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Special education teachers serving students with autism: A descriptive study of the characteristics and self-reported knowledge and practices employed

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Abstract. Autism now affects a significant number of students in schools. The purpose of this study was to survey special education teachers who serve students with autism to 1) determine teacher, environmental, and student related characteristics; 2) identify the self-reported knowledge of effective teaching practices; and 3) identify the self-reported implementation of effective teaching practices. The study was conducted with special education teachers employed in Virginia using a web-based survey titled the *Needs Assessment of Special Educators who Serve Students with Autism*. Respondents included 498 special education teachers with a wide array of qualifications and experience including licensure status, years of teaching and area of endorsement. Results provide a description of teacher characteristics that directly impact instructional delivery as well as information regarding self-rated knowledge and implementation of efficacious strategies. Information from this study can be used to improve service delivery to students with autism by informing policy and directing and enhancing teacher professional development initiatives at the preservice and inservice levels.

Keywords: ASD, special education teachers, students with autism

1. Introduction

Recent prevalence rates released in 2009 by the Centers for Disease Control and Prevention (CDC) estimate that 1 in 110 children have an autism spectrum disorder (ASD). The increased prevalence has placed substantial pressure on educational systems, creating a strong need for teachers qualified to instruct these individuals. The number of students identified with autism within our public schools has risen at an approximate rate of 20% per year since data first became available [45]. Autism is currently the fastest growing group of students served through special education [30].

The Individuals with Disabilities Education Act [21] defines autism as a developmental disability significantly affecting verbal and nonverbal communication and social interaction. Other characteristics are engagement in repetitive activities and stereotyped movements, resistance to change, and unusual responses to sensory experiences. According to educational law, a student may be determined to have autism if he/she has any of the Pervasive Developmental Disorders, also referenced as autism spectrum disorders, provided educational performance is adversely impacted.

Those with autism present with unique learning characteristics that differ widely from typical learners as

well as learners with other types of disabilities [23, 37]. According to the National Research Council (NRC) report, *Educating Children with Autism*, commissioned by the USDOE Office of Special Education Programs (OSEP) in 2001, one of the most pressing challenges for school systems is keeping up with the increase in personnel needed to provide appropriate services for students with autism. The challenge involves not only the quantity of personnel needed to accommodate the increasing numbers of students, but also involves the quality of those personnel. Teachers who work with these students must be knowledgeable of the range of available educational practices, and must be able to implement them individually based on student need [28, 39, 40].

Within the last decade, there has been an expansion of educational practices demonstrated to be effective with students with autism [22, 27, 42]. The current literature published in this field describes a variety of instructional methods found to be effective. Examples include behavioral [7, 29], naturalistic teaching [25, 26], joint attention [32], peer-mediated [17], and story-based interventions [4]. More recently, the National Autism Center [36] conducted a comprehensive review of intervention literature and identified eleven strategies that are effective for students with autism. The NAC published the National Standards Report which described each intervention in detail and provided illustrative examples.

Despite these advancements, there is ongoing concern regarding the quality of educational services for this population. Educational achievement is low in comparison to typically developing students, as well as students from other disability categories [47, 48]. Furthermore, students with autism are not being well-prepared for adulthood. Postsecondary outcome studies reveal poor long term outcomes in living arrangements, employment, and community integration [19, 20, 33].

2. Challenges educating students with autism

Educating students with autism creates a complex set of issues for educators. Perhaps the most significant is regarding the range of personnel who provide instruction to this group. In the Study of Personnel Needs in Special Education (SPeNSE [8]) special educators from all teaching assignments reported teaching at least one student with autism. It is significantly associated with intellectual disabilities and has an association with some medical conditions including tuberous sclerosis, fragile X, cerebral palsy, down syndrome, and epilepsy [14]. Additionally, comorbidity with mental health conditions including anxiety and depression is common [16]. Taken collectively, these characteristics nearly guarantee special educators from multiple backgrounds will provide services to a student with autism during their career, regardless of their primary content area [31]. Given such variation, special education teachers require preparation to educate this population with such unique and intensive learning needs.

Preparation of special education teachers has been fraught with challenges. According to a study by Müller [34], there are few states throughout the country with licensure in the area of autism, therefore, there is not a set of guidelines mandating teacher qualities and requirements. Absence of state licensure in autism ensures these students are educated by teachers with different types of certification resulting in variation of teacher knowledge and skills [41]. This issue is exacerbated by the recent movement towards noncategorical licensure in special education where teachers are prepared to instruct students from all disability categories and do not receive specialized training [24]. How such programs are preparing the range of teachers touched by autism to serve this group is unknown at this time.

