

THE EXTENT OF AUTISM KNOWLEDGE OF NOVICE ALTERNATIVELY
CERTIFIED SPECIAL EDUCATION TEACHERS IN TEXAS

Jennifer A. Alward, M.Ed.

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APPROVED:

Smita Mehta, Major Professor

Bertina Combes, Committee Member

Prathiba Natesan, Committee Member

Kevin Callahan, Committee Member

Abbas Tashakkori, Chair of the Department of
Educational Psychology

Jerry Thomas, Dean of the College of
Education

Mark Wardell, Dean of the Toulouse Graduate
School

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An increase in the prevalence rate of autism is not necessarily matched by a concurrent increase in the rate of highly qualified special education teachers. The low ratio of highly qualified teachers to the number of students with autism has resulted in chronic teacher shortages in this area. Alternative certification is used as a mechanism to alleviate the demand for highly qualified teachers in special education. However, alternative certification routes have often left novice teachers underprepared for teaching students with autism, more specifically in the implementation of evidence-based practices necessary for instructional effectiveness. The purposes of the study were: a) to assess the knowledge of novice alternatively certified (AC) teachers in the area of autism education; and b) to determine the extent to which age, credit hours of instruction, formal hours of instruction, amount of professional development, and number of students with autism predict the variance in knowledge scores. Participants included all novice (i.e., first-and second-year) alternatively certified special education teachers in the state of Texas. Data were collected through an electronic survey instrument disseminated state-wide to approximately 33 individuals. Multiple regression was conducted in order to determine the strongest predictors of autism knowledge scores. In addition, a multi-way ANOVA was performed to identify differences between groups. The largest predictor of knowledge of autism was hours engaged in self-directed learning. Overall, AC programs in Texas need to provide basic and core content in the area of autism to increase the knowledge of novice teachers.

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THE EXTENT OF AUTISM KNOWLEDGE OF NOVICE ALTERNATIVELY
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Autism is a developmental disorder characterized by impairments in verbal and nonverbal communication, social interactions, and repetitive and restricted behaviors. The Centers for Disease Control (CDC, 2013) recently estimated that 1 in 50 children are diagnosed with autism. Autism is considered to be the fastest growing classification category for students receiving special education services in public schools (Ludlow, Keramidas, & Landers, 2007). In Texas, the number of children diagnosed with autism continues to increase each school year. During the 2009-2010 school year, the number of students diagnosed with autism ($n = 30,179$) surpassed the number of children with emotional disturbances ($n = 28,827$) to become the fifth largest special education classification category in the state (Texas Education Agency, 2013). As the number of students with autism rises throughout the United States, novice special education teachers need to be adequately prepared to meet the educational challenges of educating students with autism (Bellini, Henry, & Pratt, 2011).

According to the fifth edition of the American Psychiatric Association's (2013) *Diagnostic and Statistical Manual of Mental Disorders (DSM-V)*, autism is a developmental disability that significantly affects verbal and nonverbal communication along with social interactions and repetitive activities and stereotyped movements. Children with autism often resist environmental change or change in daily routines and respond unusually to sensory experiences (CDC, 2013). Children with autism require professionally prepared and highly qualified teachers to enable them to grow into adults who might be able to function as independently as possible with or without support from caregivers.

One of the major concerns in the preparation of teachers of students with autism is the lack of professional standards regarding the quality and quantity of training (Scheuermann, Webber, Boutot, & Goodwin, 2003). Currently, certification trends support non-categorical licensure to encourage special educators to meet the needs of a wide variety of students. One of the problems with non-categorical licensure is that special education teachers may lack in-depth knowledge and competencies to work with categorical groups such as students with autism (Barnhill, Polloway, & Sumutka, 2010). The National Research Council (NRC, 2001) indicated that one of the weakest components of effective programming for children with autism is high quality personnel preparation. While personnel graduating from traditional teacher preparation programs may have received intensive coursework and supervised field experiences in teaching students with low or high incidence disabilities, they too may not have received advanced training in specific categories of disability (e.g., autism), making them vulnerable as first-year teachers to the demands of the job. The challenges experienced by alternative certification (AC) teachers are even greater especially if training was delivered through the fast-track route with little or no supervised field experiences.

A fast-track AC program requires individuals to complete several weeks of training during the summer and obtain a *teacher of record* position for the adjacent school year (Darling-Hammond, 2009). Not all AC programs use the fast-track route; some are extremely similar to a traditional teacher preparation program (Humphrey & Wechsler, 2007) providing regular course work and field experiences. However, fast-track AC programs are limited in number. Most of the novice teachers certified through the typical AC program are underprepared to meet the unique needs of students with autism (Casella & Colella, 2004; LeBlanc, Richardson, & Burns,

2009; Scheuermann et al., 2003; Simpson, Mundschenk, & Heflin, 2011) and more likely to resign than other special educators in the first 3 years of teaching (Robertson & Singleton, 2010).

AC programs provide a means of entering the teaching profession without having to attend an undergraduate teacher preparation program. Many AC programs were developed to address the need to recruit and retain high quality teachers in urban areas (Ng, 2003; Schonfeld & Feinman, 2012). In fact, teachers from AC programs are more likely to accept challenging positions, such as positions in special education or urban areas (Ng, 2007; Rosenberg, Boyer, Sindelar, & Misra, 2007). Additionally, AC programs were established to increase the number of male and female minority teachers (May, Katsinas, & Moore, 2003). Lastly, AC programs vary tremendously in their recruitment of participants because each program determines the population of participants to recruit based on the market demands of the local school districts (Brindley & Parker, 2010). For example, a state with severe shortages in special education teachers, such as Texas, may have more participants seeking special education certification compared to those being certified in mathematics and science (May et al., 2003). In general, AC programs have been designed to recruit specific populations into the field of education in order to meet the market demands of the geographical area (Brindley & Parker, 2010).

Participants entering an AC program have a vast amount of life experiences and knowledge which enables them to access their previous learning in order to construct new knowledge as they progress through their certification program (Dai, Sindelar, Denslow, Dewey, & Rosenberg, 2007; Knowles, 1984). This belief regarding adult learning constitutes the theoretical framework needed for understanding how candidates in AC programs learn new knowledge. This conceptualization is critical because they are likely to self-direct learning based on current work demands and utilize previous learning where applicable. The following section

describes the theoretical foundation for the study and the relevance of understanding of how AC teachers self-direct learning in the absence of high quality professional preparation and on-the-job demands for teaching students with autism.

Theory of Adult Learning

Andragogy as “the art and science of helping adults learn” (Knowles, 1984, p. 3) formed the theoretical framework for this study. Andragogy is based on five assumptions about adult learners: (a) knowledge of self which can direct own learning; (b) accumulated life experiences which can be drawn upon as a basis of learning; (c) learning needs that are directly related to changing social roles; (d) problem-centered learning with immediate application of knowledge; and (e) intrinsic motivation that advances their learning (Merriam, 2001, p. 5). Individuals draw upon previous life experiences in order to add and construct new knowledge for directly solving or alleviating immediate problems. This framework applies directly to AC program participants as they transition into their classroom teaching positions and use self-directed learning to solve immediate problems or to gain vital information needed to function within the classroom setting (e.g., understand why children with autism also have sensory disorders and how to effectively program for these deficits).

Based on these assumptions, Knowles, Holton, and Swanson (1998) created the andragogy in practice model for designing programs for adult learners including teachers. Figure 1 demonstrates external factors which affect adult learning including: (a) goal and purpose of learning; (b) individual and situational differences; and (c) individual, societal, or institutional growth. The outer circle of the figure demonstrates the goals and purposes needed to facilitate adult learning. These goals and purposes shape the learning experiences of individuals. As adults begin to learn new information, they experience individual growth which in turn leads to institutional and societal growth. In other words, as knowledge of a particular subject matter

grows, learners enhance both their places of work (educational institution) and society as a whole through application of knowledge.

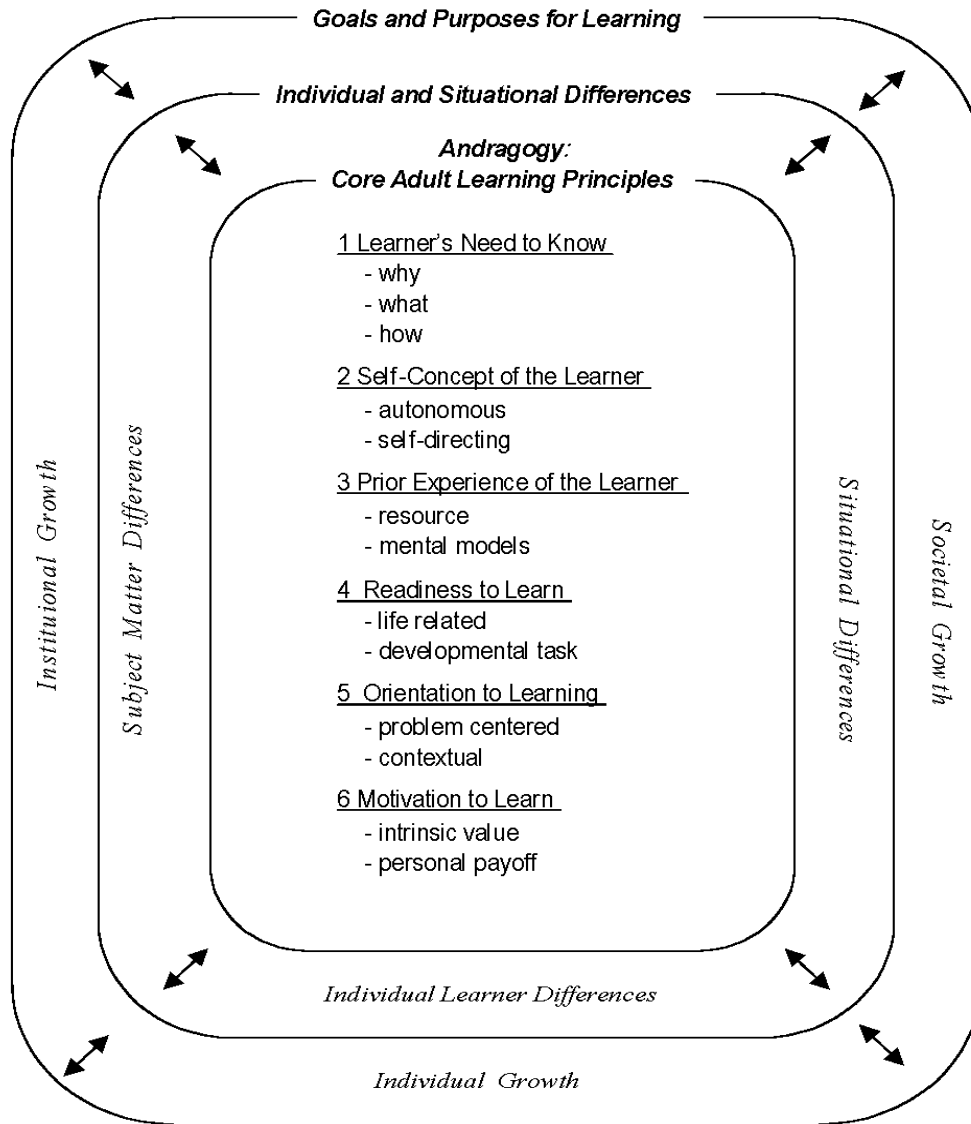


Figure 1. The andragogy in practice model demonstrates additional influences that can interact with adult learning and be applied across domains to enhance adult learning practices.

Participants in AC programs are expected to use prior learning and apply newly acquired content knowledge directly to classroom situations for problem-solving. As a function of on-the-job training and required state standards (e.g., the Autism Supplement in Texas), AC teachers learn to integrate old and new knowledge and experiences to meet the expectations of their local

educational agency. Failure to meet expectations is one of the many factors associated with attrition of AC teachers. It is paradoxical that the purpose of AC programs is to alleviate teacher shortages, yet relatively little attention seems to be paid to retain teachers already on the job.

Factors that Affect Attrition and Retention Rate of Teachers

Special education teachers appear to have the highest turnover rate in the field of education, and new teachers are at high risk for attrition within the first three years of employment (Roberson & Singleton, 2010). Even though new special education teachers tend to lack classroom experience, principals expect them to demonstrate a vast knowledge of special education, including in-depth knowledge of curriculum and skills in implementing interventions utilized with students with disabilities (Brownell, Hirsch, & Seo, 2004). The expectation for expertise is higher for special education teachers when compared to those of general education teachers (Brownell et al., 2004), even in cases where training was provided through the fast-track route.

In the field of special education, historically the critical shortage of available highly qualified teachers in relation to the number of job openings has strained efforts to provide high quality services to children in special education and, in particular, to children with autism (Boe, 2006). With critical shortages of special education teachers, school districts struggle to find teachers to fill these positions and to retain the same teachers the following year. Various factors such as certification status and work environment affect decisions of teachers to remain or resign from their position or even the profession (Billingsley, 2004).

Passage of No Child Left Behind (NCLB, 2002) resulted in a burgeoning supply of teachers by allowing individuals who held a bachelor's degree to enter the field of teaching through an AC route. Moreover, NCLB was designed to provide funds for expanding teacher education. NCLB mandated higher standards for hiring teachers, a positive aspect of the law,

because teachers must be highly qualified to meet the varied educational needs of students (Tissington & Grow, 2007). For teachers to be considered highly qualified, they must hold the bachelor's degree and demonstrate subject content knowledge by passing the state examinations for certification (Brownell, Sindelar, Bishop, Langley, & Seo, 2002; Cohen-Vogel & Smith, 2007).

Boe, Shin, and Cook (2007) suggested that a teacher with a degree in his/her field of study will have extensive content knowledge and be more prepared to teach the subject. This may be true for mathematics and science teachers at a secondary level where relatively less pedagogical knowledge is required. The same is not true of elementary education, which requires a higher amount of pedagogy and instructional skills compared to extensive content area knowledge (Boe et al., 2007). This blend between pedagogy and instructional skill sets is particularly necessary even for teaching children having difficulty learning complex subject matter, such as children with disabilities; in these cases, knowledge of pedagogy and differentiated instruction becomes critical for teacher preparation (Sindelar, Daunic, & Rennells, 2004). Pedagogical knowledge (i.e., knowing how to teach, how to construct and implement lesson plans, and how to assess student progress) is crucial for AC special education teachers to enable them to provide accommodations and modifications to the curriculum (Quigney, 2010). In a study of perceptions of preparedness of AC teachers for their teaching role, Kee (2012) found that teachers felt more prepared to teach when the program included three or more courses in methods, learning theory, or psychology.

