample of students taking classes in both settings, and they were included in the analysis. However, discerning characteristics associated with the success of the hybrid students proved more elusive. The analyses were based on the demographic attributes of age, gender, and ethnicity, and the scholarly factors of number of course attempts, time spent in the program, and differences between the first and last TABE scores in mathematics, language, and reading, along with the number of times the students attempted the AGE program and the number of times the student attempted each individual program.

One intriguing finding was that younger age was an advantage in successful program completion regardless of mode of course delivery, which contrasts with studies

of distance learners showing that older students tend to fare better (Park & Choi, 2009). It is possible that older students in an AGE program need more assistance due to the longer time they have been out of school. Older AGE students might be less aware of available resources and supports, which is a detriment to all students, especially those who take courses online (Harrell, 2008; Zavarella & Ignash, 2009). Gender was not a factor in this study, although several studies have found that women tend to fare better in online coursework (Aragon & Johnson, 2008; Carpenter et al., 2004; Muilenburg and Berge, 2005). In this study, ethnicity was a predictive factor for students in the traditional program only. That is, African American students were somewhat less likely to be successful.

A greater number of factors displayed predictive value in distinguishing successful from non-successful face-to-face students. For these students, nine factors could be included in a predictive model that accurately classified approximately 58.5% of the students in terms of success versus non-success. Four factors were found to make unique contributions: age, ethnicity, the number of course attempts, and the difference between the students' first and last math TABE scores. For the online students, five factors were included in a predictive model that accurately distinguished roughly 64.4% of the students. In the final analysis, only one factor was a unique predictor of program success: the number of course attempts.

The fact that an *increase* in the number of times a student attempted a course would be associated with success suggests that motivation might play a part. Motivation is recognized as an important influence on academic success, especially in the online learning environment where factors related to motivation and self-regulation tend to have a pronounced impact on students' persistence and performance (Harrell, 2008; Liu et al.,

2007; Puzziferro, 2008).

With the aim of creating a framework that could be utilized to enhance student retention, Liu et al. (2007) conducted a comprehensive review of theoretical and empirical literature to explore factors involved in community college students' decisions to drop out of online courses. The researchers observed certain common factors across the array of surveys they analyzed. They synthesized the psychological, technological, and social factors drawn from their research into a framework for informing institutional policies and practices for increasing retention in online courses. The multidimensional model encompasses early identification via learner assessment; targeted, continuous intervention including the development of effective blended learning programs; psychological counseling and advising; available, prompt technical support; and the development of social and learning communities.

The findings from this study, which focused on demographic and academic variables, could be synthesized into a framework for aiding AGE students, with parallel frameworks for students in traditional classes and online or hybrid classes. Following Lui et al. (2007), a comprehensive framework would also include psychological, social, and technological factors that are relevant to the students' success.

### **Recommendations for Future Research**

The scarcity of empirical research on AGE students makes this a potentially very productive area for future research. In particular, there is an urgent need for research examining the experiences of learners who take AGE courses online or in hybrid form. The addition of motivational factors, for example, might result in a model that effectively identifies successful or non-successful students. For AGE students in general, research examining the influence of motivational and self-regulatory factors would be useful for



targeting assistance for students at risk for not completing the program. Motivation is a variable that could be measured using archival data sets and was, therefore, beyond the scope of this quantitative correlational study.

For their research examining differences in the characteristics of students who dropped out or completed online community college courses, Aragon and Johnson (2008) contacted students who withdrew from the course to explore their reasons for dropping out. Roughly one-third dropped out for “personal reasons,” which is not unusual for adult learners with multiple responsibilities. However, a substantial proportion of students dropped out due to course design and communication issues, tutorial issues, and in some cases the realization that online education was not compatible with their personal learning styles. Analogous to exit interviews that are used to guide human resources management practices in business, questioning students who drop out of an AGE program could be a valuable source of information for improving policies and practices. Former students who were dissatisfied with online courses might be persuaded to reenroll in traditional classes and vice versa.

Qualitative research is recommended to further illuminate factors to which AGE students attribute their success or lack of success in the program, and mixed methods studies are especially valuable. Comments by students interviewed by Zavarella and Ignash (2009) highlighted the importance of assuring that students who enroll in distance courses are prepared for online learning. One of their recommendations was creating a website that students are required to access before taking a technology-based course, outlining the expectations for the course and the characteristics of successful students. This could be especially valuable for developmental students, who might need additional training and preparation. Interviews with former, current, and prospective AGE students

could provide useful information for preparing new students. This line of research would further identify characteristics that contribute to (or detract from) students' success in the traditional classroom, online, and in hybrid courses. Especially important, this information would come from the students' themselves; thus their perspectives would be integrated into the design of courses and student supports.

