Addressing the Academic Needs of Adolescents With Autism Spectrum Disorder in Secondary Education

Veronica P. Fleury, Susan Hedges, Kara Hume, Diane M. Browder, Julie L. Thompson, Kathy Fallin, Farah El Zein, Colleen Klein Reutebuch and Sharon Vaughn

Remedial and Special Education 2014 35: 68

DOI: 10.1177/0741932513518823

Article

Hammill Institute on Disabilities

Remedial and Special Education
2014, Vol. 35(2) 68–79

DOI: 10.1177/0741932513518823
rase.sagepub.com
SAGE

Addressing the Academic Needs of Adolescents With Autism Spectrum Disorder in Secondary Education

Veronica P. Fleury, PhD[1], Susan Hedges, MA[1], Kara Hume, PhD[1], Diane M. Browder, PhD[2], Julie L. Thompson, MEd[2], Kathy Fallin, MEd[2], Farah El Zein, MEd[3], Colleen Klein Reutebuch, PhD[3], and Sharon Vaughn, PhD[3]

Abstract

The number of individuals with Autism Spectrum Disorder (ASD) who enter secondary school settings and access the general education curriculum continues to grow. Many educators may find they are not prepared to adapt their instruction to meet both state standards and the diverse needs of the full spectrum individuals with ASD, which has implications for postsecondary success. In this article, we present an overview of current knowledge around academic instruction for this population, specifically (a) how characteristics associated with ASD can impact academic performance, (b) academic profiles of individuals with ASD across content areas, and (c) interventions that have been successful in improving academic outcomes for this population, including special considerations for those individuals who take alternate assessments based on alternate achievement standards. We conclude by offering suggestions for future research and considerations for professional development.

Keywords

autism spectrum disorder, secondary education, academic achievement, intervention, alternate achievement

Academic achievement in high school plays a critical role in a student's future academic and career success. Accordingly, high school is a time of increased academic focus for all adolescents, with and without disabilities, as they transition to adulthood. The greater demand for a more technologically advanced workforce makes academic skills ever more essential for high school graduates (National Academies, 2010). It is projected that roughly two thirds of American jobs will require some amount of postsecondary education by 2020 (Carnevale, Jayasundera, & Hanson, 2012), yet the current educational system is not keeping pace with the demand for higher level skills. The presence of a disability, such as Autism Spectrum Disorder (ASD), has been associated with poor postsecondary outcomes. According to findings from the National Longitudinal Transition Study–2 (NLTS-2, n.d.), college enrollment for individuals with ASD is among the third lowest of all 11 disability categories, making it difficult for individuals to gain employment. It is estimated that only 37% of young adults with ASD are employed, most work part-time, and few receive benefits.

Interestingly, one study found that individuals with ASD without intellectual disability (ID) are 3 times more likely to be unemployed and participate less frequently in recreational activities than individuals with ASD and ID (Taylor & Seltzer, 2011). Possible reasons for this finding include a lack of vocational support services provide opportunities for job training for individuals with ASD who receive the majority of their instruction in general education classes (Taylor & Seltzer, 2011), coupled with insufficient academic and behavioral supports to succeed in postsecondary education (Camarena & Sarigiani, 2009; VanBergeijk, Klin, & Volkmar, 2008). Research indicates that for those with ASD, academic performance not only plays a role in postsecondary education outcomes but also in employment opportunities, wages earned, and hours worked (Migliore, Timmons, Butterworth, & Lugas, 2012). Even for students

[1]University of North Carolina at Chapel Hill, USA
[2]University of North Carolina, Charlotte, USA
[3]The University of Texas, Austin, USA

Corresponding Author:
Veronica P. Fleury, FPG Child Development Institute, University of North Carolina at Chapel Hill, CB #8040, Chapel Hill, NC 27599–8040, USA.
Email: veronica.fleury@unc.edu

with ASD with comorbid IDs for whom employment may be a more frequently utilized route than higher education, effective instructional strategies to promote academic performance should be prioritized (Stodden & Mruzek, 2010).

The research citing poor postsecondary outcomes for all individuals with ASD calls into question the quality of academic instruction they receive throughout their educational careers, particularly during high school. It has been suggested that increased access to the general education curriculum, with appropriate instructional strategies and supports, will improve academic performance and participation in postsecondary education for individuals with ASD (Stodden & Mruzek, 2010). According to the 30th Annual Report to Congress on the Implementation of Individuals With Disabilities Education Act (IDEA; Office of Special Education and Rehabilitative Services, U.S. Department of Education, 2008), the inclusion of individuals with disabilities (ages 6–21) in general education settings has increased dramatically over the past 20 years with the largest increase made by individuals being served under the disability category of autism. Although most high school students with ASD attend regular public schools (84%), only one third of their courses are taken in a general education classroom, and only 36% of those courses are academic courses (Newman, 2007). Furthermore, data from the NLTS-2 reveal that many individuals with ASD do not actively participate in general education academic classes. Teachers report their students with ASD participate less actively than other students in the general education classroom in responding orally to questions, making presentations to class, and working with peer partners. As academic participation is a significant factor in predicting postsecondary education participation (Chiang, Cheung, Hickson, Xiang, & Tsai, 2012), the poor postsecondary outcomes for students with ASD are not surprising.

In an effort to better prepare all students for college and careers, the National Governors Association Center for Best Practices and the Council of Chief State School Officers released the Common Core State Standards (CCSS) for English language arts and literacy and mathematics (CCSS Initiative, 2010). Although the CCSS outlines expectations of what educators should teach, it provides no guidance on how these skills should be taught. If educators and other school personnel are to be successful in aligning educational programs with these standards and providing appropriate supports to improve academic achievement for individuals with ASD, it is critical they are better informed about ASD. In this article, we present the current body of knowledge around academic instruction for this population, specifically (a) how characteristics associated with ASD can impact student performance, (b) academic profiles of individuals with ASD across content areas, and (c) interventions found to be successful in improving academic outcomes across individuals with ASD.