Educational standards have long been used to outline necessary teacher qualities [6]. However, nationally accepted professional standards that could be used to guide effective practices for teachers of students with autism were regrettably absent from the educational arena until 2009. It was at this time that the Council for Exceptional Children (CEC) created standards that reflect the knowledge, dispositions, and performances deemed essential for a well-prepared special educator. While the development of these standards is an important step for guiding practice, given the licensure situation described above, educator's knowledge of these standards remains unclear.

Professional development activities designed to build knowledge and skills specific to autism have become more prevalent in recent years. In cooperation with OSEP, Müller [35] surveyed state education agencies to determine approaches to personnel preparation in autism, and found states had increased training efforts since 1996. In a survey of personnel preparation practices at colleges and universities, Barnhill, Polloway, and Sumutka [3] reported 184 higher education institution programs from 43 states offering personnel

preparation in autism. The nature of these training programs was highly variable with differences found in the type, amount, and content of training provided. How such programs are preparing the range of teachers touched by autism to serve this group remains unidentified.

3. What is known about teachers of students with autism

Educators serving these students must possess autism-specific knowledge and demonstrate methods that fit into best practice [28, 41]. We place important responsibilities on these teachers. As a result it is critical to have a solid understanding of who is teaching students with autism as well as their aptitudes. Research in this area is sparse resulting in restricted information regarding teacher competency. In 2008, Hess, Morrier, Heflin, and Ivey surveyed Georgia public school teachers to identify the types of interventions currently being utilized by those working with students with autism. Less than one third reported using interventions rated as evidence based or a promising practice by Simpson [42]. Fewer than ten percent of the strategies implemented were based upon scientific research. Analysis revealed the choice of strategies varied by grade level and classroom type (e.g., general education, special education).

In a study examining interventions utilized by early intervention programs in the public schools in California, Stahmer, Collings, and Palinkas, [43] used focus groups to investigate techniques employed. Results indicated the use of practices that were research based as well as many that were not. Additionally, when evidence-based practices were used, significant modifications and adaptations were often reported. All participants noted a lack of adequate training and preparation for teachers and paraprofessionals as a critical concern.

4. Purpose of the study

The rise in reported numbers of students with autism in public schools, poor educational outcomes, and an expansion of knowledge of educational practices that are effective with this population, has led to a sense of urgency among educators and parents to ensure students are provided an appropriate education. It is essential to determine information about teachers so we can improve both knowledge and performance and ultimately, impact student outcomes [49]. Professional development is needed that provides quality preservice and inservice training and arms teachers with the skills needed to effectively serve these students [28].

The purpose of this study was to survey special education teachers who serve students with autism in order to identify characteristics as well as specific knowledge and practices of teachers who work with this population. The three specific objectives were as follows:

1) Determine the teacher, environmental, and student related characteristics of special education teachers who serve students with autism.
2) Identify the self-reported knowledge of effective teaching practices for students with autism.
3) Identify the self-reported implementation of effective teaching practices for students with autism.

The present study provides a preliminary evaluation of special education teachers who serve students with autism in a sample of schools in Virginia. The results of this study may be used to inform research and educational efforts. Given that information about special education teachers who serve students with autism is so sparse, this preliminary study, despite its limited sample size, presents information regarding gaps in knowledge and skills that may inform professional development for special educators.

5. Method and procedure

A quantitative study using a nonexperimental design was utilized. A self-report survey was implemented to answer the research questions.

5.1. Instrument

For the purpose of this study, a survey titled the *Needs Assessment of Special Educators who Serve Students with Autism* was created. The survey consisted of a compilation of best and promising practices identified as critical to address the needs of individuals with autism.

The authors created the survey by synthesizing items contained in the *Virginia Skill Competencies for Professionals and Paraprofessionals Supporting Individuals with Autism Across the Lifespan. The* "*Virginia Skill Competencies*" were developed by the Virginia Autism Council (VAC), a state-supported council of autism experts who work to advance training and educational opportunities (2004). Its mission is to increase

knowledge and understanding of autism in the wider community in order to maximize outcomes for people with autism.

The *Virginia Skill Competencies* is a list of guidelines for educators who serve students with autism. The *Virginia Skill Competencies* were generated following an examination of current research and previous efforts to develop educational standards in autism. Resources used in their development included the National Research Council report, Educating Children with Autism [28]; the review of evidence-based practices compiled by Simpson [42]; the examination of effective educational practices by Iovannone et al. [22], the interventions and treatments text by Simpson, de Boer-Oh, Griswold, Smith Myles, Byrd, Ganz, et al. (2005); the *Iowa Best Practice Guidelines*; and the *Autism Program Quality Indicators.*

The *Virginia Skill Competencies* outlines six key areas of proficiency, each with equal importance:

1) General autism: Addresses basic information regarding the diagnosis and characteristics of autism;
2) Individualization and support strategies: Addresses appropriate assessment and program planning for individuals with autism;
3) Communication: Focuses on practices and skills needed to improve communication and language;
4) Social skills: Focuses on practices and skills needed to improve social functioning;
5) Behavior: focuses on determining messages communicated by behaviors and developing positive plans to teach new skills and reduce problem behavior; and
6) Sensory motor development: Addresses sensory motor supports that are needed by some individuals with autism.