While AC programs may increase the supply of classroom teachers, they are at risk for recruiting candidates with little understanding of pedagogy, a lower set of skills in classroom management and instructional strategies, and lack of knowledge of important issues related to

social and academic development of students (Nagy & Wang, 2007). New AC teachers who lack adequate administrative support may find themselves seeking resources independently, dealing with performance pressures without receiving proper organizational mentoring, and becoming more likely to indicate the intention of leaving the field (Billingsley, 2004).

Retention rates of general and special education teachers initially certified in the state of Texas were analyzed for three cohorts (i.e., traditionally prepared, AC, and post-baccalaureate) from 1998-2003 (Herbert, 2004). Results indicated that all cohorts, regardless of preparation route, had low attrition rates during the first year of employment and attrition tended to increase during the second and third years. For reasons unclear, the highest amount of attrition during all years of the study was for teachers prepared through post-baccalaureate routes, followed by teachers prepared through traditional certification (TC) programs. Results for this study were not separated by attrition rate for general or special education teachers, therefore no assumptions can be made about which group was at a greater risk for attrition (Herbert, 2004). These results indicate a clear link between type of certification (i.e., post-baccalaureate) and attrition rate even though reasons for teachers' attrition are not clear. Moreover, the results seem to challenge conventional wisdom and other reports that suggest that teachers who hold emergency or provisional/probationary certificates are at an increased risk of leaving special education when compared to teachers who completed a traditional teacher preparation program (Billingsley, 2004).

Retention of teachers is extremely important. Research indicates that over time, the field of special education has not been able to increase the amount of teacher positions commiserate with student growth or retain fully certified teachers (Boe, 2006). A study of job burnout rates of

special educators found that AC teachers have the lowest burnout rates compared to TC teachers (Banks & Necco, 1990).

Mentoring is an essential component of teacher retention. Individuals who lacked mentoring were more likely to indicate a desire to leave the field of education (Billingsley, 2004). According to Haberman (2006) and Humphrey and Wechsler (2008), mentoring should be an integral element of all AC programs. TEA requires that teachers who seek initial certification have access to a mentor, also called field supervisor. Mentoring quality and the curriculum quantity for AC programs is varied across the nation (Darling-Hammond, 2009). Even though mentoring is considered a critical component of an AC program, according to Feistritzer (2005), 10% of participants indicated their program lacked a mentoring component. Of the participants who received mentoring, less than half (41%) indicated that mentoring was helpful compared to 6% who said mentoring was not helpful at all (Feistritzer, 2005). In order to increase retention of special education teachers, programs have to meet the challenge of preparing candidates to enter special education classrooms by delivering more effective and specialized training.

Need for Effective Preparation of AC Special Education Teachers of Students with Autism

The focus of AC program effectiveness must shift toward the essential knowledge and skills a special education teacher needs so that teachers can document more effective outcomes for students with disabilities (Brownell et al., 2010). Special education teachers are required to have extensive knowledge and skills when compared to general education teachers because of having to teach a very heterogeneous group of students (Quigney, 2010). Even though new special education teachers lack classroom experience, principals expect them to demonstrate vast knowledge of special education and in-depth knowledge of curriculum and interventions utilized for teaching with students with disabilities (Brownell, Hirsch, & Seo, 2004).

Learning these types of specialized skills necessitates intensive training and supervision. Due to the prevalence of fast-track AC programs, many new special education teachers will most likely be underprepared for the responsibilities noted above. This is in part because within an expedited program, communicating all of the content knowledge effectively and coaching on pedagogical skills needed to be a highly qualified special education teacher, can be a daunting task even for established AC programs (McLeskey & Billingsley, 2008). AC teachers will most likely be unprepared for the demands they face and will have less knowledge regarding evidence-based practices which will decrease their instructional effectiveness (Darling-Hammond, Holtzman, Gatlin, & Heilig, 2005). As previously noted, without proper knowledge to face the challenges of teaching students with disabilities the likelihood for attrition is high (Dai et al., 2007; McLeskey & Billingsley, 2008). Because most special education teachers receive a noncategorical teaching certificate, they lack disability specific knowledge and skills to be better prepared to meet the learning needs of those populations (Brownell et al., 2010). Due to the specific learning needs and characteristics of students with autism, it is vital that special education teachers are knowledgeable about the disorder and understand which evidence-based strategies are appropriate when teaching students with autism.

Even though it is common knowledge that there is a need for highly qualified teachers of students with autism, relatively few studies have assessed the knowledge of AC special education teachers. While there are existing studies pertaining to the knowledge of autism, very few specifically address special education teachers who are alternatively certified.

Multidisciplinary Studies on Assessment of Knowledge of Professionals Regarding Autism

Although several studies have been conducted with education personnel about their knowledge of autism (Casella & Colella, 2004; Heidgerken, Geffken, Modi, & Frakey, 2005; Williams, Fan, & Goodman, 2011), none have specifically addressed the actual knowledge of

novice AC special education teachers. The first published report of assessing the knowledge of individuals regarding autism was by presented by Stone (1987). She had developed an instrument called The Autism Survey with 23-items, which was administered to professionals representing the fields of clinical psychology, pediatrics, school psychology, and speech-language pathology to assess their knowledge of and beliefs about autism. The results indicated that many of the personnel had misconceptions about autism such as not being able to differentiate it from other conditions like childhood schizophrenia. Results also indicated that many professionals such as pediatricians, clinical psychologists, and school psychologists perceived autism to be a temporary condition that could be cured while speech-language pathologists perceived it to be an emotional disorder. Several studies have been replicated or extended Stone's original research in assessing the knowledge of multidisciplinary professionals working with individuals with autism (Casella & Colella, 2004; Heidgerken, Geffkin, Modi & Frakey, 2005; Schwartz & Drager, 2008).

An assessment of 82 speech-language pathologists (SLP) regarding their general knowledge of autism and communication disorder was conducted by Casella and Colella (2004). Of all of the interventions, a majority of SLPs rated themselves as knowledgeable with regard to the social communicative approach and social stories. Although many of the SLPs indicated they had previous experiences working with students who had autism, a majority of them indicated being minimally to somewhat experienced in working with the students and utilizing interventions. Casella and Colella (2004) suggested the need for guidelines to be established by the American Speech-Language Hearing Association to address the knowledge base and skills that SLPs need to work with students who have autism.

Replicating Stone's research with hospital personnel, Heidgerken et al. (2005) measured the beliefs of 111 participants from Shands Hospital at the University of Florida. The participants included individuals from the fields of neurology, pediatrics, child psychiatry, speech pathology, clinical psychology, and family practice. In addition, participants also included professionals employed by the Center for Autism and Related Disabilities (CARD). Heidgerken et al. found that participants employed at CARD had beliefs about autism that were not as outdated as those participants working outside of the center. In general, most of the participants did not indicate a need for children with autism to receive special education services in public schools because they were not knowledgeable about the unique and individualized learning needs of this population. Authors noted that hospital personnel may be less likely to urge parents to follow through with request for special education services for their children.

In another study, Schwartz and Drager (2008) also assessed the knowledge of 67 SLPs from 33 states throughout America. Their findings indicated that the knowledge of SLPs regarding the diagnostic criteria of autism was mixed. For example, only twenty-one percent of SLPs believed impairments in social interactions were necessary for a diagnosis of autism. Although communication impairment is a crucial characteristic for the diagnosis of autism, 85% of the participants did not believe the student had to have a communication impairment to be diagnosed with autism. In general, the knowledge of SLPs regarding the characteristics of autism was greater than their knowledge about the diagnostic criteria.

Further, the African Network for the Prevention and Protection Against Child Abuse and Neglect (ANPPACAN) in collaboration with the World Bank, tried to ascertain the level of knowledge of healthcare workers in a southern region in Africa. Bakare, Ebigo, Agomoh, and Menkiti (2008) revised ANPPACAN's survey instrument and created the Knowledge about

Childhood Autism among Health Workers (KCAHW) questionnaire. The reliability of the instrument was the purpose of the study. Cronbach's alpha coefficient of 0.97 was calculated and suggested strong test reliability. A Cronbach's alpha coefficient as high as .97 indicates that the items on the instrument test the same variable. Using the revised instrument to assess the knowledge of autism of healthcare workers in Nigeria, Bakare et al. (2009) disseminated the instrument to 134 healthcare workers employed in the southeast and south-south regions of Nigeria. Results indicated that health care workers who had previous experience with children with autism had greater understanding of the nature of autism when compared to workers who had no previous experience. In addition, two predictor variables appeared to be correlated to higher knowledge scores including age and experience of participants. Healthcare workers in their 40s and those who treated children in specialized areas such as psychiatric facilities had higher scores on the test of knowledge of autism.

Continuing this line of research, Igwe, Bakare, Agomoh, Onyeama, and Okonkwo (2010) administered the KCAHW to 300 final year undergraduate students attending the University of Nigeria and enrolled in the departments of medicine, nursing science, and psychology to assess their understanding of autism. Igwe et al. found that medical students were more likely to be knowledgeable about the characteristics of autism, followed by the nursing and psychology students. Knowledge of autism was directly correlated with both the number of weeks the undergraduates spent working with children who had autism and the number of lecture hours attended. Higher durations for both were correlated with higher knowledge scores. Igwe et al. indicated the need to assess the knowledge of individuals prior to the completion of the program so that proper training could be planned and implemented prior to graduation.

The population of students identified with autism seems to be growing, which requires professionals working with this population to obtain extensive training (Casella & Colella, 2004; Igwe, Bakare, Agomoh, Onyeama, & Okonkwo, 2010). The existing literature showed that many teachers, regardless of the route to certification, lack knowledge of evidence-based practices fundamental for teaching students with autism (Hess et al., 2008). Moreover, in order for teachers to be prepared to teach this population and implement evidence-based practices with fidelity, professional development should focus on increasing the knowledge and skills of teachers of students with autism by providing high quality and ongoing training (Scheuermann et al., 2003). There is a need to study the relationship between autism knowledge of teachers and the AC versus TC certification route, specifically for teachers in states for which AC represents the most prolific pathway to teacher certification, such as Texas.

Requirements for AC in Texas

Texas requires that all educator preparation programs (EPP) adhere to specific requirements when developing an AC or TC program for both general and special education fields. Texas Education Agency (2013) publishes and maintains the approved EPP list. AC programs are run by five entities including universities/colleges, education service centers (ESC), community colleges, local school districts or schools, or private organizations/businesses. The Texas Administrative Code §228.35 stated that all EPPs must provide the preservice teacher with a minimum of 300 clock-hours of coursework and/or training (Texas Education Agency, 2008). At least six clock-hours of coursework must be devoted to test preparation, a minimum of 30 clock-hours of field experience (of which 15 hours may be provided through electronic transmission or technology-based equipment), and 80 clock-hours of coursework and/or training. EPPs are free to choose how the remaining hours are divided. Prior to the completion of the EPP

program and before receiving standard certification, individuals must complete all coursework or training.

While EPPs are required to provide at least 80 hours of training or coursework, the curriculum of each program must be based on scientifically-based research which aligns with the Texas Essential Knowledge and Skills (TEKS; Texas Education Agency, 2008). The following subject matter must be included in the curriculum: (a) reading instruction; (b) educator code of ethics; (c) child development; (d) motivation, (e) learning theories; (f) TEKS organization, structure, and skills; (g) TEKS in content areas; (h), state assessment of students; (i) curriculum development and lesson planning; (j) classroom assessment for instruction/diagnosing learning needs; (k) classroom management/developing positive learning environment; (l) special populations; (m) parents conferences/communication skills; (o) instructional technology; (p) pedagogy instruction; and (q) certification test preparation. Each EPP has the autonomy to select the number of hours of training required for each topic listed above. These broad curricular areas indicate components needed for basic preparation of general education teachers but lack specific focus on specialized knowledge and skills necessary for special education teachers (e.g., differentiated instruction, intensive behavioral intervention).

EPPs provide field-based experiences in the form of an internship, student teaching, or clinical teaching. Student or clinical teaching lasts a minimum of 12 weeks whereas an internship lasts for one academic school year. During the internship, the preservice teacher holds a probationary certificate and is classified as a teacher on the Public Education Information Management System (PEIMS). As part of the EPP program, preservice teachers must receive on-going support from an experienced educator who has been trained as a field supervisor. Each observation must be at least 45 minutes in length and the first observation needs to occur within

the first six weeks of the teaching assignment. A preservice teacher completing an internship must have at least two formal observations during the first semester followed by one formal observation during the second semester. A preservice teacher completing student or clinical teaching must have at least three observations during their 12-week assignment.

Significance of the Study

The state of Texas certified 13,668 general and special education teachers through AC routes during the 2007 school year, which was the highest number of persons certified through an alternate route in the country. Beginning in 2006, data maintained by Texas Education Agency indicated an increasing trend for AC participants and a decreasing trend for TC participants in teacher preparation programs. The State Board for Educator Certification (2013) for Texas concluded that more teachers were prepared through AC or post-baccalaureate routes than TC programs.

Although there are basic requirements for special education AC programs in Texas, there is a tremendous variety in the nature and amount of training provided by each of these entities even though they are all among approved by the state (see Appendix A). Thus, it is difficult to determine which of these entities prepare highly qualified AC teachers and which of these routes are the most effective as well as most efficient. With AC being the predominant route to certification in Texas, it is crucial that the various entities continue to strengthen the quality of their programs each year. As stated previously, there is a need to study the route to AC in relation to the knowledge of AC teachers in the area of autism.

Purpose of the Study

The purpose of this study was to assess the knowledge of novice AC teachers in the area of autism education and to determine the extent to which age, credit hours of instruction, formal hours of instruction, amount of professional development, and number of students with autism,

predict the variance in knowledge scores. Professionals in the field state that teachers are considered to be novice when they were in their first 3 years of teaching (Casey, Dunlap, Brister, & Davidson, 2011), whereas others pontificated that experience, not technical knowledge, determined teaching effectiveness (Darling-Hammond, 1997). For the purposes of this study, novice teachers had less than 3 years of teaching experience since receiving certification. The specific research questions were as follows:

1. To what extent are novice special education AC teachers knowledgeable about autism?
2. To what extent do age, credit hours of instruction, formal hours of instruction, amount of professional development, hours of self-directed learning, and number of students with autism predict the variance in knowledge scores of special education AC teachers?
3. What differences do delivery of instruction (i.e., on-line, face-to-face, or blended), type of previous experience with individuals with autism, and current teaching assignment have on autism knowledge scores?