Impact of Student Characteristics on Academic Performance

Research related to poor academic achievement for students with ASD, which will be described in greater detail in the following section, indicates there are factors related to school structures and student characteristics interfering with classroom success. Though the diagnostic criteria for ASD does not imply academic difficulties, impairments in the social communication domain, as well as engagement in restricted, repetitive, and stereotypic behaviors may contribute to the challenges around academic performance, and may be predictive of future academic achievement (Estes, Rivera, Bryan, Cali, & Dawson, 2011). Deficits in the areas of imitation and observational learning are well documented and may limit a student's ability to watch others in an effort to learn skills necessary in an academic setting (Plavnick & Hume, 2013). Delayed or limited receptive and expressive communication also may affect academic performance across content areas, impacting primarily comprehension and understanding of vocabulary and sentence structure (Norbury & Bishop, 2002). In addition, students with ASD may have difficulty disengaging from repetitive or stereotypic behaviors, which can interfere with school activities (Zandt, Prior, & Kyrios, 2007). Additional diagnoses can also play a role in academic performance, as a subset of students with ASD has a comorbid diagnosis, such as ID (16%–30%, de Bildt, Systema, Kraijer, & Minderaa, 2004), or Attention Deficit Hyperactivity Disorder (ADHD, 31%, Lecavalier, 2006), which contributes to the varied academic profile.

The impact of social communication differences and their impact on academic performance require additional emphasis. Broadly, limited social initiation may contribute to academic difficulty, as students may not seek out social and verbal learning opportunities and miss opportunities to gain valuable information from the environment (Peck, 1985). More specifically, social communication impairment is a significant predictor of reading comprehension. For example, a recent study indicated these deficits limit reading comprehension above and beyond the influence of word recognition and oral language deficits (Ricketts, Jones, Happé, & Charman, 2013). Researchers theorize that difficulties in understanding social and communicative norms may make inferencing and perspective taking more difficult for readers with ASD (Ricketts et al., 2013). Similarly, a recent meta-analysis of reading comprehension skills indicated that texts with highly social content (e.g., texts requiring perspective taking) were more difficult to comprehend than those with lower social content (e.g., general knowledge; Brown, Oram-Cardy, & Johnson, 2013).

Cognitive Profile of Students With ASD

Understanding the profile of students with ASD is complex, as they often have uneven skill profiles or splinter skills that make accurate assessment and support more difficult. For example, students who are low performers on the Wechsler Intelligence Scales for Children–Second Edition (WISC-II) have consistently demonstrated reading decoding, spelling, and visuospatial skills that are above the expected range, and students who have performed highly on the Wechsler Intelligence Scales for Children–Third Edition (WISC-III) often demonstrate significant weaknesses in graphomotor and writing skills (Mayes & Calhoun, 2003). In the past decade, there has been an increased emphasis on examining the cognitive profile of students with ASD to better understand the complexities and the impact of the cognitive profile on academic performance (e.g., Charman et al., 2011; Noterdaeme, Wriedt, & Hohne, 2010). Although findings have not been conclusive on all aspects of cognitive functioning, several characteristics of the cognitive profile have emerged that may impact both academic performance and influence the development of academic supports.

Auditory and visual processing. Research indicates individuals with ASD may process auditory or linguistic information at a slower rate than their peers (Cashin & Barker, 2009). In addition, research indicates processing verbal and visual stimuli simultaneously may also be difficult. However, individuals with ASD may also have enhanced perceptual functioning when engaged in visual processing (Samson, Mottron, Soulières, & Zeffiro, 2012). Although brain imaging studies suggest superior performance on visual tasks, many individuals with ASD show enhanced visual mental imagery or "visual thinking" as compared with individuals without ASD. Individuals with ASD have described their reasoning processes to be comprised of a series of images when engaged in problem-solving behaviors (Kunda & Goel, 2011).

Detail focused processing. Individuals with ASD may exhibit a bias toward local processing (e.g., detail; weak central coherence [WCC]) rather than global processing ("big picture"; Happé & Frith, 2006). Several studies have shown superior performance on tasks relying on local processing versus those relying on global processing of stimuli, thus supporting the theory that individuals with ASD may have more difficulty extracting the overall meaning or "big picture" while attending to specific details instead (Grinter, Maybery, Pellicano, Badcock, & Badcock, 2010). For example, in a study of individuals with high-functioning autism, researchers found that participants spent more time processing the individual words that comprised a sentence rather than the meaning of the full sentence, thus impacting comprehension (Norbury & Bishop, 2002).

Executive function (EF). EFs are processes such as behavioral regulation (e.g., inhibition) and metacognition (e.g., manage self and tasks; Rosenthal et al., 2013). These functions are often impaired in individuals with ASD, specifically the abilities to plan multistep sequences of events, demonstrate mental flexibility, reflect, and reason (Joseph & Tager-Flusberg, 2004). Research indicates EF impairments increase in adolescence and may manifest in students with ASD in secondary settings as difficulty following multistep directions, keeping materials organized, and being a "self-starter" (Rosenthal et al., 2013).

Theory of mind (ToM). Individuals with ASD may demonstrate difficulty in recognizing and understanding the mental states of themselves and others and have deficits in their understanding of irony, symbolic language, and deception (Hill & Frith, 2003). ToM deficits impact and are impacted by language levels, can impair social relationships, and may have ramifications in academic performance as well, particularly in literacy activities where taking the perspective of another (e.g., a character in a book) may prove difficult (Norbury & Bishop, 2002).

Memory. Research indicates a varied memory profile for individuals with ASD, with recognition memory and cued recall intact (Williams, Goldstein, & Minshew, 2006). The memory challenges experienced by individuals with ASD are around the ability to recall words, stories, and sentences (Williams et al., 2006) and also memory within the context of day-to-day activities such as people's names, locations, and appointments (Jones et al., 2011). These deficits in adolescents with ASD in everyday memory are related to not only their memory capabilities but also EF and social communication skills (Jones et al., 2011).

Academic Performance of Students With ASD

These characteristics, related to both ASD diagnosis and cognitive profile, influence student performance across academic domains. While individuals with ASD may share common diagnostic features, there is great heterogeneity across the autism spectrum. This variability, in combination with a limited body of research, makes it extremely difficult to draw general conclusions about academic performance.

In addition, the influence of cognitive variables, as well as the complex relationship between the cognitive variables described (e.g., the influence of EF deficits on the performance of memory tasks) on academic performance, is likely great yet difficult to quantify on measures of academic skill.