Under each area, there are two types of competencies: knowledge based and specialized skills. Knowledge based competencies depict particular knowledge needed to serve individuals with autism, while specialized skills outline particular aptitudes professionals should demonstrate.

5.2. Survey development

The Needs Assessment of Special Educators who Serve Students with Autism was created by identifying items from the *Virginia Skill Competencies*. Three specific steps were used to guide the development of instrumentation. The first step was the generation and selection of questionnaire items and ratings. This survey contained 32 of the *Virginia Skill Competencies*, and included items from each of the six proficiency areas. There were a total of eight questions that comprised the proficiency area General Autism. For this area, participants were asked to rate their level of knowledge. These questions contained knowledge-based content that could not actively be implemented in the classroom. For all other proficiency areas, participants rated their level of knowledge and implementation as these questions specifically asked about strategies and practices. The number of questions posed and examples for each proficiency area are provided in Table 1.

Participants provided a self-rating of their knowledge and implementation of practices using a five-point Likert scale. When rating current level of knowledge, one represented "little knowledge" and five "very knowledgeable". When rating current level of implementation, one represented "rarely implemented" and five "frequently implemented".

The second step consisted of a review by a panel of experts to ensure validity. Experts in the field of autism intervention reviewed the survey and provided feedback on the content and format. Changes were made accordingly.

The third step was completion of a pilot test to ensure validity and reliability. Participants in the pilot included former special education teachers as well as private school teachers of students with autism. The pilot group was asked to take the survey and comment on the following questions [13]: (a) Are instructions clearly written? (b) Are questions easy to understand? (c) Are response options easy to understand and exhaustive? (d) Is privacy of the responses understood? and (d) Are there any suggestions for clarifying instructions, questions, or response options? Additionally, each question was evaluated ensuring variability among responses. Modifications were incorporated into the survey. After this revision, the experts had an additional opportunity to review the altered survey.

5.3. Participants

The participants for this study were special education teachers employed in a public school in the Virginia Department of Education Region I. Special education teachers were eligible to participate if they taught at least one student with autism in the five years preceding distribution of the survey. To qualify as having taught a student with autism, instruction must have been delivered to the student for a minimum of 25% of the school

Table 1
Needs Assessment of Special Educators who Serve Students with Autism Description

Content area	# of Evidence based indicators	Examples of evidence based indicators
General autism	8	– the characteristics of autism as defined by the most recent version of the Diagnostic and Statistical Manual of Mental Disorders – the array of learning styles associated with autism including difficulties in attending, organization, and problem solving
Individualization and support strategies	5	– the steps involved in using discrete trial instruction to teach new skills, including clearly defining the instruction, level of prompt needed, student's desired response, and the consequence to be delivered based on the student's response – the steps involved in identifying individualized reinforcement preferences for students with autism, including observing the student; interviewing the student, staff, and family; and conducting preference assessments
Communication	5	– the process for selecting an appropriate communication system that is based on the specific characteristics of the student with autism – the steps involved in using the natural environment to increase communication skills, including setting up the environment to foster interactions, providing prompting that encourages expansion of student responses, and providing positive feedback
Social skills	5	– methods used to determine a student's ability to understand and use nonverbal communication, including interviews, structured observations, and standardized assessments – a variety of instructional strategies that enable a student with autism to increase social interactions, including, but not limited to Circles of Support, peer tutoring, social scripts, and self-management
Behavior	5	– interventions designed to proactively prevent a problem behavior from occurring, including modifying the environment, setting events, and antecedents that may trigger the problem behavior – the components of a crisis behavior management plan for a student with autism to ensure health and safety
Sensory motor development	4	– methods used to determine if a student demonstrates hypo- or hyper- sensitivity to sensory input, including interviews, structured observations, and standardized assessments – methods used to determine if a student demonstrates deficits in fine or gross motor development, including interviews, structured observations, and standardized assessments

day in any educational setting. Additionally, the student must have met the educational criteria of autism as outlined in IDEA [21].

The Virginia Department of Education Region I is comprised of 15 school divisions and is located in central Virginia. The divisions contained within are geographically diverse. The USDOE, Institute of Education Sciences National Center for Education Statistics (IES NCES) provides the geographical status of each school division using the classifications of city, suburb, town, and rural. According to this source, two of the divisions are classified as city, four are suburb, while nine are rural. Cities and counties in this region make up approximately 15% of Virginia's total population (United States Department of Agriculture Economic Research Service [44]).