Working hypothesis. Novice first year special education AC teachers with no previous experiences with individuals with autism were expected to have moderate to low scores on assessment of autism knowledge. It was predicted that AC teachers who had previous experiences with students with autism (i.e., special education paraprofessional or a parent of child with autism) and participated in professional development workshops or coursework in autism were more likely to receive higher knowledge scores. Lastly, AC teachers prepared through post-baccalaureate routes involving supervised field experiences of at least 20 hours were more likely to have higher knowledge scores.

Method

Participants

A total of 700 individuals were contacted to either disseminate the recruitment e-mail with a URL to the questionnaire or were asked to take the questionnaires themselves. Out of 124 total responses via the Qualtrics website, 36 individuals met criteria and completed the questionnaire. A total of 54 people did not meet the criteria to obtain access to the questionnaire due to the fact that they were not novice teachers, had not taught at least one student with autism during the last 2 school years, or did not obtain their certification in the state of Texas. Table 1 indicates the total response rate of the questionnaire.

Table 1

Questionnaire Responses

Total Responses	Completed Survey	Did Not Meet Criteria	Declined to Participate	Did Not Attempt	Attempted at least One Question	Completed Most Demographic Questions
124	36	54	3	11	7	13

Note. In 2012, 1,259 teachers and in 2013, 1,800 teachers received probationary certificates in the State of Texas. Since the study focused on novice AC teachers in their first 2 years of teaching, $N = 3,059$. The sample size analysis conducted with G*Power estimated 200 responses would be need for the study to have 90% power.

Dependent Variable

The dependent variable for the study was the autism knowledge score. Basic and factual knowledge of autism was tested through the questionnaire disseminated to the respondents.

Instrument

The 50-item questionnaire (instrument) was used to assess the knowledge of novice teachers of students with autism who received their initial special education certification through an AC program. The instrument was modified from the Knowledge about Childhood Autism among Health Workers (KCAHW) questionnaire developed by Bakare et al. (2008) in Nigeria.

The instrument adapted for this study took approximately 20-30 minutes to complete and contained the following five sections:

Section I. The personal background section (Items 5-7) collected data only on age, gender, and ethnicity of the participants.

Section II. The educational background section (Items 8-20) sought information regarding highest degree received including the specialization area for each degree, name and type of AC program, method of delivery of content in the AC program (i.e., online or face-to-face), previous coursework specific to autism, number of hours specific to autism provided by the AC program, number and types of professional development workshops taken following certification, graduate certificates and/or degrees pursued, and suggested changes to the participant's AC program in relation to their autism coursework.

Section III. The professional background section (Items 21-29) included questions relating to the ESC region in which the participant worked and at which the teacher attended professional development events and programs. In addition, participants were asked to identify the number of students with autism they taught during the previous 2 school years (2011-2012 and 2012-2013) and their previous experience working with the population.

Section IV. This section addressed the knowledge of AC special education teachers regarding autism (Items 30-47) and included true/false and multiple choice questions relating to the specific characteristics of autism. Specific wording of the questions was revised from the KCAHW (Bakare et al., 2008) to make it more precisely applicable to special education teachers.

Section V. The Texas autism supplement questions (Items 48-50) related specifically to the supplement required by the state in all individual education plan (IEP) meetings of students identified as having autism. The questions assessed the knowledge of participants on the Autism

Supplement. Topics in this section included daily schedule, extended school year service, and student-teacher ratio, usually indicated on the supplement. In addition, participants were asked to identify evidence-based practices (EBPs) for teaching students with autism, from a list of popular teaching methods that included both EBPs delineated by the National Autism Center (2009), and other methods (e.g., facilitated communication, gluten and casein free diet, and equine therapy) not considered to have evidence of effectiveness.

Content Validation Procedures

The questionnaire was e-mailed to nine experts in the field of autism spectrum disorders and teacher training with an invitation to assist with establishing the content validity of the instrument. These experts were informed about the purpose of the study and were provided with the URL link to the survey instrument uploaded on Qualtrics (Appendix B). The experts were asked to review each question and state whether it should be kept, modified, or deleted with consideration to the purpose of the study. Five experts returned the questionnaire with their suggestions including Drs. Brenda Scheuermann, Michael Morrier, Dorteia C. Lerman, Mirah J. Dow, and Amanda Boutot. These experts completed their review of the instrument within a 3-week time frame. Subsequently, the original questionnaire was modified based on the comments and suggestions to ensure that each question was clear, easy to understand, and unambiguous for respondents. This questionnaire was included in the application to the university's IRB for seeking approval to conduct research with human participants. The study itself has been approved by the IRB and no changes have been made to the original instrument subsequent to that time.

Procedures for Field-testing the Instrument

Prior to administering the questionnaire to novice special education AC teachers, the instrument was field-tested with a small group (17) of graduate level teachers working toward an

Educational Diagnostician's certificate at the university. The purpose of the field test was to determine the following: (a) average length of time taken to complete the survey; (b) clarity of the questions with respect to comprehension (following content validation procedures); and (c) likelihood of any question left unanswered. Field test results indicated that the questionnaire did not require any changes.

Procedure for Data Collection

Multiple strategies were utilized to recruit participants for the study. First, 40 directors of approved AC programs in Texas offering special education certification, were contacted via e-mail. They were asked to forward the survey information including a URL link, to their recent graduates (2012-2013) and participants who completed their program during the last school year (2011-2012). Contact information for all of the Educator Preparation Program directors was obtained from their respective program websites. Each invitation e-mail was personalized with the director's name. The 700 individuals in Texas consisted of the following: 40 directors of AC programs, 20 ESC autism consultants, 12 ESC AC program directors, 47 coordinators of postbaccalaureate programs at universities or colleges, and 537 special education directors. In addition, 22 graduates of a postbaccalaureate program at the University of North Texas were directly sent the survey for completion and requested to forward to other AC special education teachers who meet the survey criteria. Furthermore, a message inviting novice AC teachers to participate in the study was posted on ProjectShare, a website for state-wide educators for professional communication. Lastly, 21 posts were made on any available Twitter and Facebook pages of AC programs or ESCs.

Several steps were taken to ensure a high response rate from participants. First, EPP directors were sent an e-mail 1-week prior to the dissemination of the survey to explain the purpose of the study, requirements of the participants, the source for obtaining the director's e-

mail address, and to alert the directors that they would receive the survey shortly. Next, the initial link to the survey sent to the directors through e-mail included an explanation of the study, the target population of the study, the time needed to complete the survey, and the completion date of the study. E-mails with these components have been shown to increase the response rates of participants (Fan & Yan, 2010; Kaplowitz, Lupi, Couper, & Thorp, 2012).

Two weeks following the invitation e-mail, a follow-up e-mail was sent to invite the directors to forward the recruitment e-mail to their novice AC teachers. A third e-mail was sent 3 weeks following the initial invitation to remind the directors to forward the e-mail to their novice AC teachers. A fourth e-mail was sent 4 weeks after the third e-mail was sent because of a low response rate. Four weeks after the fourth e-mail, a fifth reminder was sent to AC program directors and autism consultants with a request to forward the invitation e-mail. A final request was sent at the beginning of 16 weeks after the initial invitation and served as the final notice about forwarding the invitation e-mail with the survey's URL link.

The entire data collection period spanned 17 weeks from beginning to end and included six specific requests for directors to contact their program participants about completing the survey. In addition, special education directors in the state of Texas were contacted three separate times in order to enlist their participation in forwarding the recruitment e-mail with the URL link to the questionnaire. Social media outlets were used three separate times as well. The questionnaire was disseminated via an Internet hyperlink for the survey hosted on Qualtrics, a web-based platform for creating and distributing questionnaires to potential participants.

Data Analysis

Following the end of the data collection period, data were exported from Qualtrics to the student investigator's computer hard drive, coded, and entered into the SPSS software (IBM Statistics) for hypotheses testing. A descriptive analysis was conducted to provide information

on the demographic background factors of participants. A multiple regression was performed using knowledge scores as the dependent variable and with age, credit hours of instruction, formal hours of instruction, amount of professional development, hours of self-directed learning, and number of students with autism as the predictor variables. Variables that did not contribute to the variance in knowledge scores (e.g., age, formal credit hours of autism instruction) were removed as predictor variables. In addition, in order to evaluate the difference between nominal and ordinal items on the questionnaire, a multi-way analysis of variance (ANOVA) was performed.

The multiple regression analysis involved beta (β) weights, p values, and squared structure coefficients to assist in the analysis of the results. By using beta weights, each variable's contribution to the overall variance of the regression model was identified (Courville & Thompson, 2001). Even though the use of p less than 0.05 is typical to determine statistical significance, comparing beta weights and squared structure coefficients along with p offers a more accurate depiction of the amount of the variance in the model as explained by each predictor. Moreover, providing beta weights with the results can increase the understanding of the effect size (Courville & Thompson, 2001). The use of both the structure coefficients and beta weights together assisted with determining the extent of variance was accounted for from the predictor variables. Effect sizes of the overall regression models were represented by R^2 to explain the variance accounted for in the dependent variable by all of the independent variables (Thompson, 1992).

Question 18 on the survey asked individuals to make three recommendations regarding how their program could have better prepared them to teach students with autism. Responses to this question were analyzed qualitatively. Open coding was conducted by classifying responses

according to broad categories of recommendations (e.g., classroom and behavior management and evidence-based practices). Broad ideas, concepts, and themes enable qualitative researchers to make generalizations (Neuman, 2006).

Results

Teacher Personal, Educational, and Professional Background Characteristics

Thirty-six novice AC special education teachers completed the questionnaire (see Table 2 for demographic data). The data revealed that most participants were female (88.9%), Caucasian in descent (83%), Bachelor's degree earners (66.7%), and teaching at an elementary school (33.3%) or a middle school (33.3%).

ESCs in Texas represented the most common route to certification (47.2%), followed by universities (25%) and other (25%). In fact, the highest response rates were received from Region IV (30.6%), Region X (19.4%), and Region XIII (27.8%). Of the respondents who completed credit hours pertaining to autism at a university level, only 22.4% indicated completing one to four university/college courses.

Novice AC special education teachers who completed AC programs at an ESC or through a private entity reported receiving 0 to 12 clock hours of instruction in autism. Approximately, 22% of the respondents did not receive any formal instruction in autism, whereas 19.4% received 1 to 3 hours, 27.8% received 4 to 6 hours, and 16.7% received 10 to 12 hours of instruction. Data on the method of instructional delivery showed that 38.9% percent of the novice AC teachers took their classes online, 38.9% took classes in a blended format, while 22.2% took face-to-face classes. The majority of the participants (83.3%) completed internships as teachers of record.

Table 2

Demographics of the 36 Respondents

Characteristic	<i>n</i>	%
Age		
18-22	1	2.8
23-27	6	16.7
28-32	10	27.8
33-37	4	11.1
38-42	9	25.0
43-47	2	5.6
48-52	2	5.6
53-57	2	5.6
Gender		
Male	4	12.1
Female	32	88.9
Ethnicity/Race		
African American	2	5.6
American Indian/Alaskan Native	1	2.8
Caucasian	30	83.3
Hispanic	1	2.8
Prefer Not to Answer	2	5.6
Geographic Area		
Suburban	18	50.0
Urban	8	22.2
Rural	10	27.8
Highest Degree Achieved		
Bachelor's	24	66.7
Master's	11	30.6
Doctorate	1	2.8
Current Teaching Assignment		
Self-contained Special Education Classroom	6	16.7
Inclusion Teacher	9	25.0
Resource Teacher	5	13.9
Content Mastery	1	2.8
Self-contained Life Skills Classroom	6	16.7
Self-contained Autism Classroom	3	8.3
Other	5	16.7
Teaching in a Title I School		
Yes	14	38.9
No	22	61.1
Teaching Level		
Elementary	12	33.3
Middle School	12	33.3
High School	7	19.4
Early Childhood & Elementary	2	5.6
Middle School & High School	3	8.3

Regarding professional development at the school level, 25% special education teachers reported attended no workshops about autism, 25% reported attending 1 to 2 workshops, 16.7%

reported attending 3 to 5 workshops, and 33.3% reported attending 6 or more workshops. Most participants (72.2%) reported being sent by their school districts to ESCs for professional development. However, 27.8% reported being sent by their school districts to different providers (e.g., state conference in autism) for professional development.

In the quest to attain autism knowledge, about 90% of the respondents engaged in self-directed learning. In fact, 58.3% devoted more than 6 hours, 22.3% spent 3 to 5 hours, and 13.9% spent 1 to 2 hours of self-directed learning in autism. Two people reported engaging in 0 hours of self-directed learning.

The results showed that special education teachers taught 1 to 11 students with autism during the previous 2 school years (2011-2013). The majority (58.4%) of teachers taught between two to five students, whereas 11.1% taught 9 to 10 students and 13.9% taught 11 or more students. Only 8.3% of the respondents taught one student with autism. When asked to describe their previous experiences with individuals with autism, 52.8% selected one or more of the available categories, but the remaining 47.2% did not have previous experience with individuals with autism. The grouped selections included previous experience as a paraprofessional (16.7%); as a friend, paraprofessional, and substitute teacher (11.1%); as a friend (5.6%) and a substitute teacher (5.6%); as a friend and substitute teacher (5.6%); as a parent, friend, and substitute teacher (2.8%); as a paraprofessional and substitute teacher (2.8%); and as a parent and substitute teacher (2.8%).

Extent of Autism Knowledge of Novice AC Special Education Teachers

The autism knowledge of the novice AC special education teachers was assessed through Sections IV and V (Items 30-50) of the questionnaire. The mean score was 61.53% and the standard deviation was 20.22. The maximum score on the knowledge portion of the questionnaire was 100% with the remaining scores ranging from 0% to 91%. One person scored

0. This score on autism knowledge appears to be an outlier. The mean autism knowledge score excluding the 0 was 63.29% with a standard deviation of 17.50. Five participants received scores in the 30s, four in the 40s, three in the 50s, six in the 60s, 12 in the 70s, three in the 80s, and two in the 90s. Overall, more participants (50.3%) scored between 60% and 79% than scored (14%) between 80% and 99%. The majority of the responding novice AC special education teachers demonstrated low-level knowledge about autism (Figure 2).