Online education and CTE are both expanding, with the implication that a growing number of Florida students will require ABE or AAAE courses before they can enter a CTE program, and many will take those courses online. The findings from this study can serve as a foundation for future research into the factors contributing to the success of ABE and AAAE students: a largely neglected population in higher education research, but no less important for the development of a skilled and talented workforce.

### **Conclusion**

The focus of this study was to determine to what extent a correlation exists between the mode of instructional delivery and impact on learning gains of students enrolled in Adult General Education coursework. The purpose of this quantitative correlational study was to determine to what extent, if any, a relationship exists between the predominant variables common among successful students who complete remedial adult basic education (ABE) coursework in either online or traditional classroom modes of course delivery. Additionally, data collected was found to be statistically significant in predicting the future success of ABE students in online, traditional, and hybrid modes of instruction. This study addressed the gap in the current knowledge base regarding successful distance educational settings for adult career and technical education (CTE) students who require remedial coursework. Furthermore, this study may help others develop and revise related adult and technical education policies.

Four research questions were developed for use in this study to determine if a common characteristic exists among successful students who took online and traditional coursework. Additionally, the research questions addressed the common characteristics among successful students in both the online and traditional modes of instruction. Ultimately, the research question based on a specific characteristic or combination of characteristics used to predict student success was posed. A predictive correlational design with pre- and posttest was utilized using the TABE as the instrument of measurement for the independent variable.

To identify the effective characteristics of students of Adult Basic Education, a research study was developed and implemented to determine if a correlation exists between Test of Adult Basic Education scores and mode of instruction; specifically, the determination if a correlation exists between learning gains of the student as determined by Test of Adult Basic Education (TABE) scores and educational setting. Additionally, differences in the time spent by students of Adult Basic Education to successfully complete their program online, in the traditional classroom, or a hybrid of both was analyzed. Furthermore, retention rate and mode of course instruction was evaluated. Quantitative data were obtained from the TABE instrument, analyzed, and used to quantify correlations in Adult Basic Education student success. The analysis of learning gains, time to complete program of study, retention rates were looked at in terms of mode of course delivery.

Prior to this quantitative correlational study, no study had been conducted to determine if a correlation exists between variables that could affect the achievement levels of distance learners and those of a more traditional classroom setting in Adult Basic Education or Applied Academic Adult Education programs. The problem then is to determine if one or more common characteristics are prevalent in Adult General

Education (AGE) students who demonstrate the greatest amount of learning gains after completion of AGE coursework as determined by pretesting and post testing of the student by the norm-referenced TABE, and if those advantageous characteristics are unique to the student's choice of mode of course delivery.

A complete set of archival student data from a specific school district's technical schools was selected for analysis. The student information was collected anonymously for use in this study, and was representative of all adult basic education (ABE) students across the state of Florida who were enrolled since the inception of the online programs for AAAE and ABE courses in mathematics, reading and language (i.e., from 2009).

A quantitative predicative correlational design was used for this study with pre- and posttest using de-identified adult general education student records between the years of 2007-2014. However, only data from 2009-2013 was able to be analyzed with statistical significance due to incomplete records available. Quantitative data analysis was obtained from the Test of Adult Basic Education (TABE) instrument, and successful completion of an Adult General Education program as determined by specific withdrawal codes. Together these were used to categorize adult basic education (ABE) student success.

The findings suggest that for face-to-face students, age, ethnicity, and number of course attempts, time spent in the program, differences in first and last TABE scores in math, language, and reading, as well as the number of attempts for the language and reading TABE assessments all had significant bivariate relationships with success. However, a binary logistic regression conducted to include all of these variables indicated that only age, ethnicity, and the number of course attempts were significantly correlated

with success when controlling for each of the six other factors.

For online students, age, the number of course attempts, time spent in the program, as well as the differences in first and last TABE scores in math, and language all had significant bivariate relationships with success. However, a binary logistic regression conducted to include all of these variables indicated that only the number of course attempts was significantly correlated with success when controlling for each of the four other factors.