There are a large number of students with autism served in this Region. During the last five years, 13–15% of the population of students with autism in the state of Virginia have been served in Region I schools. At the time of this survey, region one had 889 of the 6,753 students served under the category of autism in the state. In the rural divisions, child counts of students served under the category of autism ranged from 3–28. For the suburban divisions, counts ranged from 12–314, and for the two city divisions, counts were 6 and 87.

5.4. Procedure

Special education teachers were provided three weeks to complete the Web based survey. All survey information was sent electronically to the teachers through school email. Electronic correspondence provided a link to the survey. Participants could complete the survey at their leisure at any point during the three week period.

Permission was granted by the division's special education director or by their research department. Attached to the email message was a detailed cover letter explaining the study. The letter described the pur-

pose, criteria for participation, the individual's rights to decline participation, confidentiality assurance measures, the website to access the survey, and detailed instructions for completion.

Potentially, all special education teachers who worked in Region I at the time of distribution had access to this survey. However, the sample was limited to those teachers who received the survey link and subsequently responded. Follow-up procedures were used to enhance participant response to the survey which included disbursement of reminder e-mails one week prior to the termination of data collection and again three days prior to termination.

There was no direct interaction between participants and researchers. Surveys were completed anonymously so there was no link between names and responses. Additionally, the name of the school division where the participant taught was not included on the form to further prevent linking responses to participants. Information was stored through a secure web server administered by the Virginia Commonwealth University Office of Technology Services.

The survey was administered and data collected using SurveyMonkey. Data was exported and analyzed using a statistical software package for Social Sciences (SPSS 14.0). All data were aggregated based on categories and were reviewed for accuracy, completion, and presence of univariate and multivariate outliers. Reliability was evaluated to determine the internal consistency of scores obtained within each of the six proficiency areas of the *Virginia Skill Competencies*.

6. Results

6.1. Response rate

There were 2,334 special education teachers employed in the 15 participating divisions at the time of the survey. A total of 498 surveys were completed and used for analysis. This equates to 21.3% of special education teachers from the participating school divisions. Variation in the school division's response rate ranged from 11.1 to 57.1%. Eighty-six surveys (14.5%) were not included in the analysis due to incomplete information. Table 2 provides detailed information about survey responses including the total from each school division and the percentage of special education teachers who completed a survey. Of these teachers 18.0% were employed in a city division, 56.6% in a suburban division, and 25.4% in a rural division.

It is unknown how many of the special education teachers in the region served a student with autism and were eligible to participate in this study. Studies regarding estimates of teachers who serve this group are sparse. The only known study available is from 2001. Using the results from Carlson et al. (SPeNSE) it was estimated that 438 of the 2,334 special education teachers in the participating school divisions taught a student with autism at the time of the survey. Given that 498 teachers responded to the survey, and given the age of the SPeNSE study, obviously many more special educators taught this group. However, other means to provide an exact count were not available.

Table 2
Response Summation by School Division

School division	# Special education teachers per division	# Surveys completed per division	% Surveys completed per division	% Special education teachers per division
Rural - A	14	8	1.6%	57.1%
Rural - B	15	7	1.4%	46.7%
Rural - C	16	3	0.6%	18.8%
Rural - D	36	4	0.8%	11.1%
Rural - E	42	7	1.4%	16.7%
Rural - F	42	0	0%	0%
Rural - G	53	20	4.0%	37.8%
Rural - H	64	11	2.2%	17.2%
Rural - I	312	102	20.5%	32.7%
Suburban - J	33	15	20.5%	45.5%
Suburban - K	48	21	4.2%	43.8%
Suburban - L	530	104	20.9%	19.6%
Suburban - M	710	160	32.1%	22.5%
City - N	48	8	1.6%	16.7%
City- O	371	28	5.6%	7.5%
Total	2,334	498		

6.2. Teacher characteristics

The teacher characteristics fell into one of three categories: teacher related characteristics, environment related characteristics, and student related characteristics. Table 3 contains a description of participants according to teacher related characteristics. The majority of special education teachers who completed the survey were fully licensed with 86.7% falling into this group. In Virginia, there is no licensure in autism. At the time of this study, Virginia operated under a special education system of categorical licensure. Categories are listed in Table 3. Participants were asked to choose their primary area of endorsement. Each of the seven endorsements recognized by the Virginia Department of Education (VDOE) at the time of the survey was reported by teachers with full or provisional licensure. Learning disabilities and mental retardation were the most commonly reported with nearly one quarter of special education teachers endorsed in either category. Hearing impairments and vision impairments were the least commonly reported areas. A total of 12 (2.4%) participants reported an endorsement of other. It is not known what other endorsements teachers held, as this information was not collected. On the survey, participants were asked to provide number of years they had been teaching inclusive of the school year in progress. Years of teaching experience ranged from 1 to 36 years with 11.99 being the mean and a standard deviation of 9.02. Fifty percent of teachers reported teaching for nine years or less. These data were analyzed and categorized into four groups containing an approximately equal number of teachers: 4 or less years, 5–9 years, 10–16 years, 17 or more years.