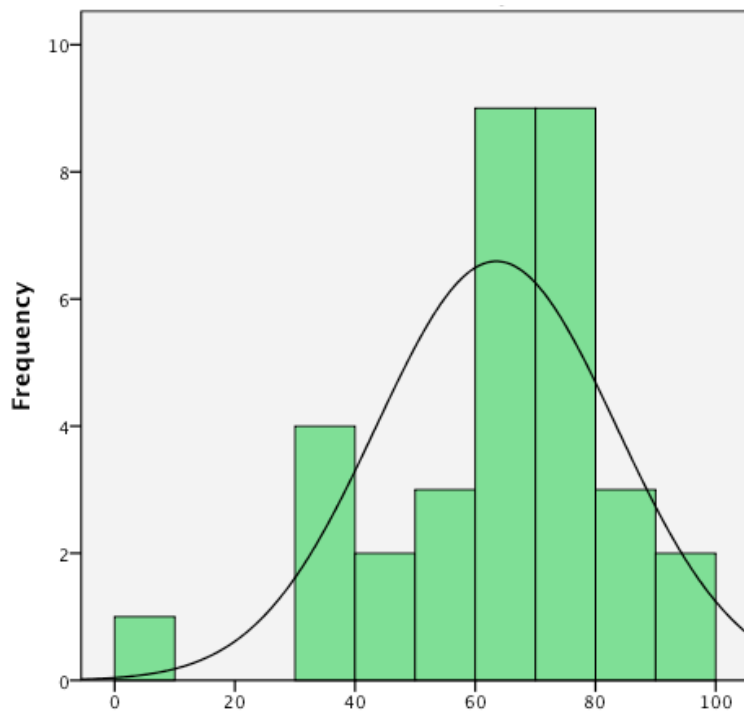


Figure 2. The distribution of knowledge scores demonstrates that most of the respondents' scores are within the normal distribution, except for the one score of 0.

Most respondents (88.9%) knew that the Texas Autism Supplement was a required document in an Admission, Review, and Dismissal (ARD) meeting. The Texas Autism Supplement requires that the ARD committee discuss extent of delivery of services for teaching students with autism (i.e., in-home and community training, goals and objectives for students, and staff-to-student ratio). Four participants (11.1%) thought that the Texas Autism Supplement was not required.

Variables that Predict Autism Knowledge of Novice AC Special Education Teachers

Multiple regression models were generated using the dependent variable (i.e., autism knowledge scores) and the independent (predictor) variables of the novice AC teachers' personal, educational, and professional backgrounds (i.e., age, credit hours, formal hours, professional development, hours of self-directed learning, and number of students with autism). The entire regression model (R^2) explained approximately 52% of the variance. Negative beta weights for age, students with autism, and professional development indicated smaller units of change with regard to the respondents' autism knowledge scores. The hours of self-directed learning resulted in the largest beta weight ($\beta = .565$), the largest squared structure coefficient ($r_s^2 = .780$), and statistical significance ($p = .009$). Therefore, the hours respondents devoted to self-directed learning emerged as the largest predictor of autism knowledge (Table 3).

Table 3

Beta Weights, Squared Structure Coefficients, and Significance Levels for Personal, Educational, and Professional Background

Variable	β	r_s^2	p
Age	-.198	.013	.286
Students with Autism	-.048	.005	.785
Credit Hours	.080	.020	.666
Formal Hours	.053	.020	.771
Professional Development	-.177	.122	.430
Hours of Self-directed Learning	.565	.780	.009*

Note. * indicates variable's statistically significance for $p < .01$.

A multi-way ANOVA was conducted with the autism knowledge score as the dependent variable with AC programs' delivery of instruction (i.e., on-line or face-to-face), type of previous

experience with individuals with autism, and current teaching assignment as the independent variables (Table 4).

Table 4

Tests of Between-Subjects Effects

Variable	<i>df</i>	<i>p</i>	<i>Partial</i> η^2
AC Class Type	2	.984	.005
Experience with Autism	7	.859	.329
Current Assignment	6	.993	.091
AC Class*Experience	1	1.0	.000
AC Class*Current Assignment	2	.611	.169
Experience*Current Assignment	2	.977	.008
Class*Experience*Assignment	0	0	0

The multi-way ANOVA and the partial eta-squared (η^2) revealed that 33% of the variance was explained by the respondents' previous experiences with an individual with autism. In addition, 17% of the variance was explained by the interaction effect of delivery of instruction and current teaching assignment. These results were not statistically significant due to the small sample size. The effect size (η^2) denoted practical significance between the groups, even though the sample size did not support statistical significance. In addition, the effect sizes were high (Cohen, 1992).

In general, respondents who took face-to-face classes had higher knowledge scores. Participants who took face-to-face rather than online classes had higher autism knowledge scores if they have previously been paraprofessionals. In addition, participants who had been substitute teachers and who took face-to-face rather than blended classes (i.e., online combined with face-to-face) earned higher autism knowledge scores (Figure 3).

Special education teachers placed in self-contained life skills classrooms who took blended classes displayed the lowest autism knowledge scores. Respondents who took blended classes and had previous experience with individuals who had autism by substitute teaching demonstrated the lowest knowledge scores of any group (Figure 4). In addition, respondents who were parents of children with autism, had previous experience substituting, and took blended classes during their AC programs attained the highest autism knowledge scores. Lastly, respondents who took face-to-face classes had the smallest amount of variance in their knowledge scores as their scores ranged from 70% to 79% (Figure 5).

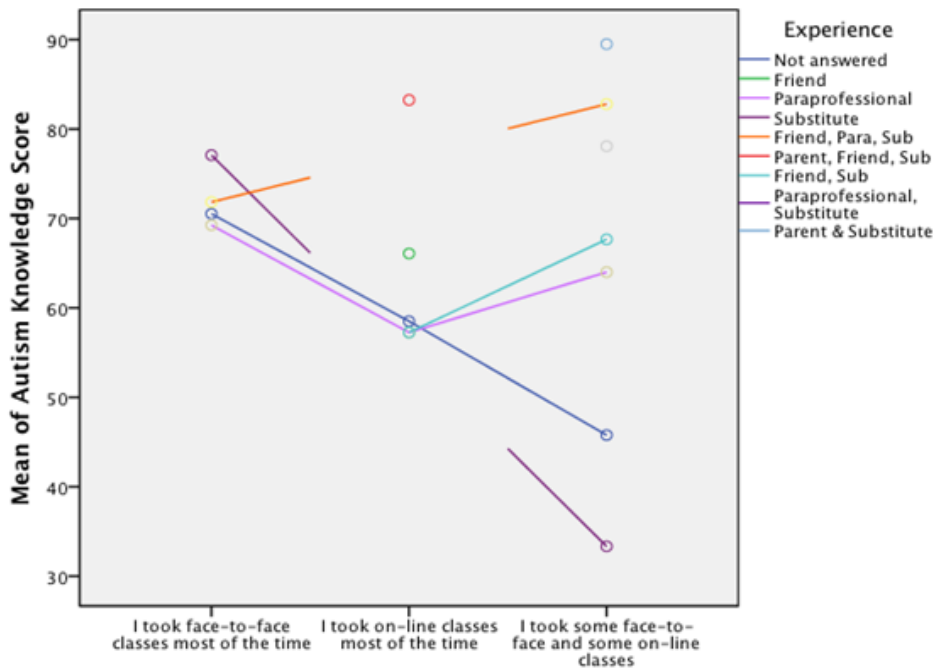


Figure 3. Interactions for autism knowledge scores, delivery of instruction, and type of previous experience with individuals who have autism.

Changes in AC Programs Recommended by Participants

Respondents were asked in an open-ended question to identify three changes they would make to their AC programs for improving their knowledge regarding autism. The qualitative data indicated that the highest number of respondents recommended training for implementing evidence-based practices (e.g., applied behavior analysis, visual schedules, etc.) and regarding

classroom and behavior management. In addition, special education teachers wanted to receive more hands-on experiences with students with autism, specific training related to designing IEP goals and objectives, and techniques for managing inclusion in general education environments. Lastly, several respondents asked for specific training in floor time, the Picture Exchange Communication System (PECS), sensory integration, direct teaching, and social stories.

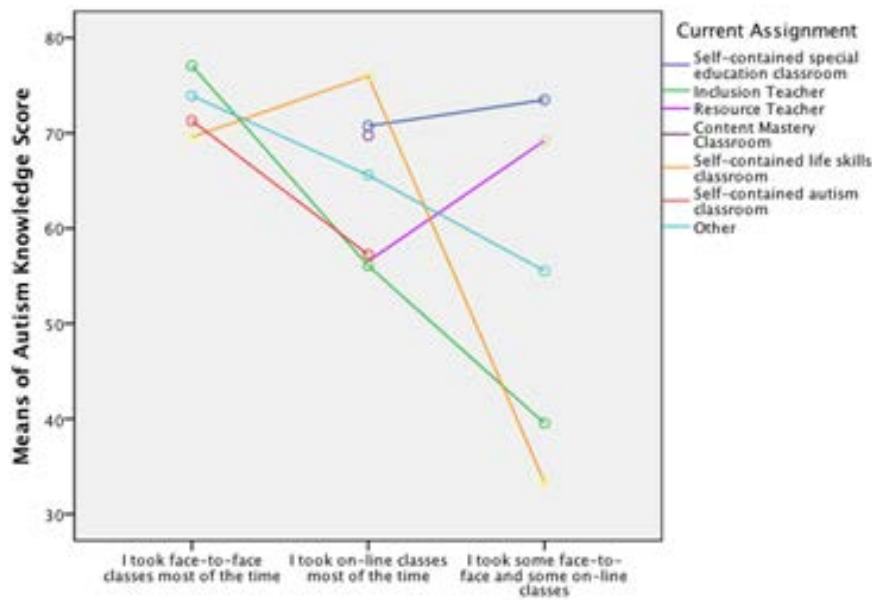


Figure 4. Interactions for autism knowledge score, delivery of instruction, and the teachers' current teaching assignments.

Emerging Profiles for AC Special Education Teachers

Based on the analysis of the results, two profiles of AC special education teachers are presented below and based on extreme autism knowledge scores. Respondent A scored 30% on the autism knowledge section of the questionnaire. He is a first-year teacher between 18 to 22 years in age and holds a Bachelor's degree. He received 10 to 12 instructional clock hours in the area of Autism Spectrum Disorder during the AC program, took all classes online, and completed a clinical teaching internship. Respondent A did not attend professional development

or engage in self-directed learning in order to increase his knowledge of autism. During the last 2 years, he taught two to three students with autism in an inclusive classroom in a rural area.

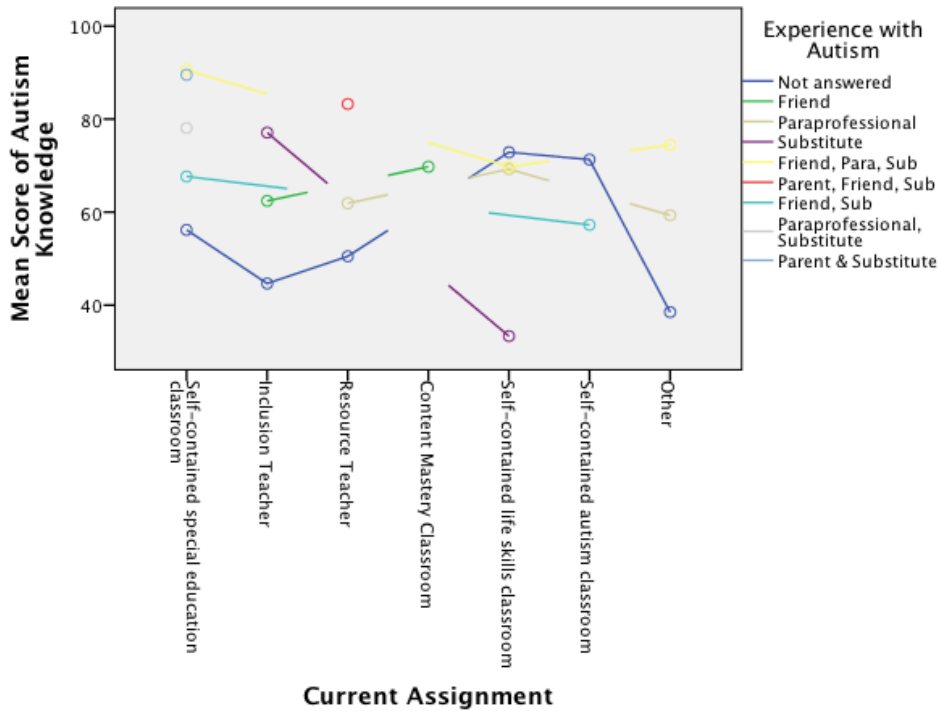


Figure 5. Interactions for autism knowledge score, current teaching assignment, and previous experience with individuals who have autism.

Respondent B scored 91% on the autism knowledge portion of the questionnaire. He is between 43 to 47 years in age, has a Bachelor’s degree, and is in his second year of teaching. He took a combination of online and face-to-face (i.e., blended) classes in the AC program through an ESC. Respondent B obtained 4 to 6 hours of formal instruction in autism and completed his internship as a Teacher of Record. He attended more than six professional development workshops and spent more than 6 hours in self-directed learning. Respondent B taught four to five students with autism in a self-contained special education classroom in a suburban area during the last 2 school years. He reported that all previous experiences with individuals with autism occurred as a friend of an individual with autism, a paraprofessional, and a substitute

teacher. In addition, Respondent B recommended that AC programs focus on teaching candidates about evidence-based practices (i.e., ABA, social stories, etc.) to better prepare them to work with students with autism.

The difference between the profiles for Respondent A (30% on autism knowledge) and B (91% on autism knowledge) showed that Respondent B had accrued more professional development workshops, attended blended classes as part of his AC program and had previous experiences with students with autism. Respondent B also taught more students with autism. All of these factors may have attributed to the higher knowledge scores of Respondent B when compared to Respondent A.

Discussion

The purpose of this study was to assess the knowledge of novice AC teachers in the area of autism education and to determine the extent to which age, credit hours of instruction, formal hours of instruction, amount of professional development, and number of students with autism predict the variance in knowledge scores. Almost half of the respondents in this study attended an ESC, but 25% of the respondents indicated attending a program they identified as other, suggesting they attended a private business, private entity, or school district to receive certification. No respondents reported attending a post-baccalaureate program. Overall, demographic data showed that a majority of the respondents were female and taught in a suburban or rural area but not at a Title I school. These findings differ from those by Dai et al. (2007), Ng, (2000), Rosenberg et al. (2007), and Schonfield and Fienman (2012), whose studies indicated that urban areas employed higher number of male teachers. In this study, participating novice AC special education teachers ranged in age from 18 to 57 years, with most (81%) between 23 to 42 years, which was similar to Rosenberg's (2007) sample.