In the following section, we summarize what is known about reading, writing and science, technology, engineering, and math (STEM) skills for students with ASD.

Reading

Our understanding of the unique cognitive style of individuals with ASD, particularly around ToM, WCC, and EF, provides some insight into factors that negatively impact reading achievement for this population (Carnahan & Williamson, 2013). A recent longitudinal study of reading achievement of students with disabilities revealed that while students with ASD develop reading skills as they progress through formal schooling, the rate of their reading improvement is significantly slower than that of students with learning disabilities (Wei, Blackorby, & Schiller, 2011). Many students with ASD show a unique profile of reading performance that includes strengths in the mechanics of reading (i.e., word decoding) coupled with difficulties in reading comprehension (Chiang & Lin, 2007). Research including a larger sample of individuals representing a range of language ability has revealed great variability in decoding skills, with especially poor reading accuracy in students with poor oral language comprehension and vocabulary (Nation, Clarke, Wright, & Williams, 2006), suggesting that language skills are a strong moderator in the mechanics of reading. While there is conflicting research around the assertion that individuals with ASD possess adequate or superior word-reading ability, there is a general agreement that individuals with ASD have difficulties comprehending text.

Given the great heterogeneity within ASD, it is not surprising there exists variability in the approaches individuals take to draw meaning from text. In a study of high-functioning adolescents with ASD, Williamson, Carnahan, and Jacobs (2012) identified three reading comprehension profiles: *text bound comprehenders* who rely heavily on the text without interpretation, *imaginative comprehenders* who understand best with the support of pictures and produce subjective representations of the text, and *strategic comprehenders* who employ strategies similar to skilled readers (i.e., asking questions during reading, connecting background knowledge with text) but have difficulties making predictions. It is worth noting that each of these profiles not only have strengths but also have unique challenges with comprehension. This study provides further evidence that the psychological constructs (e.g., ToM, WCC, EF) believed to characterize cognitive differences of individuals with ASD do play a role in comprehension difficulties to differing degrees.

Writing

The writing difficulties that students with ASD encounter may be attributed to both the mechanics of writing (i.e., handwriting) and content-related aspects of writing (Church, Alisanski, & Amanullah, 2000). It is believed individuals with ASD have poor fine motor skills and difficulties with visual-motor speed, in particular when using a writing utensil (Silverman & Weinfeld, 2007). Because of these difficulties, writing can be a burdensome task for many students with ASD, resulting in often illegible (Fuentes, Mostofsky, & Bastian, 2009) or brief writing samples (Sansosti, Powell-Smith, & Cowan, 2010). Looking beyond writing mechanics, the quality of written expression is often compromised by problems with perspective taking (Hill & Frith, 2003). Writing is a communicative act between a writer and his audience (McCutchen, 2003), and individuals who have difficulty understanding others' perspectives will have problems tailoring their writing for the intended audience. The writing process is also complex and requires that students be able to plan, generate text, organize, and revise, which is difficult for many individuals with ASD due to EF impairments described previously (Minshew, Goldstein, & Siegel, 1997). Taken together, issues around fine motor, processing, and executive functioning can affect both the quantity and quality of the written product (Sansosti et al., 2010; Whitby & Mancil, 2009).

STEM

Careers in STEM fields are quickly replacing manufacturing jobs (Kaku, 2011) and may be a viable postsecondary option for many individuals with ASD provided they are equipped with the level of STEM skills that are necessary to contribute to the workforce. Although college enrollment for individuals with ASD is strikingly low compared with other disability groups (Newman, 2007), they comprise the highest STEM participation rates out of all disability groups, mainly due to a high concentration of math, science, and computer majors (Baron-Cohen, Wheelwright, Burtenshaw, & Hobson, 2007; Wei, Yu, Shattuck, McCracken, & Blackorby, 2012). The overrepresentation of individuals with ASD in STEM postsecondary majors does not imply individuals with ASD do not struggle with this content. Based on what we know about the cognitive profiles of individuals with ASD, it is not surprising the challenges individuals face in STEM fields reflect their difficulties with language comprehension and executive functioning. For example, a longitudinal study of individuals with ASD indicate that growth rates in calculation skills were significantly slower for students with ASD compared with those with learning disabilities (Wei, Lenz, & Blackorby, 2013). Difficulties such as remembering mathematical operations needed to solve equations and understanding instructions or word problems can negatively affect student performance in math (Minshew, Goldstein, Taylor, & Siegel, 1994). The extent to which these difficulties impact math performance, however, is difficult to extrapolate from the limited literature base. In a literature

review of mathematical abilities of students with ASD without ID, Chiang and Lin (2007) reported that mathematic achievement for this subset of individuals ranges from clinically modest weaknesses to mathematical giftedness. We caution that the general mathematical profile of individuals with ASD that is presented by the aforementioned studies is limited in generalizability, given that these studies focused on one subset of the autism spectrum.

Academic Interventions for Students With ASD

Many students with ASD receive some type of accommodation and/or curricular modification when accessing content area instruction. In addition, roughly half of all students with ASD take alternative tests (Newman, 2007). Regardless of whether students with ASD receive the majority of their academic instruction in general education or in special education classes, they are likely to have difficulty acquiring some academic skills without appropriate instructional and behavioral supports to maintain engagement in classroom activities (Jones et al., 2009). The demand for interventions to improve academic performances for the full range of students with ASD is growing as more individuals are being diagnosed and expected to meet the same academic standards of their typically developing peers. A full description of how to implement specific strategies is beyond the scope of this article; rather, our intention is to provide a broad overview of the different strategies that researchers have found to be effective in helping students with ASD meet the curricular demands in high school. Although these strategies would likely benefit all learners with disabilities, we have included them in this summary because it can be argued that these strategies effectively support specific cognitive deficits that are associated with ASD.