For hybrid students, the number of course attempts, time spent in the program, as well as the number of attempts for math, language, and reading TABE assessments all had significant bivariate relationships with success. However, a binary logistic regression conducted to include all of these variables indicated that this set of variables could not be used in combination to accurately predict placement in a success or non-success group.

A greater number of factors displayed predictive value in distinguishing successful from non-successful face-to-face students. For these students, nine factors could be included in a predictive model that accurately classified approximately 58.5% of the students in terms of success versus non-success. Four factors were found to make unique contributions: age, ethnicity, the number of course attempts, and the difference between the students' first and last math TABE scores. For the online students, five factors were included in a predictive model that accurately distinguished roughly 64.4% of the students. In the final analysis, only one factor maintained a unique predictor of program success: the number of course attempts.

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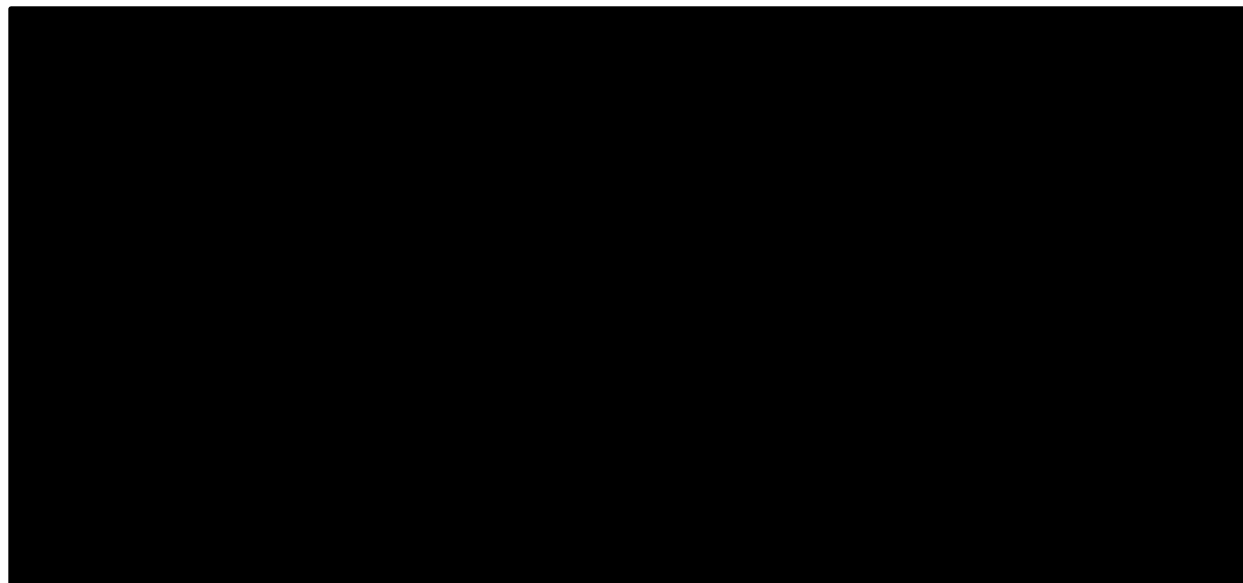
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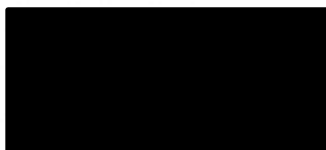
Appendix A

Permission to use Location and Data



March 21, 2014

*Superintendent of Schools*

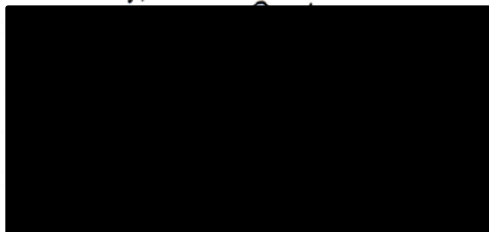


Nova Southeastern University IRB Office:

As Director, I have given Mr. Daniel J. Stackhouse provisional permission to review and use archival data previously collected and stored by our Center provided Mr. Stackhouse receives prior approval from the Institutional Review Boards (IRB) of Nova Southeastern University and [REDACTED] School. I have spoken with Mr. Stackhouse and understand the scope of his research, and how he will be using our data. All information to be gathered will be done in a confidential and appropriate manner.

Should you have any questions, please feel free to contact me.

Sincerely,



Appendix B  
TABLE

**I. Study the table and choose the best possible answers**

The following table gives the caloric expenditure after 10 minutes of activity for various body weights. This data was obtained from Reebok Instructor News, Volume 4, Number 2, 1991.