External validity refers the generalizability of sample results to the overall population and is critical for demonstrating that research results apply to natural settings (King & He, 2005). In addition, bias in estimates can result from coverage error, measurement error, processing or editing error, and nonresponse error (Federal Committee on Statistical Methodology, 2001). Nonresponse biases a sample, reduces statistical power, and yields inaccurate effect sizes. These biases are especially likely for studies with low response rates. Low power and inaccurate effect size estimation can threaten validity and power and reduce accuracy in identifying relationships the direction and magnitude of those relationships (Sivo, Saunders, Chang, & Jiang, 2006).

In this study, a power analysis (G*Power) was conducted to identify the number of responses needed for utilizing parametric statistics. The small sample size did threaten external validity, and the current study's results should be interpreted with caution. The results of the study are not valid and cannot be generalized to the overall population; however if they could be, the data from the current study would have depicted novice AC special education teachers with low scores on knowledge about autism as the majority of the sample's scores fell between 60% and 89%. The scores of 13 participants (33.6%) were in the poor knowledge range (30-57%).

Overall, the findings showed that the mean autism knowledge score (61.3%) of novice AC special education teachers was slightly lower than the mean score of 63% earned by healthcare workers in Nigeria (Bakare et al., 2009), but higher than the mean score of 56% earned by undergraduate medical, nursing, and psychology students in Nigeria (Igwe et al., 2010). The implication is that AC special education teachers in the state of Texas need to be better prepared on the core autism knowledge in order to teach this population of students more effectively. This need is especially important given that the number of children diagnosed with autism in Texas appears to be steadily increasing. During the 2009-2010 school year, the 30,179

students with ASD surpassed the 28,827 children diagnosed with emotional disturbances (TEA, 2013). Previous research by Morgan and colleagues (1994) and Kretlow, Wood, and Cooke (2009) demonstrated the effectiveness of peer coaching for improved performance of inservice teachers of students with special needs. AC programs in the state of Texas need to incorporate supervised teaching experiences as an integral component of professional development for sustained outcomes for both, teachers and students with autism.

Eighty-three percent of this study's respondents completed internships as Teacher of Record. Connelly and Graham (2009) observed that preservice special education teachers who complete less than 10 weeks of student teaching are more likely to leave the profession or to move to a different type of teaching position. The current sample for this study accrued more hours of teaching than is typically accrued through clinical student teaching; however, it is not clear whether any of these teachers were supervised by peers or mentors skilled in implementation of evidence-based practices.

While 44.5% of novice special education teachers received four or more hours of instruction, 41.4% received less than three or less hours of instruction in the area of autism. A large number of teachers in the sample were inadequately prepared to teach students with autism. In fact, teachers of students with autism must be particularly knowledgeable regarding effective evidence-based practices (Mehring & Dow, 2006).

When evaluating the extent to which personal, educational, and professional background factors predict autism knowledge scores, in this study, only one predictor, the amount of self-directed learning, demonstrated statistical significance. Seventy-five percent of this study's respondents received professional development; however, only 33% attended six or more workshops. Also, 88.9% of this study's respondents engaged in self-directed learning.

Respondents who spent more than 5 hours in self-directed learning were more likely to be moderately knowledgeable about autism. This finding regarding autism knowledge scores might indicate that instead of facilitating the transition of professionals or new graduates from other career tracks into special education instruction (Feistritzer 2009), AC programs in Texas failed to provide core autism knowledge. This training deficit forced teachers to self-educate which was only as beneficial to teaching children with autism as each individual's overall commitment to teaching and professional development. While self-directed learning is likely to increase basic autism knowledge, it is unlikely to increase skills in implementation of evidence-based practices so crucial for improving student outcomes (Morrier, Hess, & Hefflin, 2010; Schuermann, Webber, Boutot, & Goodwin, 2003). Bellini, Henry, and Pratt (2011) discussed the need to train teachers adequately about autism, but in lieu of such training, the current results direct novice AC special education teachers to engage in self-directed learning if they are to attain a moderate level of autism knowledge.

The autism knowledge scores in this study were lower for novice AC special education teachers in self-contained life-skills classrooms than those in self-contained autism classrooms. Novice teachers trained through AC programs were more likely to acquire general knowledge about educating students with disabilities but lack advanced training about specific categories of disabilities (e.g., autism, multiple-impairments) or the evidence-based practices necessary for instructional effectiveness. This lack of specific preparation leaves novice teachers vulnerable to the demands placed on them and are more likely to leave the profession within five years of employment (Barnhill et al., 2010; NRC, 2001) unless inservice and on-the-job coaching is provided (Kretlow & Bartholomew, 2010).

Implications for Policy and Practice

The results from this study indicated that novice AC special education teachers have less knowledge about autism. This lack of knowledge could be attributed to limited exposure to the field of special education in general and autism in particular, prior to entering the AC program. In addition, novice AC teachers might not have had clinical experiences with individuals with autism prior to entering their certification program, which most likely explained lower autism knowledge scores. As a result, AC programs and public school districts need to focus effort on increasing the availability of professional development activities specifically about autism. AC programs in Texas need to provide basic and core content about autism to increase the knowledge of novice AC teachers on the characteristics and needs of students, instructional strategies that are considered to be evidence-based versus unscientific practices, and the Texas Autism Supplement. AC programs need to provide frequent and quality hands-on experiences through a clinical internship to ensure that teachers are knowledgeable about autism and possess basic skills in effective instructional strategies. Higher levels of autism knowledge will not only increase the probability of serving this population more effectively but also improve teacher retention.

Special education teachers, regardless of whether they are prepared through AC or traditional preparation programs, are at high risk for leaving the profession within 3 years of entering the field (Robertson & Singleton, 2010). Therefore, providing substantial preservice preparation, such as 10 or more weeks of student teaching, will increase the likelihood of novice special educators remaining in the field special education (Connelly & Graham, 2009). In addition, AC programs need to enlist quality mentors with previous teaching experience with students with autism in order to facilitate the ability of novice teachers to develop a well-rounded understanding about the unique needs of students with autism (Kretlow & Bartholomew, 2010).

While novice AC special education teachers tend to receive most of their training prior to becoming certified, it appears that the responsibility of continuous professional development is in the purview of public school districts who hire these teachers. School districts must provide extensive well-designed induction training (Brownell et al., 2004) with ongoing professional development in the area of autism if they intend to retain special education teachers. In addition, since most school districts provide professional development workshops that are topic specific, school districts should provide an array of workshops pertaining to the use of evidence-based practices for students diagnosed with autism (Scheuermann et al., 2003). In fact, providing such training to novice teachers and paraprofessionals may indeed increase interest in evidence-based practices and influence increases in self-directed learning.

The state of Texas has noncategorical special education licensure for most special education teachers, meaning that teachers do not receive certification in specialized areas such as autism spectrum disorders, mild/moderate disabilities, and emotional/behavioral disorders. AC programs need to articulate how they plan to increase the knowledge base of preservice teachers in all disability categories, including autism. Providing specific instruction about autism will enable teachers to understand the characteristics of autism and to implement appropriate evidence-based practices.

Limitations of the Study

The survey response rate was low, despite the number of individuals contacted for disseminating the questionnaire (see Supplement A). The low number of responses could be attributed to lack of desire on part of the directors of the AC programs to send the survey link to their AC program graduates. When contacted, many AC program directors expressed various types of concerns related to the topic of study. Some program director directly refused to forward the questionnaire link to their program participants.

One AC director of a very large program suggested that the research questions should be changed and should include assessment of autism knowledge of all teachers, not just of novice AC special education teachers. This director said that by focusing exclusively on novice AC special education teachers, the investigation focused on identifying potential problems with the quality of training in AC programs. Frequent electronic communication and in-person meetings did not appear to convince this program director. Another director suggested that she too was convinced about the logic of the AC program director who did not want her teachers to participate in the survey. In addition, several AC directors declined to participate because they did not believe their program needed to be evaluated. They noted that they were already working diligently to ensure their programs were equal in quality to traditional teacher certification programs and followed the same guidelines as all EPPs in Texas.

Second, the survey was distributed by invitation e-mail with the URL link in late May 2013 and at the end of the prior school year. Data were collected for a period of 17 weeks. Data collection ended 2 weeks after special education teachers returned to their positions for the new academic year. This timing might account for the low response rate, since the survey was distributed over the summer. Distributing the survey during the mid-term period of either the spring or fall semester might have yielded more responses. Finally, even though the survey was distributed statewide, mainly teachers from three regional ESCs responded, suggesting that results may not generalize to all the teachers in the state of Texas. Further, due to the small sample size, the findings might not generalize to all novice AC special education teachers, even within the same three regions.

Lessons Learned While Conducting the Study

One of the most critical lessons learned throughout the study was the reluctance of AC program directors to participate. The administrative code in Texas requires all approved

Educator Preparation Programs (EPPs) to adhere to the same requirements when constructing a teacher certification program. While this might not be the case in other states, Texas does not differentiate between types of EPPs. Therefore, many AC directors reported apprehension about disseminating the questionnaire to their AC participants. The directors were concerned that strictly evaluating the knowledge of AC special education teachers without including traditionally trained teachers could have potentially led to “finding fault with AC programs” without acknowledging any “faults of TC programs.” While this concern is understandable, the focus of the research was about the autism knowledge of novice AC special educators and what factors contributed to accruing that knowledge. Even with this purpose reiterated several times to many AC directors, participation was extremely low. Since AC is prevalent throughout the nation and Texas, AC directors need to participate in research to ensure the quality and validity of all teacher preparation programs.

Recommendations for Future Research

While there have been several studies conducted regarding the self-reported autism knowledge of school personnel or related service personnel (Cascella & Colella, 2004; Hendricks, 2011; Schwartz & Drager, 2008; Stone, 1987), there are no published studies of novice AC special education teachers and their autism knowledge assessment. Researchers are encouraged to survey this population at the national level because AC programs are prevalent nationwide (Feistritzer, 2011). Given the high number of AC teachers in Texas (May, Katsinas, & Moore, 2003) and because this study had a low response rate, future researchers may focus on comparing the autism knowledge of novice versus veteran AC special education teachers.

Assessment of autism knowledge of novice AC special education teachers was the focus of the current study. Researchers could benefit from evaluating novice and veteran teachers' knowledge regarding the other disability categories that they are more likely to serve (e.g.,

multiple impairments, auditory impairments, sensory impairments, etc.). The findings of such studies could benefit EPPs around the country desiring to provide special education training to preservice teachers. Additional research could focus on evaluating the extent to which novice special education teachers are trained to implement evidence-based practices for supporting students with exceptionalities. Lastly, a recommendation for EPPs in Texas and around the country is to consider a formal evaluation of the quality of AC programs. Specifically, assessments of the amount of formal instructional hours related to evidence-based practices and the type of supervision received by preservice AC teachers, are needed to increase the longevity of individuals in the field of special education (Connelly & Graham, 2009).

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ALTERNATIVE CERTIFICATION AND PREPARATION OF SPECIAL EDUCATION TEACHERS OF STUDENTS WITH AUTISM: AN ONGOING CHALLENGE

Becoming a special education teacher requires extensive training and education, regardless of the quality of the preservice teacher preparation program attended (Billingsley, 2004). This need for extensive training and education is especially true for those entering the field through alternative or non-traditional routes to certification (Brownell, Sindelar, Kiely, & Danielson, 2010), with minimal supervised field experiences (Turley & Nakai, 2000), and opportunities to work with a specific population (e.g., students with autism, emotional/behavioral disorders or sensory impairments; Humphrey, Wechsler, & Hough, 2008). Magnifying the need for training high quality special education teachers is the current shortage of all types of teachers in the United States in general and Texas in particular (Nickson & Hughes, 2010). Critical teacher shortages throughout the United States and the need for models for fast preparation of teachers were the reasons that alternative certification (AC) programs were initiated (Tissington & Grow, 2007). Texas, with its 26 million residents, represents nearly 10% of the entire population of the United States (U.S. Census Bureau, 2013) and may serve as a model for implementation and effectiveness of AC programs. The purpose of this review is to address the challenges for meeting the demand for high quality AC special education teachers to teach students with autism.

AC commonly encompasses every licensure avenue beyond traditional teacher preparation programs found in university settings (Bauer, Johnson, & Sapona, 2004; Boe, Shin, & Cook, 2007; Cohen-Vogel & Smith, 2007; Dai, Sindelar, Denslow, Dewey, & Rosenberg, 2007; Darling-Hammond, Chung & Frelow, 2002; Humphrey, Wechsler, Bosetti, Wayne, & Adelman, 2002; Zeichner & Schulte, 2001). AC occurs through one of four routes: (a) post-

baccalaureate programs through universities at which such individuals work toward Master's degrees (Humphrey & Wechsler, 2007); (b) fast-track programs in which individuals complete several weeks of training in the summer and take *teacher of record* positions in the fall (Darling-Hammond, 2009); (c) emergency certificates issued to individuals completing required coursework at a university; or (d) opportunities to finish AC coursework as required for special education certification for individuals holding general certification (Darling-Hammond, Berry, & Thoreson, 2001). Many university-based AC programs offer curriculum modified in intensity from the traditional teacher certification (TC) programs even though some consider both programs equally robust (Roth, 1994; Turley & Nakai, 2000).

Fast-track programs with short durations are the most common approaches to achieving AC. They accommodate individuals with full-time employment outside of education and wanting to transition into the teaching profession (Johnson, Birkeland, & Peske, 2003). In fact, many organizations and entities have launched AC teacher preparation programs to address critical teacher shortages (Johnson, Birkeland, & Peske, 2005), often at the expense of high quality training in content and pedagogy (King-Sears, 2005; Katsiyannis, Zhang, & Conroy, 2003; Suell & Piotrowski, 2006).

Prior to the inception of AC programs, states issued emergency certificates to individuals so they could teach immediately and without any instructional training, orientation, or instructional support, while requiring them to take classes after business hours (Feistritzer, 1993). In 1983, New Jersey created its first AC program, enabling well-educated adults to teach full-time. The AC program reduced the number of pedagogy courses needed and paired the teacher candidates with experienced mentors during the first year in the classroom (Kretlow & Bartholomew, 2010). At the end of the year, teachers were either awarded full certification or

encouraged to seek another position (Feistritzer, 1994; Walsh & Jacobs, 2007).