Considerations for Academic Instruction in General Education Classrooms

The number of adolescents with ASD who receive the majority of their academic instruction in general education settings and take standard state assessments has increased over recent years. Because many of these students demonstrate normal or above average intellectual abilities, it is possible for educators to overlook the special academic needs of adolescents with ASD in their classrooms as they may appear to understand more than they actually do (Myles & Simpson, 2001). Accordingly, educators should be aware of potential difficulties that students with ASD may encounter during academic instruction and be able to use instructional strategies that are appropriate given their students' unique learning styles if needed. A summary of instructional strategies is provided in Table 1 to provide educators and researchers with an overview of the type of research conducted with middle and high school students with ASD in general education classrooms. We have organized these studies as follows: (a) antecedent interventions that occur outside of the immediate teaching context that support students' participation in academic activities, (b) specific strategy instruction that scaffold students' thinking during academic tasks, and (c) strategies that occur after skill mastery that facilitate generalization and independence.

Antecedent interventions: Setting the stage for successful participation. The very structure of high school poses several challenges for many students with ASD. The physical environment is often crowded and noisy; students frequently transition between classrooms or buildings; there are different teachers for each subject each with their own expectations and rules; and possibly, a different set of peers is in each class. Being able to anticipate and understand activities, schedules, and expectations improves students' ability to appropriately participate and respond to classroom demands (Myles & Simpson, 2001). Establishing routines and creating written schedules will support executive functioning difficulties that may impede students' ability to plan and organize their schedules. Executive functioning deficits have also been attributed to students having difficulty managing their own behavior during a given academic task. The use of *priming*—exposing school assignments to students before their presentation in class—has been found to be particularly effective in helping students with ASD anticipate what is expected of them and better prepare them to participate in classroom activities and assignments (Koegel, Koegel, Frea, & Green-Hopkins, 2003).

Scaffold student's thinking. Individuals with ASD require explicit instruction to learn new skills, including academic skills. Generally, the instruction individuals with ASD receive around academic content should include clear explanations of the skill or task sequence, modeling, guided practice, and multiple opportunities to independently practice and apply the learned knowledge (Pennington & Delano, 2012). The use of visual supports has been found to be a useful tool in addressing WCC by enabling students with ASD to identify and connect important ideas and features of writing and reading tasks (Carnahan & Williamson, 2013). Of particular importance for individuals with ASD is providing explicit instruction on the cognitive processes involved in completing academic tasks, as well as teaching self-monitoring skills that will support their ability to identify and address problems they encounter during the task, which is especially problematic for many individuals with ASD due to executive functioning difficulties. During explicit strategy instruction, students are taught a strategy (e.g., a mnemonic) to help them remember specific steps or processes to complete a task, along with modeling and guided practice in using the steps. Cognitive and

Table 1. Instructional Strategies for Teaching Content to Students With ASD in General Education Settings.

Instructional strategy	Description	Rationale for using the strategy (link to cognitive profile)	Example from literature
Priming	A teacher, parent, or peer familiarizes the student with academic material prior to its use in school by providing a short (10–15 min) overview of the upcoming activity. It is generally recommended that actual instructional materials be used; however, priming can also consist of introducing a task by listing steps or providing a description of the activity.	Priming can reduce students' stress and anxiety by adding predictability to new or difficult academic tasks (supports EF deficits related to organization and planning).	Koegel, Koegel, Frea, and Green-Hopkins (2003): Exposing school assignments before their presentation in class resulted in improved accuracy of responding and decrease in disruptive behaviors in *writing* class.
Peer support	Typically developing peers are taught specific strategies to interact and support the engagement of their classmates with ASD during teacher-directed and learner-initiated activities. Peers can be taught to adapt the instruction (i.e., paraphrasing questions, breaking assignments into smaller tasks) to support the participation of the student with ASD, provide frequent feedback, and promote communication between the students with ASD and other classmates.	Peer support interventions reduce the students' reliance on adult support and provide opportunities for students with ASD to interact with peers (supports social communication difficulties).	Carter, Cushing, Clark, and Kennedy (2005): Pairing a high school student with ASD with two typically developing peers during *English* class resulted in higher levels of consistency and contact with the general education curriculum and increased percentage of time spent socially interacting with peers.
Video modeling	A form of teaching in which the learner watches videotaped examples of an individual demonstrating a target skill. Types of video modeling include basic video modeling, video self-modeling, and point-of-view modeling.	Individuals with ASD have difficulties learning solely by observing others in the natural environment (supports visual processing and observational learning).	Delano (2007): SRSD instruction delivered via computer-based video self-modeling resulted in gains in the number of words written and number of functional essay elements in persuasive *writing*.
Explicit strategy instruction	Students are explicitly taught specific strategies that can be used if they encounter difficulties completing academic tasks such as writing or math problems. These strategies involve both students' thinking (metacognitive) as well as their actions (cognitive). Students are taught memorable routines to follow during a specific task. Students are often taught to use a mnemonic to remember the steps of the routine.	The routine capitalizes on visual strengths and strong rote memory (supports everyday memory deficits).	Whitby (2012): Cognitive and metacognitive strategies were taught to students using the *Solve It!* Problem-Solving curriculum resulting in improved percent of correct responses on *math* word problems. Asaro-Saddler and Bak (2013): The SRSD approach was effective in increasing the number of essay elements and overall quality of persuasive *writing*.
Self-management	Students are taught to monitor their own behavior or performance and deliver self-reinforcement at established intervals.	The expectation and the steps to accomplish the task are explicitly stated. Reduce the need for the teachers to provide performance feedback (supports EF deficits related to self-management).	Myles, Ferguson, and Hagiwara (2007): Student was successfully taught to record his homework assignments in *history, English*, and *science* classes.
Graphic organizer	Visual chart that is used to organize a student's knowledge or ideas. Examples of graphic organizers include Venn diagrams, KWL charts, flowcharts, and story boards.	Individuals with ASD tend to be "bottom-up" thinkers and focus on details. This strategy supports comprehension by helping the learner connect details across the text in a meaningful way (supports central coherence deficits).	Carnahan and Williamson (2013): Students use key words that signal a pattern and a Venn diagram to support their comprehension of expository *science* text.