Activity & Calories/min	120 lbs	140 lbs	160 lbs	180 lbs
Aerobics (Traditional)	7.4	8.6	9.8	11.1
Basket	7.5	8.8	10.0	11.3
Bowl	1.2	1.4	1.6	1.9
Cycling (10 mph)	5.5	6.4	7.3	8.2
Golf (pull/carry clubs)	4.6	5.4	6.2	7.0
Golf (power cart)	2.1	2.5	2.8	3.2
Hi	4.5	5.2	6.0	6.7
Jog	9.3	10.8	12.4	13.9
Run	11.4	13.2	15.1	17.0
Sitting	1.2	1.3	1.5	1.7
Skating (ice and roller)	5.9	6.9	7.9	8.8
Skiing (cross country)	7.5	8.8	10.0	11.3
Skiing (downhill and water)	5.7	6.6	7.6	8.5
Swimming (crawl and moderate pace)	7.8	9.0	10.3	11.6
Te	6.0	6.9	7.9	8.9
Walk	6.5	7.6	8.7	9.7
Weight	6.6	7.6	8.7	9.8

- Which weight class burns the most calories by running?
  - 120
  - 140
  - 160
  - 180
  
- Which two exercises will burn the most calories in the 140-weight class?
  - Jogging and aerobics
  - Running and cycling
  - Jogging and running
  - Hiking and skiing
  
- Which activity burns a little less than double that of bowling in the 120-weight class?
  - Golf (power cart)
  - Golf (pull/carry clubs)
  - Tennis
  - Hiking

**II. Read the paragraphs below and then choose the best answer for question 1.**

Nursing is, in general, the process of caring for or nurturing another individual. More specifically, nursing refers to the functions and duties carried out by persons who have had formal education and training in the art and science of nursing. Formal nursing education in the United States had its antecedents in Europe and England.

One of the first formal training programs for nurses was begun in 1836 in Kaiserswerth, Germany, by Pastor Theodor Fliedner for the Order of Deaconesses. Other religious orders were also providing formalized training for nurses in Europe at that time, but Fliedner's school is noteworthy for having given the British nursing reformer Florence Nightingale her formal training. Her experience at Kaiserswerth gave her the impetus to organize nursing care on the battlefields of the Crimean War and, later, to establish a nursing training program at Saint Thomas's Hospital in London.

In the late 1800s training schools patterned after this model were established in the United States. Originally, nurses received little or no classroom preparation. Most of the training was based on apprenticeship, with older students teaching the younger ones how to care for patients. All programs were directed by hospitals, and nursing students provided low-cost service to the institutions; upon graduation, most of them worked as private-duty nurses in patients' homes. (Taken from Encarta Encyclopedia)

1. Identify the main idea of the entire passage:

- A. Nursing is defined as the caring for or nurturing of another individual.
- B. Florence Nightingale was trained in Germany.
- C. Nursing education in Europe and the United States is quite similar.
- D. The religious history of nursing is interesting.

**III. Study these three ads, which might appear in a local college newspaper, then answer the questions below.**

Animal Care Tech looking for hard working person to work w/ reptiles & rodents. Will train, PT to start with more hrs. later. Must be drug free. Start at \$5.50/hr. Flex hrs. Please call 555-555-5555 between 9-4 M-F.

Certified Nursing Assistant needed FT for elderly male in-home care. M-F 8-5 \$200/wk. Drug test required. Must be certified. Call 555-555-5512

LIKE TO WORK WITH LUXURY CARS?



Shop helper, M-F 1 pm-6 pm, alt Sat 10-4. Fall/Spring. Must be at least 21, clean driving record, drug free, pers ref, pre-emp screening. Some exp nec. Live close. Please call 555-555-5551.

1. What similarities do the three advertisements share?
  - A. Applicants can expect to do a drug test.
  - B. Salary is just above minimum wage.
  - C. All must be 21 or older.
  - D. All offer flexible hours.
  
2. Which position does not require previous training or experience?
  - A. Animal Care Technician
  - B. Certified Nurses Assistant
  - C. Shop Helper
  - D. Both Animal Care Technician and Shop Helper
  
3. Which two ads might appeal to a full-time college student with morning classes?
  - A. All three positions are possible for consideration.
  - B. Animal Care and Certified Nurses Assistant
  - C. Certified Nurses Assistant and Shop Helper
  - D. Animal Care and Shop Helper

**I. For numbers 1-3, choose the group of words that makes a complete sentence.**

1.
  - A. As she parked in my driveway.
  - B. Beeping the horn.
  - C. Before I could greet her.
  - D. She backed the car into the street.
  