Information describing the demographics related to the teaching environment is summarized in Table 4. The majority of participants were from a suburban school division, while nearly a third from a rural division. The grade or educational level taught was captured. The majority, with 42.8%, taught elementary aged students. The lowest percentage of participants taught early childhood with 9.1%, while the balance taught middle and high school students. Teachers were asked to indicate the classroom setting that best describes where they teach. Participants reported working in a variety of settings. A self-contained classroom for students with a disability category other than autism was the most commonly reported, while a general education classroom as a consultative or collaborative teacher was the second most common.

Table 5 provides a description of participants according to student related characteristics. Teachers were asked to report the number of students taught in the past five years. The number ranged from 1–65, with 7.29 being the mean and a standard deviation of 8.04. These data were analyzed and categorized into three groups containing an equitable number of teachers. The groups delineated teachers who have taught a small (3 or less), moderate (4–9), and large (10 or more) number of students with autism.

Table 3
Participant demographics: teacher related characteristics

Characteristic	# of participants	Valid % of participants
Type of licensure	N = 495	
– Full licensure	432	87.3%
– Provisional licensure	59	11.9%
– No license/long term substitute	4	0.8%
Area of teaching endorsement	N = 490	
– Early childhood special ed	57	11.4%
– Emotional disturbance	106	21.3%
– Hearing impairments	6	1.2%
– Learning disabilities	137	27.5%
– Mental retardation	117	23.5%
– Severe disabilities	52	10.4%
– Visual impairments	3	0.6%
– Other	12	2.4%
Years of teaching experience	N = 498	
– 4 or less years	122	24.5%
– 5–9 years	132	26.5%
– 10–16 years	107	21.5%
– 17 or more years	137	27.5%

Note. Number of participants who completed occupational information varied.

Table 4
Participant demographics: environmental related characteristics

Characteristic	# of participants	Valid % of participants
Geographical Description	N = 498	
– City School Division	36	7.2%
– Suburban School Division	300	60.2%
– Rural School Division	162	32.5%
Educational Level	N = 495	
– Early Childhood	45	9.1%
– Elementary	212	42.8%
– Middle	109	22.0%
– High	129	26.1%
Classroom Setting	N = 484	
– Self-contained Classroom-Autism	68	13.7%
– Self-contained Classroom-Other	211	42.4%
– Special Education Resource Room	67	13.5%
– General Education Classroom	138	27.7%

Note. Number of participants who completed occupational information varied.

Table 5
Participant demographics: student related characteristics

Characteristic	# of participants	Valid % of participants
Number of students with autism taught	N = 498	100%
– Small number (3 or Less)	194	39.0%
– Moderate number (4–9)	181	36.3%
– Large number (10 or More)	123	24.7%
Type of students with autism taught based on cognitive ability	N = 428	
– Majority with an intellectual disability	93	21.7%
– Majority without an intellectual disability	181	42.3%
– Comparable number with/without intellectual disability	154	36.0%
Type of students with autism taught based on classroom setting	N = 381	
– Majority in special education classroom	179	47.0%
– Majority in general education classroom	109	28.6%
– Comparable number in both	93	24.4%

Note. Number of participants who completed occupational information varied.

Characteristics about the students taught were acquired and were based on the student's level of need and capabilities. First, teachers were asked to indicate the percentage of students believed to have an intellectual disability and requiring significant levels of support. These students were defined as those with non-verbal or minimal verbal language, seemingly below normal cognitive functioning and adaptive behavior. Teachers were also asked to indicate the percentage of students believed to have average or above average intellectual ability and requiring less support. Students in this group were defined as those with fluent verbal language and seemingly normal cognitive functioning and adaptive behavior. This group included students who were diagnosed with Asperger's Disorder or pervasive developmental disorder not otherwise specified. These data were arranged into the following groups: majority of students with an intellectual disability (61–100% of students served had an intellectual disability), majority of students without an intellectual disability (61–100% of students served did not have an intellectual disability), and comparable number of students with and without an intellectual disability (between 39–60% of students served from either category). The greatest number of teachers reported teaching students without an intellectual disability, while the fewest reported teaching those with an intellectual disability.

Teachers were asked to indicate the percentage of students they had taught who were primarily educated in a special education or general education classroom. Based on the results, these data were arranged into three groups: majority of students educated in a special education classroom (66–100% of students educated in special education classroom), majority of students educated in a general education classroom (66–100% of students educated in general education classroom), and comparable number of students educated in a special and general education classroom (34–65% of students educated in either setting). The greatest number of teachers reported teaching a majority of students educated in a special education classroom, with nearly half teaching this group.