Note. ASD = Autism Spectrum Disorder; SRSD = self-regulated strategy development; EF = executive functions; KWL = Know, What, Learn.

metacognitive strategies have been successfully used to improve math (Whitby, 2012) and writing (Asaro-Saddler & Bak, 2013) performances of individuals with ASD in general education classrooms. Although teachers have traditionally provided this type of instruction, the use of technology such as video modeling procedures (Delano, 2007), which capitalizes on visual processing strengths associated with ASD, and enlisting support from trusted peers (Carter, Cushing, Clark, & Kennedy, 2005) are gaining popularity and are successfully being used to complement teacher-led instruction in classrooms.

Facilitate skill generalization and independence. The ability to generalize skills beyond the immediate teaching context is a common difficulty encountered by many individuals with ASD (National Research Council, 2001). For this reason, it is especially important that educators specifically plan their instruction to facilitate skill generalization (Alberto & Troutman, 2009). One method for improving students' ability to generalize learned skills is to provide them with ample opportunities to practice skills across settings by integrating instruction throughout the school day. Developing strong home–school collaborations, through various means such as email correspondence, periodic team meetings, home visits, or communication notebooks, can also support skill generalization (Morrow & Carnahan, 2010). Furthermore, teaching students to monitor and manage their own behavior (Myles, Ferguson, & Hagiwara, 2007) will help ensure that these skills are being used in a variety of settings with the additional benefit of reducing the need for constant adult guidance. Thoughtful educational planning that includes generalization and independence targets will

ensure that the skills that are being taught are functional for individuals with ASD.

Considerations for Alternate Achievement

The term *alternate achievement* became well established in schools when federal policy permitted using alternate assessments based on alternate achievement standards (AA-AAS) for students who could not participate in general assessments with or without accommodations. Students in AA-AAS work toward the same grade-level standards as their same-age peers who are nondisabled but with alternate achievement targets. These alternate achievement standards had to be linked to the state's academic content standards in the areas targeted by the law (U.S. Department of Education, 2005). As states move toward adopting the CCSS, the new generation of alternate assessments is also being aligned with these standards but with some alternate achievement. Alternate achievement of grade-level standards target some prioritized, pinpointed, or simplified version of the original standard while retaining the original content of the grade level to the greatest extent possible.

Because some students with ASD work on alternate achievement standards in fully inclusive general education classrooms, it would be erroneous to assume that alternate achievement academics are only for students in self-contained settings. Whether students with ASD participate in the general state assessment or an alternate assessment is an Individualized Education Program (IEP) team decision using state guidelines for eligibility. Even if the team selects an AA-AAS as the appropriate way for the student to show progress, it still is important for students with ASD to have full access to the general curriculum content for their assigned grade level based on chronological age. Table 2 includes descriptions of instructional strategies and examples of grade-aligned content successfully taught to students with ASD accessing AA-AAS. Many of the strategies used with this population provide extra support for executive functioning difficulties by breaking down multiple-step tasks into component parts that can be taught incrementally and prompting procedures to support memory deficits.

Alternate achievement literacy. Alternate achievement literacy is the ability for nonreaders to access and comprehend text that is chronologically age appropriate by using adaptations, modifications, and technology. Although many students with ASD can learn to read and comprehend text, some will need alternate routes to this goal. The primary goal of alternate achievement literacy is for students to apply whatever independent reading skills they have and become fluent in listening comprehension of connected text (Browder, Trela, & Jimenez, 2007). Reading aloud by the student or teacher is a key feature of alternate achievement literacy. Reading aloud can be a target of the lesson; alternatively, the teacher may read the text for her students to provide them with opportunities to develop important skills such as vocabulary (McDonnell et al., 2006; Polychronis, McDonnell, Johnson, Riesen, & Jameson, 2004) and simplified ways to write text (Pennington & Delano, 2012). It may be necessary for teachers to adapt the piece of literature by shortening the text while preserving the overall theme, plot, and important literary elements (i.e., grade-level vocabulary, a mix of sentence structure, author's tone and purpose) in order for some students to access literary content (Saunders, Spooner, Browder, Wakeman, & Lee, 2013). In addition, because many students with ASD do not use functional speech as their primary form of communication (Noens & van Berckelaer-Onnes, 2005), consideration may also need to be given to alternative ways that these students communicate their understanding of the material.

Alternate achievement of mathematics and science. Researchers have found that students with severe disabilities, including those with ASD and ID, were able to participate in lessons aligned with biology, life science, and chemistry/physical science standards with adaptations that included teacher-directed inquiry (e.g., experiments to discover a concept), explicit instruction in science vocabulary, hands-on materials (Browder et al., 2012), graphic organizers (Knight, Spooner, Browder, Smith, & Wood, 2013), and explicit e-text (Knight, Wood, Spooner, Browder, & O'Brien, in press). While the research on alternate achievement mathematics and science has been inclusive of students with ASD at the secondary level, much more research is needed to build an evidence-base for practice. These initial studies do show promise that students with more severe ASD can learn content of their grade level that has been adapted and prioritized. Until more research emerges, teachers may try using the adaptations demonstrated in these studies using data to evaluate their effectiveness for specific content and students.

Moving Forward

The data on dismally poor postsecondary outcomes for individuals with ASD highlight the urgent need to reevaluate the quality and quantity of academic preparation individuals with ASD receive in schools. If postsecondary outcomes are expected to improve for individuals with ASD, the field must place greater value on the importance of academics for adolescents with disabilities. The CCSS for English language arts and literacy and mathematics, which has already been adopted in most states, provides educators with guidance on what students need to learn across grades and content areas. In reading, this means there will be more emphasis on the comprehension of complex texts in all subjects (Rothman, 2012), and in writing, there will be a shift in the emphasis from narrative to more

Table 2. Instructional Strategies for Teaching Grade-Aligned Content to Students With ASD Who Access AA-AAS.