Following New Jersey's model, several other states, including Texas, introduced AC programs to address teacher shortages and to replace emergency certification programs (Cohen-Vogel & Smith, 2007; Feistritzer, 1994). By 2004, 538 AC programs were registered throughout the United States and collectively had produced approximately 35,000 newly certified teachers by 2005 (Feistritzer, 2005). AC programs continue to gain in popularity. Currently, 48 states and the District of Columbia have at least one AC program in existence (Feistritzer, 2011).

Further, the No Child Left Behind Act of 2001 (NCLB, 2002) encouraged streamlining alternative route programs to attract individuals capable of becoming highly qualified teachers and who would otherwise not be interested in undertaking the TC pathway (Dai, Denslow, Dewey, & Rosenberg, 2007). With NCLB, teachers must be fully certified, have a bachelor's degree, and demonstrate content knowledge by passing content examinations to be labeled highly qualified (Gelman, Pullen, & Kaufman, 2004; Tissington & Grow, 2007). However, in recent years, AC programs have become less stringent with the number of requirements for certification (Johnson, Birkeland, & Peske, 2003; McLeskey & Billingsley, 2008), challenging the designation of highly qualified status for general or special education teachers. Because AC programs are considered to encourage individuals from diverse ethnic and cultural groups to teach (Feistritzer, 2011), critical shortages in fields such as special education, mathematics, and science may be alleviated (Tong, Castillo, & Pérez, 2010).

Characteristics of Individuals Attending AC Programs

Although AC programs enable individuals to enter the profession without attending a traditional undergraduate teacher preparation program, the quality of training of professionals varies tremendously because each program independently determines the recruitment criteria based on local market demands (Brindley & Parker, 2010). For example, a large state, such as

Texas, with severe shortages in special education teachers, may focus on addressing this area of need over other teacher shortages in mathematics and science (May, Katsinas, & Moore, 2003). Historically, AC programs have been designed to recruit specific populations into the field of education in order to meet the market demands of the area, such as to recruit and retain high quality teachers in urban areas (Dai, Denslow, Dewey, & Rosenberg, 2007; Ng, 2003; Schonfeld & Feinman, 2012) and to increase the number of minority and male teachers (May, Katsinas, & Moore, 2003). Teachers from AC programs are more likely to accept challenging positions, such as positions in special education or urban areas (Ng, 2003; Rosenberg, Boyer, Sindelar, & Misra, 2007).

Career Tracks

According to Dai, Denslow, Dewey, and Rosenberg (2007), three groups of candidates are the most promising recruits for AC programs including paraprofessionals, midcareer changers, and early career changers. Paraprofessionals represent a specific recruitment target for future special education teachers even though they lack scientific knowledge because they tend to be employed in school districts and work with students with disabilities. In contrast, midcareer changers have a vast amount of content knowledge and technical experience but are among the riskiest group of individuals because many appear to be ill-suited to teach students in school settings. Lastly, individuals in their mid-20s interested in education are early career changers with less to lose financially than midcareer changers and less likely to expect the higher salaries that middle-aged adults might expect to receive based on their specialized areas of expertise.

Gender

Regarding the gender of teacher recruits, a survey of an AC program in Hawaii indicated that more women (56%) than men (44%) entered the state's AC program with a similar trend

noted for candidates in mainland USA (Feistritzer, 2011). During 2009, in Texas, 71.4% of AC participants were female and only 28.6% were male (NCEI, 2010). A similar distribution was noted by Robertson and Singleton (2010) who had conducted a survey of AC participants attending the University of Memphis. They found that 80% of AC participants were female and 20% were male. Depending on the geographical location of the AC program recruits, gender differences could also be a function of the site for recruitment. For example, *Troops to Teachers* is a United States Department of Education and Department of Defense program that assists eligible military personnel transition into the field of education. The number of women in the military is far lower than men, and this program could increase the number of men who go through AC programs (Brindley & Parker, 2010).

Ethnicity

Regarding candidates' ethnicities, AC programs boast greater diversity in ethnic background over TC programs. Feistritzer (2011) appraised the demographic data of 1,076 AC teachers and found that 70% certified through AC programs were Caucasian (implying 30% under-represented ethnicities) when compared to TC counterparts who were 87% Caucasian, 5% African American, and 4% Hispanic. Additionally, AC programs appear to have enrolled 11% of African American and 15% of Hispanic teachers (Feistritzer, 2011).

Age and Professional History

When comparing the ages of both general and special education AC and TC participants, Rosenberg, Boyer, Sindelar, and Misra (2007) found AC special education teachers to be younger than 30 years whereas Feistritzer (2011) showed TC teachers as falling into the two age categories of being between 20 to 30 years old or over 50 years old. Humphrey, Wechsler, and Hough (2008) found the mean age of participants in seven AC programs to be slightly higher

than that of teachers from TC programs. In Texas, the Texas Education Agency (TEA, 2012) reported teachers in their 30s as the largest group of probationary certificate holders.

As seen above, AC participants are more likely to be in their 20s to 30s, and over 50 years old and 42% of AC program participants already worked in schools prior to entering AC programs (Humphrey, Wechsler, & Hough, 2008). Further, 60% of participants sampled from 71% of the AC programs indicated holding a position as a classroom teacher, substitute teacher, or a teacher's aide prior to entering the program. Humphrey et al.'s findings supported Shen's (1997) finding that 51% of AC trained teachers attended a university/college during the prior year or had an education related position (23.8%) prior to entering an AC program. While demographic data can be used for understanding the background of participants, it is important for teacher preparation programs to use the best method for training general and special education teachers (Goldhaber & Brewer, 2000). The best instructional method warrants some discussion given the amount of variability in existing AC programs especially in the state of Texas.

Characteristics of AC Programs in the State of Texas

In Texas, the first AC program was introduced within the Houston Independent School District (ISD) in 1985 (Stafford & Barrow, 1994). During its first year, Houston ISD certified 276 teachers. In 1986, Texas was the second state to implement AC programs statewide (Roth, 1994). Since the 1980s, AC has become one of the main teacher certification routes in Texas. By the 1989-1990 academic year, 13 AC programs had been implemented throughout the state. These few programs were created because of the requirement to prove independently through documentation, that a shortage of teachers existed in the specific geographic area served by the AC program. As a result, the Texas Board of Education adjusted the strict regulations to allow emerging AC programs to train prospective teachers without necessarily supplying

documentation of teacher shortages in the state (Roth, 1994). During the 2007-2008 school year, 13,668 teachers were certified through AC routes in Texas, the highest number within any one state in the country (NCEI, 2010).

Texas has developed requirements to which all AC and TC teacher preparation programs adhere. According to the Texas Administrative Code (2008) rule §228.35, all teacher preparation programs must provide candidates with a minimum of 300 clock-hours of coursework or training and at least 6 clock-hours of test preparation. The 300 clock-hours consist of a minimum of 30 clock-hours of field experience, 15 hours of which may be provided by electronic transmission or technology-based equipment, and 80 clock-hours of coursework and/or training. The state of Texas allows educator preparation programs (EPP) to determine the format and delivery of the necessary and required hours of AC coursework and training. Individuals must complete all coursework or training prior to the completion of the teacher preparation program to receive standard certification. Additionally, all teacher preparation programs must provide field-based experiences such as internships, student teaching, teaching, or clinical teaching. Student teaching and clinical teaching must occur for a minimum of 12 weeks, whereas an internship is for a minimum of 1 academic year with candidates holding a probationary certificate and being classified as teacher in the Public Education Information Management System (PEIMS).

As part of the teacher preparation program, candidates must receive on-going support from an experienced educator trained as a field supervisor. Each observation of teaching in the field must be at least 45 minutes in length. Teacher preparation programs must provide the first observation within the first 6 weeks of classroom assignments. If candidates complete internships, the teacher preparation program must provide at least two formal observations

during the first semester and one formal observation during the second semester. A candidate completing student teaching or a clinical internship must have undergone at least three observations during the 12-weeks (TEA, 2008).

While teacher preparation programs must provide the required hours of training or coursework, the curriculum of each AC program in special education must be based on scientifically-based research aligning with the Texas Essential Knowledge and Skills (TEKS). The following subject matter must be included in special education curriculum: (a) specified requirements for reading instruction; (b) the educator's code of ethics; (c) child development; (d) motivation; (e) learning theories; (f) TEKS organization, structure, and skills; (g) content areas' TEKS; (h) state assessments; (i) curriculum development and lesson planning; (j) classroom assessments for instruction and diagnosing learning needs; (k) classroom management for developing positive learning environment; (l) special populations; (m) parents conferences and communication skills; (n) instructional technology; (o) pedagogy instruction; (p) certification test preparation (Texas Administrative Code, 2008). The TEA (2008) reports that five entities manage AC programs: universities, Education Service Centers (ESC), community colleges, local school districts or schools, or private organizations or businesses (TEA, 2008). Figure 6 displays the various Texas entities currently providing teacher preparation programs in special education.

The TEA (2011) maintains statistical data regarding teacher preparation in Texas, and noted that the number of AC certified teachers rose from 2006 through 2010 while the number TC certified teachers decreased during the same period. From 2004 to 2006 and 2007 to 2008, SBEC (2012) reports showed that more teachers were prepared through AC or post baccalaureate routes than through TC programs. AC programs are on target to remain the primary source of

teacher certification in Texas (SBEC, 2012), but retention of AC teachers is a challenge for various reasons.

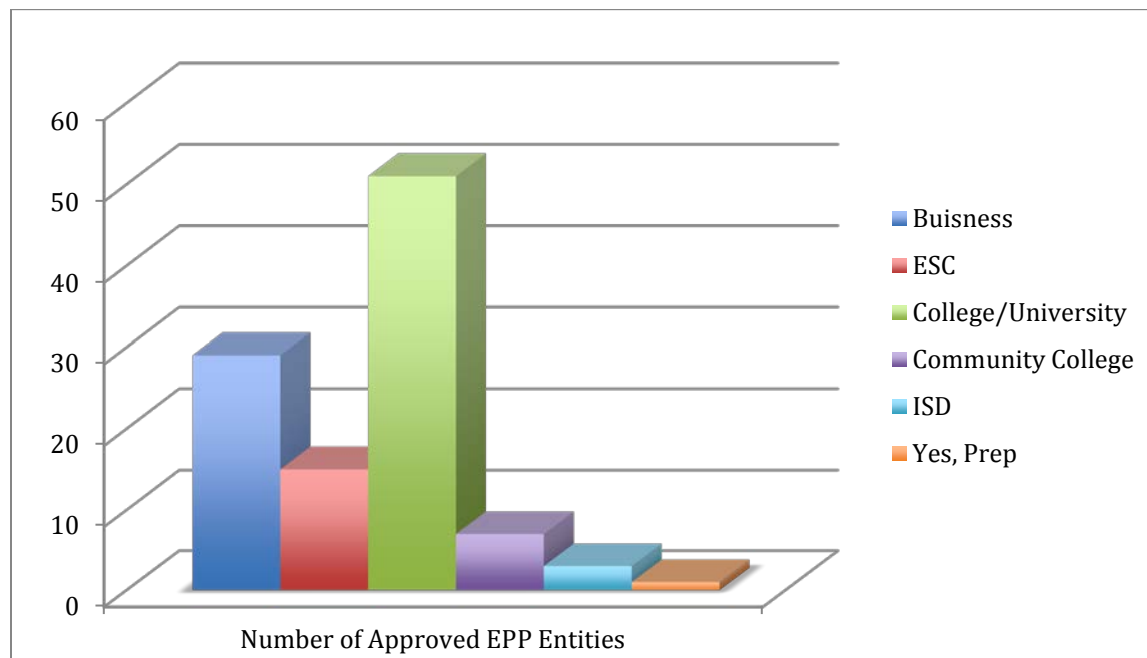


Figure 6. The teacher preparation program entity certifying special education teachers by type, includes colleges and universities and private organizations/businesses.

Challenges for Retaining Special Education Teachers

Special education teachers represent the highest turnover rate among teachers, and new teachers are at high risk for attrition within the first 3 years of employment (Roberson & Singleton, 2010). Even though new special education teachers lack classroom experience, principals expect them to demonstrate vast knowledge of special education and in-depth knowledge of curriculum and interventions utilized for teaching with students with disabilities (Brownell, Hirsch, & Seo, 2004). The expectation for expertise is higher for special education than for general education teachers (Brownell et al., 2004).

Special education has historically endured critical shortages in available highly qualified teachers in relation to job openings. Efforts to provide high quality services to children receiving special education services have been strained (Boe, 2006). With critical shortages of special

education teachers, school districts cannot fill such positions and retain the same [less qualified] teachers the following year (Billingsley, 2004).

Boe, Shin, and Cook (2007) suggest that teachers with degrees in their field of study have extensive content knowledge to teach content in their respective areas. This may be true for mathematics and science teachers at a secondary level where little pedagogical knowledge is needed. The same is not true of elementary education, which requires a higher amount of pedagogical skill and relatively less need for extensive content knowledge (Boe et al., 2007). When children have difficulty learning complex subject matter, particularly children with disabilities, pedagogical knowledge and skills become vital to have acquired through teacher preparation (Sindelar, Daunic, & Rennells, 2004). Pedagogical knowledge enables teachers to use alternative teaching methods for accommodating and modifying curricula for their students (Quigney, 2010). Kee (2012) discovered that AC programs offering three or more courses in methods, learning theory, or psychology more likely produced better prepared educators.

While AC programs increase the supply of classroom teachers, they are at risk for recruiting candidates with little understanding of pedagogy, classroom management, instructional strategies, and important issues related to social and academic development specifically of students with special needs (Nagy & Wang, 2007). New AC teachers lacking proper administrative support must provide resources for themselves, deal with performance pressures without mentoring, and are likely to leave the field within a short period of time (Billingsley, 2004).

Retention rates of general and special education teachers initially certified in Texas were analyzed for three cohorts (TC, AC, and post baccalaureate) from 1998-2003. All cohorts, regardless of their preparation route, showed low attrition rates during the first year of

employment, which tended to increase during the second and third years. Surprisingly, the highest rates of attrition during all three years of the study were observed for individuals prepared through postbaccalaureate AC route followed by teachers prepared through TC programs. These results suggest a clear link between type of certification and attrition. Teachers who hold emergency, provisional, or probationary certificates show an increased risk of leaving special education compared to teachers trained through TC programs (Billingsley, 2004).