2.
  - A. When I stepped on the stage.
  - B. Standing before the audience.
  - C. I became nervous.
  
3.
  - A. The girl who enrolled in school.
  - B. Studying to be a nurse.

- C. She followed a heavy schedule.
- D. Completing the program.

**II. For numbers 1 -3, decide which punctuation, if any, is needed in the sentence.**

1. "Are the combs and brushes sanitized yet " asked the salon manager.

- A. .
- B. ,
- C. ?
- D. "
- E. None

2. The date of her ASE exam is June 14 2003.

- A. , <sup>1</sup>.
- B. "
- C. .
- D. ! <sup>3</sup>.
- E. None

3. Your resume John was the best one we received.

- A. :
- B. ,
- C. "
- D. '

**III. Choose the answer that best develops the topic sentence.**

1. Fire safety techniques should be taught to children.
  - A. Hundreds of children are killed each year, and hundreds more are injured because of firework displays.
  - B. If a child's clothes are on fire, the child should stop where he is, drop to the ground, and roll over and over to smother the fire.
  - C. Since child seat-belt laws have been in effect, thousands of lives have been saved.
  - D. Schools are the best place for children to learn these things.
  
2. A cosmetologist must discover a customer's vision of herself in order to create a look that will please the customer.
  - A. Beauty salons are wonderful places to gossip and leaf through magazines to discover what the newest styles are.
  - B. That is why it is so important to have mirrors and a wide array of products for sale in a salon.
  - C. An elegant up-sweep might please a society matron, while a spiked rainbow would probably please a person with punk rock leanings. Neither of those customers would be happy with the other's style.
  - D. Women get tired of looking the same way all of the time, so a cosmetologist must constantly try out new looks on her customers. That way the customer will be happy.
  
3. Effective study habits include regular review.
  - A. Good note taking includes the use of outlines and colored highlighters to mark important points.
  - B. One should study at the same time and in the same place every day. One should also take good notes.
  - C. The reason cumulative exams are difficult is because it is easy to forget those things which we do not use. To stay sharp in those areas will only require about half an hour of review each week for each subject of study.
  - D. A quiet room and good lighting is also essential to effective study.

**test 3 | mathematics****I. Read each question and choose the best answer.**

1. An airplane flying at an altitude of 32,000 feet descends at a rate of 1,300 feet per minute. If the plane descends for 15 minutes, what would its altitude be in feet?

A. 10,000 ft.  
B. 12,500 ft.  
C. 19,000 ft.  
D. 19,500 ft.

2. The angle of the roof on Wendy's dollhouse is  $56^\circ$ . She built a scale model of the dollhouse with a scale ratio of 1:4. What is the measure of the angle of the roof of the model she built?

A.  $14^\circ$   
B.  $34^\circ$   
C.  $56^\circ$   
D.  $224^\circ$

**II. Solve the following problems and write your answers on the answer sheet.**

1. 
$$\begin{array}{r} 612 \\ \times 4 \\ \hline \end{array}$$
- A. 2848  
B. 2408  
C. 2448  
D. 1658  
E. None of the above

2. 
$$\begin{array}{r} 301 \\ \times 9 \\ \hline \end{array}$$
- A. 2709  
B. 2799  
C. 2409  
D. 2499  
E. None of the above

3.  $44 \times 12 = :$
- A. 132  
B. 4488  
C. 428  
D. 528  
E. None of the above

**III. Choose the best answer to each question.**

1. Find 20% of 65.

- A. 130                      B. 1.3  
C. 13                         D. 0.13

2. \_\_\_\_% of 80 is 20.

- A. 4%                        B. 25%  
C. 40%                      D. 2.5%

3. What is 15% of \$30?

- A. \$45                      B. \$4.50  
C. \$.45                      D. \$.04

**IV. Choose the best answer to each question.**

1.  $6 - (2)(3) =$                       A. 12  
   B. 0  
   C. 8  
   D. 6

2.  $9 + 15 \div 3 =$                       A. 8  
   B. 4  
   C. 24  
   D. 14

3.  $5(7-2)5 =$                         A. 25  
   B. 125  
   C. 250  
   D. 625