Instructional strategy	Description	When to use the strategy (link to cognitive profile)	Example from Literature with students with ASD accessing AA-AAS
Task analysis	Breaking a chained task into its component parts and teaching one step at a time. Task analysis for similar skills may vary depending upon individual student (i.e., some students may need skill broken down into simplest steps while other students may be able to complete fewer, more complex steps in the task).	Use when teaching chained tasks (supports EF deficits related to planning).	ELA: Task analysis for teachers to follow when teaching read-aloud of adapted grade-aligned literature Browder, Trela, and Jimenez (2007)[a] Math: Nine-step task analysis on finding points on a plane Browder et al. (2012)[a] Science: Task analysis for participating in science inquiry lesson Browder et al. (2012)[a]
Time delay	An errorless instructional strategy where a prompt of the correct answer is provided simultaneously with instruction and then after a brief delay (e.g., 4 s). The timing of prompts is faded as students begin to demonstrate the skill within wait time prior to the prompt.	Use when teaching simple facts such as word identification, number identification, and so on (supports memory deficits).	ELA: Vocabulary from grade-aligned adapted literature (e.g., Call of the Wild) Browder et al. (2007)[a] Math: Number identification and telling time to the hour Polychronis, McDonnell, Johnson, Riesen, and Jameson (2004) Science: When given definition select correct science term McDonnell et al. (2006)[a]
System of least prompts	A prompting hierarchy that allows student opportunity to independently perform task before providing prompt. Prompts are introduced from least intrusive to more intrusive until student is able to perform skill.	Use when teaching discrete or chained tasks. Do not use when an error may be harmful, for example, when crossing the street (supports memory and EF deficits related to planning).	ELA: Modified system of least prompts passage reread (paragraph, sentence, answer) for answering comprehension questions with read-aloud of biographies. Mims, Hudson, and Browder (2012)[a] Social Studies: Modified system of least prompts passage reread (vocabulary definition, passage, sentence, answer) for answering comprehension questions with read-aloud of social studies text. Zakas, Browder, Ahlgrim-Delzell, and Heafner (2013)[a]
MLT	Instructional scaffolding that begins with teacher modeling task, then completing the task simultaneously with the students, and finally testing students by having them demonstrate the skill independently. With some simpler tasks, model-test may be appropriate. MLT can also be used as a systematic error correction. (Student makes error—teacher implements MLT until student is firm on skill).	Use when teaching discrete or chained tasks (supports visual processing and observational learning).	ELA: Systematic error correction using model-lead-test during instruction using Direct Instruction curricula (Language for Learning and Corrective Reading) Flores et al. (2013)[a] Math: Teaching time telling to the 5 min increment using components of Direct Instruction curriculum Connecting Math Concepts Thompson, Wood, Test, and Cease-Cook (2012) Science: Identification of science descriptor (e.g., wet, dry, living, dead) Knight, Smith, Spooner, and Browder (2012)
Graphic organizers	A visual template provided to students as a scaffold for grouping, organizing, categorizing information, and/or solving problems.	Use when teaching chained tasks, problem solving, or big ideas (supports central coherence deficits).	ELA: Sorting story descriptors using graphic organizer of "wh-questions" and answering comprehension question related to stories in a Direct Instruction reading program Bethune and Wood (2013). Math: Graphic organizer for completing simple linear equation Browder et al. (2012)[a] Science: KWHL graphic organizer for science inquiry lesson Knight, Spooner, Browder, Smith, and Wood (2013)[a] Social Studies: Graphic organizer for event, people, location, details, and outcome of historical event from adapted social studies text. Zakas et al. (2013)[a]

Note. ASD = Autism Spectrum Disorder; AA-AAS = alternate assessments based on alternate achievement standards; MLT = Model-lead-test; EF = Executive functions; ELA = English Language Arts; KWHL = Know, What, How, Learn.
[a]Middle/high school study.

informational and explanatory writing as these are more useful in the postsecondary educational and work environments (Graham & Harris, 2013). Simply knowing what should be taught, however, will likely be insufficient for those who teach individuals with ASD. Educators will need to not only be able to align educational programming with content grade-level standards but also be skilled at adapting their instruction to meet the unique needs of individuals with ASD.

More research on the academic achievement and instruction for individuals with ASD is needed to move the field forward, especially in the secondary grades. The following are some specific areas of need that practitioners and researchers who are invested in improving academic

achievement for individuals with ASD are asked to consider.

Recognize the cognitive profiles for learners with ASD when adapting instruction. There is an urgent need for the development of academic interventions that simultaneously target the specific learning needs of individuals with ASD and are appropriate for the secondary school context. With the CCSS, teachers will be presenting students with more complex texts across content areas, which will present additional challenges for individuals with ASD. Individuals with ASD will benefit from explicit instruction on specific cognitive processes employed by successful readers (e.g., locating referents, asking questions, repair strategies such as rereading) as they tackle more challenging texts (Randi, Newman, & Grigorenko, 2010). While initial studies of explicit strategy instruction have been found to be effective for adolescents with ASD, it is likely that instruction will require further adaptation to be effective for the broader spectrum. The challenge for researchers will be to develop strategies that build upon cognitive strengths (i.e., visual processing) and address areas of weaknesses (i.e., WCC, executive functioning).

Recognize the need for multicomponent interventions. There exists a strong relationship between social skills and academic performance (McClelland, Morrison, & Holmes, 2000). Teachers structure their instruction in a number of different ways, most of which require a level of active participation by the learner. Because there is a strong link between social and academic skills, it is important that researchers consider developing interventions that simultaneously address students' social and academic needs. This can be done by explicitly targeting both social (e.g., conversation skills) and academic (e.g., identifying key concepts in text) goals during academic instruction. Alternatively, some academic interventions may enhance social communication without explicitly targeting it. Researchers studying reading comprehension may consider adding social communication measures to identify if there are some collateral benefits in this area.

Inform all educators about ASD. Teachers' ability to understand their students' learning needs and abilities leads to the success of students with disabilities who participate in general education classes (Marino, 2010). Although special education teachers should be available to support general education teachers, it is important that general education teachers are able to collaborate with specialists and carry out educational plans, as it is deemed appropriate. Professional development of all teachers—preservice/inservice, special education/general education—should include coursework or resources focused on understanding ASD. Some advocacy groups (i.e., Organization for Autism Research) and federally funded projects (i.e., Center on Secondary Education for Students with ASD; National Professional Development Center on ASD) have already created such materials and present information in a way that is practitioner friendly and accessible to all individuals regardless of expertise level.