6.3. Self-reported knowledge

Data analysis required the use of descriptive statistics (total number of participants, mean, standard deviation, and range) to determine the self-reported knowledge and implementation practices of special education teachers. Descriptive statistics were calculated for the total score for Region I as well as each of the six proficiency areas.

Information describing teachers' self-reported knowledge is found in Table 6. This table summarizes the responses for total knowledge as well as knowledge

Table 6
Self-reported knowledge of skill competencies

	N	Minimum	Maximum	Mean	Std. deviation
Region I					
Total	440	1.00	4.97	2.89	0.87
General autism	490	1.00	5.00	3.12	0.92
Behavior	481	1.00	5.00	3.06	1.07
Individualization	479	1.00	5.00	3.04	1.02
Communication	480	1.00	5.00	2.72	1.07
Social skills	485	1.00	5.00	2.61	0.99
Sensory motor	488	1.00	5.00	2.54	1.02

Note. A mean score of 1.00 = little knowledge; 2.00 = low knowledge; 3.00 = intermediate knowledge; 4.00 = moderate knowledge and 5.00 = high knowledge.

Table 7
Self-reported implementation practices of the virginia skill competencies: Region I

	N	Minimum	Maximum	Mean	Std. deviation
Region I					
Total	441	1.00	4.96	2.55	0.89
Individualization	474	1.00	5.00	2.75	1.01
Behavior	480	1.00	5.00	2.68	1.05
Communication	477	1.00	5.00	2.57	1.09
Sensory motor	482	1.00	5.00	2.39	1.00
Social skills	483	1.00	5.00	2.38	0.95

Note. A mean score of 1.00 = rare implementation; 2.00 = low implementation; 3.00 = intermediate implementation; 4.00 = moderate implementation and 5.00 = high implementation.

of General Autism, Individualization and Support Strategies, Communication, Social Skills, Behavior, and Sensory Motor Development. Responses are provided in descending order to indicate the greatest to least amount of knowledge reported in the six areas. The mean for total knowledge was 2.89 with a standard deviation of 0.87. This demonstrated a low to intermediate mean level of knowledge. Participants reported the greatest knowledge in General Autism, and the least knowledge in Sensory Motor Development followed by Social Skills.

6.4. Self-reported implementation of practices

Table 7 provides a summary of the self-reported implementation practices. A summary for the total score is provided, as well as the proficiency areas of Individualization and Support Strategies, Communication, Social Skills, Behavior, and Sensory Motor Development. The proficiency area General Autism was not included in this analysis, as this area was comprised of knowledge-based content that could not be actively implemented in the classroom. Responses in the table are provided in descending order to indicate the greatest to least amount of implementation. The mean score for total implementation was 2.55 with a standard deviation of 0.89. This demonstrated a low to intermediate level of implementation. Participants reported implementing Individualization and Support Strategies the most often. They reported implementing practices related to Social Skills followed closely by Sensory Motor Development the least often.

7. Discussion

The purpose of this study was to ascertain information about special education teachers who serve students with autism. It is critical to have a solid understanding of who is teaching these students as well as their aptitudes. Research in this area is sparse resulting in restricted information regarding teacher competency. The present study provides a preliminary evaluation of special education teachers who serve students with autism in a sample of schools in Virginia.

This study provides a description of germane teacher characteristics that directly impact instructional delivery as well as information regarding actual knowledge and implementation of efficacious strategies. Results can be used to improve service delivery by directing and enhancing teacher professional development initiatives at the preservice and inservice levels. Results may also be used to inform future research. There are several important observations that can be made based on the data. These observations are summarized below.

1) Special education teachers who serve students with autism present with a wide array of qualifications and experience. Teachers, regardless of area of endorsement, teach students with autism. All seven areas of endorsement recognized by VDOE were represented in this study. Endorsements in learning disabilities, mental retardation, and emotional disturbance were the most frequently reported. However, also noteworthy were the number of participants with endorsements in early childhood special education or severe disabilities. This finding is critical, as students with autism present with needs vastly different from those with other disabilities [23, 28]. Distinctive supports and intervention are required given that cognitive ability is interwoven with social and communication limitations and the presence of stereotypical patterns of behavior and sensory processing difficulties interfere with learning [2].

   Total years of teaching experience varied dramatically with a fairly even distribution ranging from one to 36 years. This demonstrates that large numbers of special educators just entering the field are serving this group. It also shows that seasoned teachers are involved. These teachers may have very different professional development needs as their experience with students with autism as well as training opportunities likely differ tremendously.