Retention of teachers is extremely important. Over time, special education has failed to increase the amount of teacher positions commiserate with student growth or to retain fully certified teachers (Boe, 2006). A study of the job burnout rates among special educators showed AC teachers to have lower burnout rates than TC teachers (Banks & Necco, 1990). Banks and Necco (1990) speculate that AC special education teachers were more likely to perceive their time in special education as short term until they secured a general education teaching position.

Mentoring is an extremely imperative component of teacher retention. Individuals who lacked mentoring were more likely to indicate a desire to leave the field of education (Billingsley, 2004). According to Haberman (2006) and Humphrey, Wechsler, and Hough (2008), mentoring should be an integral element of all AC programs. TEA requires that teachers who are seeking initial certification have access to a mentor, also called field supervisor. Mentoring quality and quantity for AC programs is varied and depends on the design of the AC program (Darling-Hammond, 2009). Mentoring is considered an integral part of an AC program, yet 10% of participants indicated no mentoring component. Of the participants who received mentoring, less than half (41%) indicated that the mentoring was helpful compared to 6% who said mentoring was not helpful at all (Feistritzer, 2005). In order to increase special education teachers' retention, AC programs need to provide specific mentoring for special education

teachers in meaningful ways (e.g., guidance in problem-solving difficult issues; modeling classroom management techniques; effective ways to interact with parents).

Need to Meet the Challenge of Preparing AC Special Education Teachers

The focus of AC program evaluation must shift toward the essential knowledge and skills special education teachers need to ensure their effectiveness in teaching with students with disabilities (Brownell, Sindelar, Kiely, & Danielson, 2010). Special education teachers must have extensive knowledge and skills that general education teachers are not required to possess (Quigney, 2010). For example, special education teachers must understand how to teach content and be able to alleviate learning problems faced by students with disabilities (Rosenberg, Sindelar, Connelly, & Keller, 2004). They need to have knowledge of technology and how it can make learning content more accessible for students, thereby circumventing specific learning problems that students who have special needs experience (Brownell et al., 2010). They must know how to utilize the assessments and interventions with students with disabilities (Brownell et al., 2010; Darling-Hammond, 2001) and make appropriate accommodations and modifications when necessary (Blanton, 1992; Carlson, Lee, & Schroll, 2004; Quigney, 2010). Finally, special education teachers must be knowledgeable in developing and implementing the individualized education plan, a necessary accountability tool, for students with disabilities.

New special education teachers trained within a two-month AC training program are not likely to retain the content knowledge and pedagogy needed for being considered to highly qualified teachers (McLeskey & Billingsley, 2008). New AC-trained special education teachers who enter the classroom with minimal preparation and field experience, are unprepared for the demands they face, and have less knowledge regarding evidence-based practices (McLeskey & Billingsley, 2008). Without proper knowledge to face the challenges of teaching students with disabilities, the likelihood for decreased instructional effectiveness and attrition are high

(McLeskey & Billingsley, 2008). Because most special education teachers receive a noncategorical teaching certificate in special education, they need disability specific knowledge to meet the learning needs of students (Brownell et al., 2010).

Teachers, who perceive AC coursework as valuable are more likely to teach in the field of education for 10 years or more and to have stronger self efficacy (Humphrey et al., 2008). Additionally, teachers who pursue self-education to learn about effective strategies for teaching a categorical group of students with disabilities (e.g., autism, emotional/behavioral disorders), are more likely to seek mentorship and network support from peers to be successful in their classrooms (Billingsley, 2004; Haberman, 2006). Due to the specific learning needs and characteristics of students with autism, it is vital that special education teachers gain knowledge through specialized coursework and understand the appropriate evidence-based strategies to utilize for instructional effectiveness. This disparity is a specific challenge for AC programs to address.

Need to Meet the Challenge of Preparing AC Teachers for Students with Autism

With an increase in the prevalence rate of autism and the need for highly qualified special education teachers, personnel preparation programs, more than ever, need to prepare teachers to specifically educate students with autism in school settings (Scheuermann, Webber, Boutot, & Goodwin, 2003). According to the Individuals with Disabilities Education Improvement Act (IDEIA, 2004), autism is defined as a developmental disability typically present before 3 years of age. It significantly affects verbal and nonverbal communication along with social interactions. Children with autism engage in repetitive activities and stereotyped movements, resist environmental change or change in daily routines, and respond unusually to sensory experiences (U.S. Department of Education, 2012). According to the Centers for Disease Control (CDC, 2012), 1 out of 88 children are diagnosed with autism. In Texas, the number of children

diagnosed with an autism spectrum disorder continues to grow (see Table 4).

As indicated in Table 5, during the 2009-2010 school year, the number of students diagnosed with autism ($n = 30,179$) surpassed the number of children with emotional disturbances ($n = 28,827$; TEA, 2013). Autism represents the fifth largest special education population in the state (TEA, 2013).

Table 5

Increases in the Number of Students Identified with Autism in Texas from 2007-2008 Through 2009-2010

School Year	<i>n</i>
2007-2008	22,903
2008-2009	26,603
2009-2010	30,179

Note. Data adapted from TEA (2013).

Currently, certification trends in Texas support noncategorical licensure for special education teachers to meet the needs of a wide variety of students, however, this model fails to equip special education teachers with necessary in-depth knowledge and specific competencies for working with students with autism (Barnhill, Polloway, & Sumutka, 2010). The National Research Council (NRC, 2001) indicated that one of the weakest components of effective programming for children with autism is [lack of] personnel preparation. Personnel need to be trained to demonstrate effective implementation of evidence-based practices for skills-instruction in the core deficit areas of autism through systematic and structured curricula and supervised field experiences.

When students with autism have difficulty learning or have behavior problems that interfere with learning, applying evidence-based strategies is crucial to educating these students and enables teachers to show their knowledge of pedagogy for special education (Dai, Denslow, Dewey, & Rosenberg, 2007). Hess, Morrier, Heflin, and Ivey (2008), in Georgia, synthesized autism intervention literature to create the Autism Treatment Survey, a list of comprehensive interventions most commonly used by teachers of students with autism. Hess et al. focused on interventions used by parents of children with autism (Green et al., 2006), a guide of evidence-based practices (Simpson et al., 2005), and a report on evidence-based practices (NRC, 2001). Authors determined that assistive technology was the most frequently used skill-based intervention. Gentle teaching and floor time were the most widely used of the interpersonal relationship strategies. Although these strategies were used in preschool, elementary, and middle school settings. Overall, Hess et al. (2008) considered fewer than 10% of the strategies to be evidence-based. Moreover, 40% of the interventions used by teachers had not been identified by Simpson et al. (2005), so teachers may implement a strategies in the classroom that are not empirically tested or evidence-based. Teachers are often unsure of how to pick a specific strategy and receive little to no support from administrators about what to choose or how to improve knowledge and understanding of autism in order to cope with the complexities of educating students with autism (LeBlanc, Richardson, & Burns, 2009).

The lack of preservice preparation for special education means most teachers of students with autism are woefully underprepared. This is exacerbated by failure of school districts in providing additional training related to autism, because most workshops are topic specific, last 1 to 2 days and focus on delivery of content knowledge, not practical skills. Teachers of students with autism need comprehensive and ongoing training, such as supervised hands-on experiences

with students with autism (Nickson & Hughes, 2010; Scheuerman et al., 2003). Providing high quality preservice education, coupled with ongoing education, will assist new AC special education teachers capabilities for meeting the unique needs of students with autism.

Recommendations to improve the odds of programs successfully meeting these challenges are discussed in the following section.

Recommendations for the Challenges Ahead

One way to retain new teachers in the field is to design AC programs that extensively prepare teachers in both content and pedagogy. In general, teacher education programs should focus on recruiting individuals with experience working with students with disabilities who understand the challenges of educating the population. The more rigorous and extensive the preparation, the more likely the AC teacher will have the knowledge and skills needed for coping with job stress and for increasing teacher retention (Dai, Denslow, Dewey, & Rosenberg, 2007).

Special education teachers must possess an understanding of how a disability manifests, as well as how to address the specific learning challenges students have by choosing appropriate evidence-based strategies to support learning (Brownell et al., 2010). In addition, the knowledge base that special education teachers need includes integration of technology to support learning and available assessments. Special education teacher shortages, at approximately 10%, are rampant in the field of education. Licensure strategies theoretically reducing the critical shortages, but fail to prepare TC or AC teachers with the unique expertise needed by teachers of record (Brownell et al., 2010). Even though AC programs are designed according to market demands, AC program coursework must include targeted content regarding pedagogy for disabilities that include autism (Darling-Hammond, Holtzman, Gatlin, & Heilig, 2005). Special education teachers have to rely on pedagogy rather than content knowledge when educating students with disabilities (Boe, Shin, & Cook, 2007). AC programs tend to offer fast-track AC

routes but produce teachers with less pedagogical knowledge. In special education, pedagogy is extremely important to ensure teachers can effectively educate students with disabilities and students with autism.

As shown, AC teachers of students with autism fail to utilize evidence-based practices and are not adequately prepared to understand the unique needs and characteristics of students with autism (Hess, Morrier, Heflin, & Ivey, 2008). In order to ascertain the most effective way to prepare teachers of students with autism, state-level leaders and institutions of higher education must develop statewide competencies for educators (Barnhill, Polloway, & Sumutka, 2010). Future research should be conducted on the most effective program for and route to certification for special education teachers (Bauer, Johnson, & Sapona, 2004). AC programs need to strengthen their curriculum by increasing the amount of instructional hours dedicated to pedagogy to ensure teachers gain the knowledge and skills necessary for performing without succumbing to job stresses (Darling-Hammond, 1999). Moreover, Boe et al. (2007) suggested that a study of the amount of instruction in pedagogy and supervised teaching by route to certification is needed in the field of AC research in order to increase teacher longevity in special education.

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APPENDIX A
SPECIAL EDUCATION AC ENTITIES IN TEXAS

AC Program	Preparation Hours		On-line	Face-to-Face	Blended	Teacher Of Record	Clinical Teaching Internship
	AC	PB					
Region I-Edinburg							
A Career in Teaching-EPP (McAllen)	162		X	X		X	
Alternative-South Texas Educator Program - Laredo (A-STEP)	90		X	X		X	
Alternative-South Texas Educator Program-Brownsville (A-STEP)	90		X	X		X	
Region 01 Education Service Center (Project P.A.C.E.)	180		X	X		X	X
South Texas College - Alternative Certification Program (STAC)	63			X		X	
South Texas Transition to Teaching Alternative Certification Program (SPED)	80			X		X	
Texas A&M International University	80					X	
Texas Alternative Certification Program at Brownsville	99			X		X	
University of Texas - Brownsville		9		X		X	X
Region 2-Corpus Christi							
A Career in Teaching-EPP (Corpus Christi)	162			X		X	
Region 02 Education Service Center	O*				X	X	X
Texas A&M University - Corpus Christi (ACE)		12		X		X	X
Texas A&M University - Kingsville		12		X		X	
Region 3-Victoria							
Region 3 Education Service Center-Educator Preparation Program (EPP)	O*			X		X	

AC Program	Preparation Hours		On-line	Face-to-Face	Blended	Teacher Of Record	Clinical Teaching Internship
	AC	PB					
Region 4-Houston							
A Career in Teaching-EPP (Houston)	120		X	X		X	
A+ Texas Teachers	49		X		X	X	
ACT-Houston	70			X		X	X
Alternative Cert for Teachers NOW! (Houston)	80			X		X	
ATC-East Houston	O*			X		X	X
College of the Mainland COMPACT	104				X		X
Harris County Department of Education	87				X	X	
Houston Baptist University		18		X		X	
Houston Community College System (ACP)	216				X	X	
Houston ISD	O*			X		X	
Lone Star College - Cy-Fair	204		X	X		X	X
Lone Star College - Kingwood	204				X	X	X
Lone Star College - North Harris	204		X	X		X	X
Lone Star College - Tomball	204		X	X		X	X
Pasadena ISD	117			X		X	
Prairie View A&M University		6					
Region 04 Educator Certification Services	113		X		X	X	X
Texas Alternative Certification Program at Houston	99			X		X	
Texas Southern University		DP		X			X
University of Houston		DP		X			X
University of Houston-Clear Lake	TEP	DP		X		X	X

AC Program	Preparation Hours		On-line	Face-to-Face	Blended	Teacher Of Record	Clinical Teaching Internship
	AC	PB					
University of St Thomas		6		X		X	
Web-Centric Alternative Certification Program	O*		X			X	X
Yes Preparatory Public Schools	80			X		X	
Region 5-Beaumont							
Lamar State College - Orange ACE Program	140		X			X	X
Lamar University		DP	X			X	X
Region 05 Education Service Center	O*		X	X		X	
Region 6-Huntsville							
Blinn College Teacher Education Alternative Certification Host (TEACH) Program	O*				X	X	
Region 06 Education Service Center	114			X	X	X	X
Sam Houston State University		12/18	X			X	X
Texas A&M University		DP		X			X
Region 7-Kilgore							
Jarvis Christian College				X			X
Region 07 Education Service Center	150					X	
Stephen F Austin State University		DP	X			X	X
Tyler Junior College	O*			X		X	X
University of Texas - Tyler		DP	X			X	X
University of St Thomas		6		X		X	
Web-Centric Alternative Certification Program	O*		X			X	X
Yes Preparatory Public Schools	80			X		X	

AC Program	Preparation Hours		On-line	Face-to-Face	Blended	Teacher Of Record	Clinical Student Teaching
	AC	PB					
Region 8-Mount Pleasant							
Texas A&M University - Texarkana	6			X		X	X
Region 9-Wichita Falls							
Midwestern State University		DP		X		X	X
Region 10-Dallas							
ACT-Houston at Dallas	70			X		X	
Collin County Community College	O*						
Dallas ISD	O*			O*		X	
Mountain View College	O*			X		X	
Quality ACT: Alternative Certified Teachers	O*			X		X	X
Region 10 Education Service Center	100				X	X	X
Southwestern Assemblies of God University		DP		O*			O*
Texas A&M University - Commerce		DP		O*			O*
Region 11-Fort Worth							
Education Career Alternatives Program (ECAP)**	97.5		X			X	
iTeach Texas	O*		X			X	X
Region 11 Education Service Center	195.5				X	X	X
Tarleton State University	O*			X		X	X