Although knowledge about how to effectively instruct individuals with ASD has grown over recent years, much more work needs to be done, particularly around adolescence and the transition to adulthood. Schools are experiencing increasing numbers of individuals with ASD who are accessing the general education curriculum and subsequently entering college or pursuing jobs. The limited information currently known about academic interventions for individuals with ASD is promising: Individuals with ASD are able to learn academic content that is aligned with state standards when provided with appropriate instruction and supports. Future research efforts focused on academic achievement for individuals with ASD are needed, and necessary, to support successful postsecondary outcomes for this population.

Authors' Note

The opinions expressed represent those of the authors and do not represent views of the Institute of Education Sciences or the U.S. Department of Education.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The work reported here was supported by the Institute of Education Sciences, U.S. Department of Education through Grant R324C120006 and Grant R324B090005 awarded to University of North Carolina at Chapel Hill.

References

Alberto, P. A., & Troutman, A. C. (2009). *Applied behavior analysis for teachers* (8th ed.). Upper Saddle River, NJ: Merrill.

Asaro-Saddler, K., & Bak, N. (2013). Persuasive writing and self-regulation training for writers with autism spectrum disorders. *The Journal of Special Education*. Advance online publication. doi:10.1177/0022466912474101

Baron-Cohen, S., Wheelwright, S., Burtenshaw, A., & Hobson, E. (2007). Mathematical talent is linked to autism. *Human Nature*, *18*, 125–131. doi:10.1007/s12110-007-9014-0

Bethune, K. S., & Wood, C. L. (2013). Effects of wh-question graphic organizers on reading comprehension skills of students with autism spectrum disorders. *Education and Training in Autism and Developmental Disabilities*, *48*, 236–244. doi:10.1007/s10803-006-0206-y

Browder, D. M., Trela, K., Courtade, G. R., Jimenez, B. A., Knight, V., & Flowers, C. (2012). Teaching mathematics and science standards to students with moderate and severe

developmental disabilities. *The Journal of Special Education*, *46*, 26–35. doi:10.1177/0022466910369942

Browder, D. M., Trela, K., & Jimenez, B. (2007). Training teachers to follow a task analysis to engage middle school students with moderate and severe developmental disabilities in grade-appropriate literature. *Focus on Autism and Other Developmental Disabilities*, *22*, 206–219. doi:10.1177/10883576070220040301

Brown, H. M., Oram-Cardy, J., & Johnson, A. (2013). A meta-analysis of the reading comprehension skills of individuals on the autism spectrum. *Journal of Autism and Developmental Disorders*, *43*, 932–955. doi:10.1007/s10803-012-1638-1

Camarena, P. M., & Sarigiani, P. A. (2009). Postsecondary educational aspirations of high-functioning adolescents with autism spectrum disorders and their parents. *Focus on Autism and Other Developmental Disabilities*, *24*, 115–128. doi:10.1177/1088357609332675

Carnahan, C. R., & Williamson, P. S. (2013). Does compare-contrast text structure help students with autism spectrum disorder comprehend science text? *Exceptional Children*, *79*, 347–363.

Carnevale, A. P., Jayasundera, T., & Hanson, A. R. (2012). *Career and technical education: Five ways that pay along the way to the B.A*. Washington, DC: Georgetown University Center On Education and the Workforce.

Carter, E. W., Cushing, L. S., Clark, N. M., & Kennedy, C. H. (2005). Effects of peer support interventions on students' access to the general curriculum and social interactions. *Research and Practice for Persons with Severe Disabilities*, *30*, 15–25.

Cashin, A., & Barker, P. (2009). The triad of impairment in autism revisited. *Journal of Child and Adolescent Psychiatric Nursing*, *22*, 189–193. doi:10.1111/j.1744-6171.2009.00198

Center on Secondary Education for Students With Autism Spectrum Disorder. Available from http://csesa.fpg.unc.edu/

Charman, T., Jones, C. R. G., Pickles, A., Simonoff, E., Baird, G., & Happé, F. (2011). Defining the cognitive phenotype of autism. *Brain Research*, *1380*, 10–21. doi:10.1016/j.brainres.2010.10.075

Chiang, H., Cheung, Y., Hickson, L., Xiang, R., & Tsai, L. Y. (2012). Predictive factors of participation in postsecondary education for high school leavers with autism. *Journal of Autism and Developmental Disorders*, *42*, 685–696. doi:10.1007/s10803-011-1297-7

Chiang, H., & Lin, Y. (2007). Reading comprehension instruction for students with autism spectrum disorders: A review of the literature. *Focus on Autism and Other Developmental Disabilities*, *22*, 259–267. doi:10.1177/10883576070220040801

Church, C., Alisanski, S., & Amanullah, S. (2000). The social behavioral and academic experiences of children with Asperger syndrome. *Focus on Autism and Other Developmental Disabilities*, *15*, 12–20. doi:10.1177/108835760001500102

Common Core State Standards Initiative. (2010). *Common core state standards: Preparing America's students for college and career*. Available from http://www.corestandards.org

de Bildt, S., Systema, D., Kraijer, A., & Minderaa, R. (2004). Prevalence of pervasive developmental disorders in children and adolescents with mental retardation. *Journal of Child Psychology and Psychiatry*, *46*, 275–286. doi:10.1111/j.1469-7610.2004.00346

Delano, M. (2007). Improving written language performance of adolescents with Asperger syndrome. *Journal of Applied Behavior Analysis*, *40*, 345–351. doi:10.1901/jaba.2007.50–06

Estes, A., Rivera, V., Bryan, M., Cali, P., & Dawson, G. (2011). Discrepancies between academic achievement and intellectual ability in the higher-functioning school-aged children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *41*, 1044–1052. doi:10.1007/s10803-010-1127-3

Flores, M. M., Nelson, C., Hinton, V., Franklin, T. M., Strozier, S. D., Terry, L., & Franklin, S. (2013). Teaching reading comprehension and language skills to students with autism spectrum disorders and developmental disabilities using direct instruction. *Education and Training in Autism and Developmental Disabilities*, *48*, 41–48.

Fuentes, C. T., Mostofsky, S. H., & Bastian, A. J. (2009). Children with autism show specific handwriting impairments. *Neurology*, *73*, 1532–1537. doi:10.1212/WNL.0b013e3181c0d48c

Graham, S., & Harris, K. (2013). Common core state standards, writing and students with LD: Recommendations. *Learning Disabilities Research & Practice*, *28*, 28–37.