   Special education teachers provide service delivery to a sizable number of students with autism. These students demonstrate a wide-range of cognitive, verbal, and adaptive ability. The

majority of teachers reported having taught moderate to large numbers of students with autism in the past five years with approximately one quarter having taught ten or more. Autism is considered a spectrum disorder that ranges from severe to milder forms [1, 37]. Predictably, such diversity among student ability is reported. Teachers served students ranging from those with minimal or no verbal language and seemingly below normal cognitive functioning to students with fluent verbal language and normal cognitive functioning. Over one third of teachers had taught a comparable number of students on opposite ends of the spectrum. This is of particular interest given the challenges educators face due to the multidimensional nature of the disability. The wide range of cognitive abilities and verbal skills affect the knowledge and competencies required [28]. What's more, the majority of participants (approximately 80%) reported having served students who are considered to have normal cognitive abilities and are high functioning, requiring special practices that address communication and social needs and enable academic success.

2) Special education teachers provide service delivery to students with autism in a variety of educational environments. Teachers from all grades reported serving this group. Approximately half taught students in early childhood and elementary school while the other half were middle and high school teachers. Obviously, students with autism do age and cross all grade levels impacting teachers regardless of educational level taught.

   Well over half of participants served students in a special education self-contained classroom. For those teachers, only one quarter taught in a class specific to students with autism, while most taught these students in classrooms designed for other types of disabilities or multiple disabilities. A quarter of teachers reported serving students primarily in the general education classroom. Noteworthy, is the number of teachers who served students in both a special education and general education setting. These teachers had students on their case load who received the majority of their educational services in two very different educational environments.

3) Special education teachers who serve students with autism have low to intermediate levels of knowledge of autism and effective instructional practices. The total mean score for self-reported knowledge was in the low range. Teachers do not possess a moderate or high level of knowledge in any of the six proficiency areas. General Autism received the highest score and fell just within the intermediate level of knowledge. Communication, Social Skills, and Sensory Motor were the lowest scored. While teachers reported higher levels of knowledge of autism characteristics, knowledge of strategies to address skill development in fundamental areas of need was lacking. This is a distressing result considering the defining characteristics of the disorder and the tremendous impact on the student with autism.

4) Special education teachers who serve students with autism have low to intermediate levels of implementation of effective teaching practices. The total mean score for self-reported implementation was in the low range. Mean implementation scores failed to reach an intermediate level for any of the six proficiency areas, including Individualization and Support Strategies which received the highest rating. These results are especially problematic since Individualization and Support Strategies outlined appropriate assessment, program planning, and evaluation methods. Communication, Social Skills and Sensory Motor were reported to have the lowest level of implementation. This is not surprising given these were the lowest rated areas of knowledge. All students with autism will benefit from an array of educational supports and practices to address primary, secondary and learning characteristics. Therefore, special education teachers, regardless of the students served, must be well-versed in a variety of strategies that effect change. It is evident from these data that special education teachers are not implementing evidence based strategies for students with autism at a satisfactory level.

8. Implications

The implications from this study are important to state policy makers, school divisions, and institutes of higher education (IHE) as results can impact teacher qualifications and guide professional development initiatives that will ensure current and future special education teachers are effectively able to teach students with autism. These findings are especially important given the rise in prevalence. The fact that this population

of students is now estimated to comprise approximately one percent of school age children is compelling (CDC, 2010).

As professional development initiatives are designed and implemented, there are several important considerations extrapolated from this research. First, it is critical to ensure all special education teachers, regardless of endorsement area are prepared to teach this group. Students with autism will differ tremendously from others and teachers must be knowledgeable of the characteristics and impact on learning. They must be familiar with research and theory regarding best practices to address academic social, communication, behavior, sensory, and motor needs.

Second, special education teachers must be adequately prepared to address the entire array of learning needs of students served. Teachers are faced with a huge task given the heterogeneity. They must be masterful in a range of strategies including applied behavior analysis, natural environment teaching, assistive technology, augmentative and alternative communication, as well as assessment and data collection and must be able to apply strategies based on student need [28, 36]. For those students considered to have normal cognitive abilities, their academic profile presents with a number of unique challenges, yet they are often expected to meet the same academic standards as their neuro-typical peers [38]. This requires special practices that address communication and social needs and enable academic success.

Third, special education teachers must know how to provide effective instruction as the student ages and develops. Teachers, regardless of grade taught, will serve these students. Practices employed as well as specific curriculum components will vary as the student ages and reaches higher grade levels. Professional development, therefore, must help teachers learn how to meet the ever changing needs of these students and must ensure appropriate preparation for adulthood including skills related to social functioning and self-regulation that are so critical in the adult world.