AC Program	Preparation Hours		On-line	Face-to-Face	Blended	Teacher Of Record	Clinical Teaching Internship
	AC	PB					
Texas Teaching Fellows (Fort Worth; TNTP Academy)	285			X		X	
Texas Woman's University		DP		X			X
The Texas Institute for Teacher Education	O*		X			X	X
University of North Texas		24	X	X		X	X
Weatherford College	101				X		
Region 12-Waco							
Baylor University		36		O*			O*
McLennan Community College	112.5			X		X	X
Region 12 Education Service Center	O*			X		X	X
Texas A&M University - Central Texas (TMATE)							
University of Mary Hardin-Baylor		DP		O*			O*
Region 13-Austin							
Austin Community College - Teacher Preparation and Certification Program	O*		X			X	X
Concordia University		30		O*		X	X
Educators of Excellence ACP	100			X		X	X
Huston-Tillotson University	O*			X		X	X
Region 13 Education Service Center	88				X	X	

AC Program	Preparation Hours		On-line	Face-to-Face	Blended	Teacher Of Record	Clinical Teaching Internship
	AC	PB					
Southwestern University**		DP					X
Texas Alternative Certification Program at Austin	99			X		X	
Texas State University-San Marcos		DP				X	X
Training via E-Learning: An Alternative Certification Hybrid (T.E.A.C.H.)	280		X	X		X	X
University of Texas - Austin		DP					X
Region 14-Abilene							
Abilene Christian University		DP		X			X
Region 14 Education Service Center	0*					X	
Region 15-San Angelo							
Angelo State University		30		X			X
Region 16-Amarillo							
West Texas A&M University		12/DP		X		X	X
Region 17-Lubbock							
Lubbock Christian University		DP		X*			X
Texas Tech University		DP		X*		X	X
Wayland Baptist University		DP		X*			X
Region 18-Midland							
Region 18 Education Service Center	0*			X*		X	
University of Texas - Permian Basin				X*		X	X
Texas Lutheran University		DP		X		X	X

AC Program	Preparation Hours		On-line	Face-to-Face	Blended	Teacher Of Record	Clinical Teaching Internship
	AC	PB					
Region 19-El Paso							
Alternative Cert for Teachers NOW! (El Paso)	80			X*		X*	
Region 19 Education Service Center	0*				X	X	
Teachers for the 21st Century	136			X		X	X
Texas Alternative Certification Program	99			X		X	
University of Texas - El Paso		DP	X	X		X	X
Region 20-San Antonio							
A Career in Teaching-ACP	104			X		X	
ACT-San Antonio (Alt Cert for Teachers)	70		X		X	X	X
Educators of Excellence ACP (San Antonio)	0*			X		X	X
Our Lady of the Lake University		DP		X*			X*
Region 20 Education Service Center	84				X	X	
Texas A&M University - San Antonio		0*		X*		X	
Texas Alternative Certification Program at San Antonio	99			X		X	
University of Phoenix (@ San Antonio)		DP	X			X*	
University of Texas - San Antonio		DP		X*			X
University of the Incarnate Word		DP		X*		X	X

AC= Alternative Certification

0*= Information not given via provider's website

**=Offers professional development in Autism Spectrum Disorders

PB=Postbaccalaureate

DP=Deficiency Plan

X*= Information not given via website

APPENDIX B
AUTISM KNOWLEDGE SURVEY

Assessing the Correlation between the Knowledge of Novice Alternatively Certified Teachers Regarding Autism and the Route to Special Education Alternative Certification

Survey Directions

Please read each question and provide a response to the best of your ability. The purpose is to gauge your knowledge of autism. Please do not use any other resources to answer the question. This is a timed survey. Please complete it in one sitting. Click on the answer of your choice. When you get to the bottom of the page, use the forward arrows to proceed further. The arrows will take you to the next question in the survey. Thank you very much in anticipation of your participation. When taking the survey, please answer the questions keeping in a mind a student who has classic autism or has moderate to severe autism. I really appreciate your willingness to participate in the study and to contribute to possible changes in the professional preparation of alternatively certified special education teachers. Your participation will also facilitate the completion of a doctoral candidate's (Jennifer Alward) dissertation.

Informed Consent and Survey Criterion

1. I have read and understood the above Informed Consent notification and am participating in this survey at my own free will.
 - Yes, I will continue
 - No, I choose to exit the survey
2. Did you receive your special education alternative certification in the State of Texas?
 - Yes
 - No
3. A beginning teacher is defined as a teacher who is currently in his/her first or second year of teaching. Are you a beginning teacher?
 - Yes, this is my first year
 - Yes, this is my second year
 - No, I have taught for more than 2 years
4. Have you taught at least one student with autism (AU) during the last (2011-2012) or current school year (2012-2013)?
 - Yes
 - No

Section I: Personal Background (Research Question 2)

5. What is your age?

- 18-22
- 23-27
- 28-32
- 33-37
- 38-42
- 43-47
- 48-52
- 53-57
- 58-62
- 63-67
- 68+ years

6. What is your ethnicity?

- African-American
- American Indian/Alaskan Native
- Asian
- Caucasian
- Hispanic
- Native Hawaiian and Other Pacific Islander
- Biracial
- Other _____
- Prefer not to answer

7. What is your gender?

- Male
- Female

Section II: Educational Background

8. What is the highest degree that you have achieved? (Research Question 2)

- Bachelor's
- Master's
- Doctorate

9. Name your specialization (major) for each of the degrees you have received

Bachelor's

Master's

Doctorate

10. You received your alternative certification by completing course work and/or practical experiences through a _____ program. (Research Question 2 and 3)

- University/College
- Education Service Center
- Community College
- Other

11. How many credit hours did you take pertaining to autism (AU) or autism spectrum disorders (ASD) during your preservice training? (Research Question 2)

- 0
- 3
- 6
- 9
- 12
- Other _____

12. How many formal instructional hours did you spend on autism (AU) or autism spectrum disorders during your preservice training? (Research Question 2)

- 0
- 1-3
- 4-6
- 7-9
- 10-12
- Other _____

13. Approximately how many content development or professional development workshops or training events regarding autism (AU) have you attended since receiving a probationary teacher certificate or a teaching certificate? (Research Question 2)

- 0
- 1-2
- 3-4
- 4-5
- 6 or more

14. Which statement most accurately describes the type of your AC preservice training prior to becoming a teacher of record or completing a clinical student teaching internship? (Research Question 2)

- I took face-to-face classes most of the time
- I took on-line classes most of the time
- I took some face-to-face and some on-line classes

15. Participants of Alternative Certification programs are required by the State of Texas to complete an internship as part of their professional preparation. Which type of internship did you complete? (Research Question 2)

- Teacher of Record Internship (salaried, full-time teacher)
- Clinical Teaching Internship (typically unpaid and similar to student teaching)

16. In addition to your alternative certification program, do you have any other graduate level formal education?

- Yes (1)
- No (2)

17. Identify the type specific degree or certification program you pursued at a graduate level? (Research Question 2)

- Graduate Certificate in Autism (AU)
- Graduate Certificate in Applied Behavior Analysis (ABA)
- Master's Degree in Special Education
- Doctorate in Special Education
- Other _____

18. If you could make changes to your alternative certification program, what areas related to autism would you have liked to have seen as part of your program to enable you to teach students with autism (AU) more effectively? List up to 3 most critical recommendations.

First Recommendation

Second Recommendation

Third Recommendation

19. Have you engaged in self-directed learning (e.g., readings from books or articles on autism, attended workshops, presentations at professional conferences or webinars, etc. not required by your employer) to increase your knowledge of autism?

- Yes
- No

20. Approximately how many hours have you spend increasing your knowledge regarding autism (AU) since receiving AC certification? (Research Question 2)

- 0
- 1-2
- 3-4
- 4-5
- 6 or more

Section III: Professional Background

21. In which of these Educational Service Center (ESC) region in Texas do you currently teach?
(Research Question 2)

- Region 1
- Region 2
- Region 3
- Region 4
- Region 5
- Region 6
- Region 7
- Region 8
- Region 9
- Region 10
- Region 11
- Region 12
- Region 13
- Region 14
- Region 15
- Region 16
- Region 17
- Region 18
- Region 19
- Region 20

22. In which Education Service Center (ESC) region did your school district send you for autism training? (Research Question 2)

- Region 1
- Region 2
- Region 3
- Region 4
- Region 5
- Region 6
- Region 7
- Region 8
- Region 9
- Region 10
- Region 11
- Region 12
- Region 13
- Region 14
- Region 15
- Region 16
- Region 17
- Region 18
- Region 19
- Region 20
- Not a Region

23. How many students with autism (AU) have you taught during the last two years school years from 2011-2013? (Research Question 2)

- 1
- 2-3
- 4-5
- 6-7
- 7-8
- 9-10
- 11+ students

24. Prior to seeking special education alternative certification, did you have previous experience with students with autism? (Research Question 2)

- Yes
- No

25. Which of these includes your prior experience with students with autism (check all that apply) (Research Question 2)

- Parent of a child with autism
- Family member of a person with autism
- Friend of a family or a person with autism
- Family member of a child with autism
- Paraprofessional in a general education class
- Substitute teacher

26. In which geographical area are you currently (2011-2012 school year) teaching? (Research Question 2)

- Suburban Area (i.e. residential area outside a major city)
- Urban Area (i.e. in a large city with a population of 500,000-1,000,000 or more)
- Rural Area (i.e. in the countryside or very small town with a population of 50,000 or less)

27. Title I schools have a high percentage of students who qualify for free or reduced lunch. Do you currently teach in such (Title I) a school? (Research Question 2)

- Yes
- No

28. At which educational level are you currently teaching? (Check all that Apply) (Research Question 2)

- Early Childhood
- Elementary
- Middle School
- High School
- All levels

29. What is your current teaching assignment? (Research Question 2)

- Self-contained special education classroom
- Inclusion Teacher
- Resource Teacher
- Preschool Program for Children with Disabilities (PPCD)
- Content Mastery Classroom
- Self-contained life skills classroom
- Self-contained behavior classroom
- Self-contained autism classroom
- Other _____

Section IV: Knowledge Regarding Autism
(Dependent Variable for Research Questions 1 & 3)

30. Children with autism (AU) have a marked impairment in the use of multiple non-verbal behaviors such as eye-to-eye contact, facial expression, body posture, and gestures during social interactions.

- True
- False
- Do Not Know

31. Children with autism (AU) fail to develop peer relationships that are considered appropriate for their developmental age.

- True
- False
- Do Not Know

32. Children with autism (AU) have a lack of spontaneous will to share enjoyment, interest, or activities with other people.

- True
- False
- No Not Know

33. Children with autism (AU) stare into open space and do not focus on anything specific most of the times.

- True
- False
- Do Not Know

34. Children with autism (AU) lack social or emotional reciprocity.

- True
- False
- Do Not Know

35. A child with autism (AU) can appear as if s/he is deaf or has an intellectual disability.

- True
- False

- Do Not Know
36. Children with autism (AU) typically lack a social smile.
- True
- False
- Do Not Know
37. Children with autism (AU) have delayed or severe deficits in the development of spoken language.
- True
- False
- Do Not Know
38. Children with autism (AU) have stereotypical or repetitive movements such as hand or finger flapping.
- True
- False
- Do Not Know
39. Children with autism (AU) may have abnormal eating habits.
- True
- False
- Do Not Know
40. Children with autism (AU) have a preoccupation with parts of objects.
- True
- False
- Do Not Know
41. Most children with autism (AU) have a high preference for regimented routines.
- True
- False
- Do Not Know
42. Autism (AU) is considered synonymous with childhood schizophrenia.
- True
- False
- Do Not Know
43. Autism (AU) is considered as an auto-immune disorder.
- True
- False
- Do Not Know
44. Autism (AU) is a neurological disorder.
- True
- False

- Do Not Know
- 45. Most children with low-functioning autism (AU) have an intellectual disability.
 - True
 - False
 - Do Not Know
- 46. Most children with autism (AU) have epilepsy or seizures.
 - True
 - False
 - Do Not Know
- 47. The onset of autism (AU) typically occurs during
 - Neonatal Age (in the womb)
 - Infancy Age (1-12 months of age)
 - Between infancy and toddlerhood (12-24 months of age)
 - Toddlerhood (2 years of age)
 - Childhood (3 years of age)

Section V: Texas Autism Supplement

- 48. The Texas Autism Supplement is a required component of all Admission, Review, and Dismissal (ARD) meetings in Texas for students who are identified as having autism.
 - True
 - False
- 49. According to the Texas Autism Supplement, which of these are documented to be evidence-based practices for teaching students with autism (AU)? (Check all that apply)
 - Extended School Year (ESY) service
 - Applied Behavior Analysis
 - In-home/community based training
 - Goals and objectives for student
 - Daily Schedule
 - Music Therapy
 - Positive Behavior Supports (PBS)
 - Transition planning
 - Schedule of services for student
 - Staff-to-student ratio
 - Speech-Language Pathology
 - Communication interventions
 - Social skills supports
 - Present levels of performance
 - Evidence-based teaching strategies
 - Parent/Family Training
 - Teacher Training
 - Future Planning

50. Which of these are evidence-based practices have been proven to be effective for students who have autism (AU)? (Check all that apply)

- Discrete Trial Training
- Visual Supports
- Joint Attention Intervention
- Time Delay
- Facilitated Communication
- Video Modeling
- Incidental teaching
- Differential Reinforcement
- Naturalistic Interventions
- Sensory Integration
- Peer-mediated training
- Equine Therapy
- Response Interruption/Redirection
- Pivotal Response Treatment
- Schedules
- Self-management
- Story-based Interventions
- Visual Supports
- Academic interventions
- Gluten Free Casein Free Diet
- Structured Work Systems
- Music Therapy
- Picture Exchange Communication System
- Functional Behavior Analysis
- Prompting
- Academic Interventions
- Task Analysis
- Antecedent-based Interventions
- Auditory Integration Training
- Dolphin Therapy

Thank you for being a participant in this survey. Would you like a copy of the results of the survey after the study has been completed? If you choose "Yes, I would like a copy of the results," please enter your e-mail address. The results will be sent to you at a later date. If you choose "No, I would not like a copy of the results," you will be immediately exited from the survey. Again, thank you for your participation.

- Yes, I would like a copy of the results _____
- No, I would not like a copy of the results

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