Finally, the finding related to placement is an important one to consider. While most participants are serving students in self-contained classrooms, there is a significant number serving students additionally or exclusively in the general education environment. Preparation is to include training on differential delivery of strategies and supports based on student need as well as the learning environment. Practices are modified according to the environment in many cases to maximize learning and to facilitate peer interaction and social inclusion. Further, the ability to implement evidence based practices in a variety of educational settings will enhance opportunities for students. It could be that students who require intensive supports and who fail to receive those supports would present increased instructional and behavioral challenges, resulting in an increased use of self contained placement. Thus, in order to increase these students access to general education environments, it is imperative to increase the skills of their teachers.

At the preservice level of teacher preparation, there is a demonstrated need for increased content related to autism as well as scientifically based practices across all teacher education programs. Teachers from all certification categories recognized by the VDOE taught students with autism. Further neophytes taught students upon entry into the field. Given the rise in prevalence, this is likely to be the case for the foreseeable future. Thus all special education teachers entering the field need to be prepared and receive instruction on those strategies currently deemed evidence based. However, instruction should also be provided in identifying practices through research findings and integrating such knowledge with the unique characteristics of the student, values and preferences of families, and data-based decision making [36]. This can and should be addressed through multiple levels of preservice instruction for special education teachers including coursework specifically centering on autism, integration of content into current teacher preparation courses, as well as opportunities for hands-on experience with students with autism through practicums and student teaching.

In service professional development for special education teachers is a critical consideration. Teachers will not enter the educational arena armed with all knowledge and skills needed to effectively serve this group of heterogeneous students. Additionally, research on autism and evidence based strategies is growing rapidly. Thus, ongoing and intensive educational opportunities for teachers are needed. The quantity, quality and structure of professional development activities require careful consideration. Common training strategies consist of workshops and large group presentations. These methods are often ineffective. According to Gersten, Vaughn, Deshler, and Schiller [15], special education teachers' knowledge of research based strategies only sporadically finds its way into educational practice. For educational performance to improve, teachers must infuse such knowledge into current practice through training that involves supervision, feedback, and consultation [36]. Teachers in this study reported lower

implementation than knowledge, supporting the need for training and development methods that will result in higher rates of implementation of substantiated practices.

These findings also beg the question regarding specialized teacher licensure in autism. It is clear that students with autism require specialized environmental and instructional practices [20]. Barnhill et al. (2010) reported that a number of IHEs now offer preparation programs related to this disability. Programs differed significantly. Only four IHEs offered a state endorsement leading to full licensure while the most commonly reported program was a certificate in autism. Licensure is determined in each state individually and IHEs can only offer licensure programs allowed by their state. This leaves IHEs to develop programs on their own, resulting in tremendous variability among the quantity and quality of courses. By offering licensure in autism, state agencies have the ability to improve consistency of IHE programming, increase availability, and ensure provision of evidence based research coupled with opportunities for practice. At the very least, state agencies not offering autism licensure should clearly define minimum standards for personnel qualifications and experience [28]. This would work towards ensuring teachers are equipped with requisite knowledge and skills needed to teach effectively.

9. Limitations

This research study provides a unique examination of special education teachers who serve students with autism. The lack of research investigating the specific knowledge and implementation practices of these teachers suggests findings are preliminary and provide a baseline for generation of future research.

Limitations with this study have been identified. The methodology employed created limited generalization of the findings. The study was regional in focus and generalizations to special education teachers outside of the Region I area should be considered with caution. Each county and city in Region I is considered to be near a metropolitan area [44]. While the size of the counties and cities vary, the proximity to metropolitan areas may have provided a unique population, resulting in participants who are not indicative of all special education teachers who teach students with autism.

There is a limited amount of information known about the population. It was not possible to determine the actual size of the population and to determine if the sample was a true representation, as it was not known exactly how many special education teachers employed in the Region I area had served a student with autism. This survey was dependent on voluntary participation and research using voluntary participation typically yields response rates well below one hundred percent [5]. The personal and professional interests of the teachers may have resulted in response bias. Comley [10] noted response rates are impacted by the participant's interest or relevance in the survey. Special education teachers who were motivated to express their knowledge of autism were more likely to respond. These limitations point to the need for more research in this area.

10. Conclusion

The rise in reported numbers of students with autism in public schools, poor educational outcomes, and an expansion of knowledge of educational practices effective with this population has led to a sense of urgency among educators and parents to ensure students are provided an appropriate education. As a result, it has become increasingly necessary to ensure special education teachers are adequately prepared and possess knowledge and skills needed to promote change.

To date, little research has evaluated qualities of special education teachers who serve students with autism. This study sought to lessen this gap by providing a description of special education teachers and an evaluation of knowledge and implementation of evidence based practices. The results of this study provide baseline data that have implications for development and refinement of personnel requirements as well as training initiatives. The success of students with autism depends on improving efforts that ensure current and future special education teachers provide consistent programs based on substantiated methods.

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