Grinter, E. J., Maybery, M. T., Pellicano, E., Badcock, J. C., & Badcock, D. R. (2010). Perception of shapes targeting local and global processes in autism spectrum disorders. *Journal of Child Psychology and Psychiatry*, *51*, 717–724.

Happé, F., & Frith, U. (2006). The weak coherence account: Detail-focused cognitive style in autism spectrum disorders. *Journal of Autism and Developmental Disorders*, *36*, 5–25. doi:10.1007/s10803-005-0039-0

Hill, E. L., & Frith, U. (2003). Understanding autism: Insights from mind and brain. *Philisophical Transactions of the Royal Society of London*, *358*, 281–289. doi:10.1098/rstb.2002.1209

Jones, C. R., Happe, F., Golden, H., Marsden, A. J., Tregay, J., Simonoff, E., . . .Charman, T. (2009). Reading and arithmetic in adolescents with autism spectrum disorders: Peaks and dips in attainment. *Neuropsychologia*, *23*, 718–728. doi:10.1037/a0016360

Jones, C. R., Happe, F., Pickles, A., Marsden, A., Tregay, J., Baird, G., . . .Charman, T. (2011). "Everyday memory" impairments in autism spectrum disorders. *Journal of Autism and Developmental Disorders*, *41*, 455–464. doi:10.1007/s10803-010-1067-y

Joseph, R., & Tager-Flusberg, H. (2004). The relationship of theory of mind and executive functions to symptom type and severity in children with autism. *Development and Psychopathology*, *16*, 137–155. doi:10.1017/S095457940404444X

Kaku, M. (2011). *Physics of the future: How science will shape human destiny and our daily lives by the year 2100*. New York, NY: Doubleday.

Knight, V. F., Smith, B., Spooner, F., & Browder, D. (2012). Using explicit instruction to teach science descriptors to students with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *42*, 378–389. doi:10.1007/s10803-011-1258-1

Knight, V. F., Spooner, F., Browder, D. M., Smith, B. R., & Wood, C. L. (2013). Using graphic organizers and systematic instruction to teach science concepts to students with autism spectrum disorder. *Focus on Autism and Other Developmental Disabilities*, *42*, 378–389. doi:10.1177/0022466910369942

Knight, V., Wood, C., Spooner, F., Browder, D., & O'Brien, C. (in press). Teaching students with ASD science concepts via e-text and explicit instruction. *Research in Autism Spectrum Disorders*.

Koegel, L. K., Koegel, R. L., Frea, W., & Green-Hopkins, I. (2003). Priming as a method of coordinating educational services for students with autism. *Language, Speech, and Hearing Services in Schools*, *34*, 228–235. doi:10.1044/0161-1461(2003/019)

Kunda, M., & Goel, A. K. (2011). Thinking in pictures as a cognitive account of autism. *Journal of Autism and Developmental Disorders*, *41*, 1157–1177. doi:10.1007/s10803-010-1137-1

Lecavalier, L. (2006). Behavioral and emotional problems in young people with pervasive developmental disorders: Relative prevalence, effects of subject characteristics, and empirical classification. *Journal of Autism and Developmental Disorders*, *36*, 1101–1114. doi:10.1007/s10803-006-0147-5

Marino, M. T. (2010). Defining a technology research agenda for elementary and secondary students with learning and other high-incidence disabilities in inclusive science classrooms. *Journal of Special Education Technology*, *25*(1), Article 1.

Mayes, S., & Calhoun, S. (2003). Analysis of WISC-III, Stanford-Binet: IV, and academic achievement scores in children with autism. *Journal of Autism and Developmental Disorders*, *33*, 329–339. doi:10.1023/A:1024462719081

McClelland, M. M., Morrison, F. J., & Holmes, D. L. (2000). Children at risk for early academic problems: The role of learning-related social skills. *Early Childhood Research Quarterly*, *15*, 307–329. doi:10.1016/S0885-2006(00)00069-7

McCutchen, D. (2003). Cognitive factors in the development of children's writing. In C. MacArthur, S. Graham, & J. Fitzgerald (Eds.), *Handbook of writing research* (pp. 115–130). New York, NY: Guilford Press.

McDonnell, J., Johnson, J. W., Polychronis, S., Riesen, T., Jameson, M., & Kercher, K. (2006). Comparison of one-to-one embedded instruction in general education classes with small group instruction in special education classes. *Education and Training in Developmental Disabilities*, *41*, 125–138.

Migliore, A., Timmons, J., Butterworth, J., & Lugas, J. (2012). Predictors of employment and postsecondary education of youth with autism. *Rehabilitation Counseling Bulletin*, *55*, 176–184. doi:10.1177/0034355212438943

Mims, P. J., Hudson, M. E., & Browder, D. M. (2012). Using read-alouds of grade-level biographies and systematic prompting to promote comprehension for students with moderate and severe developmental disabilities. *Focus on Autism and Other Developmental Disabilities*, *27*, 67–80. doi:10.1177/1088357612446859

Minshew, N. J., Goldstein, G., & Siegel, D. J. (1997). Neuropsychologic functioning in autism: Profile of a complex information processing disorder. *Journal of the International Neuropsychological Society*, *3*, 303–316.

Minshew, N. J., Goldstein, G., Taylor, H. G., & Siegel, D. J. (1994). Academic achievement in high functioning autistic individuals. *Journal of Clinical and Experimental Neuropsychology*, *16*, 261–270. doi:10.1080/01688639408402637

Morrow, L. M., & Carnahan, C. (2010). Exemplary and balanced literacy instruction. In C. Carnahan & P. Williamson (Eds.), *Quality literacy instruction for students with autism spectrum disorders* (pp. 189–216). Shawnee Mission, KS: AAPC Textbooks.

Myles, B. S., Ferguson, H., & Hagiwara, T. (2007). Using a personal digital assistant to improve the recording of homework assignments by an adolescent with Asperger syndrome. *Focus on Autism and Other Developmental Disabilities*, *22*, 96–99. doi:10.1177/10883576070220021001

Myles, B. S., & Simpson, R. L. (2001). Effective practices for students with Asperger syndrome. *Focus on Exceptional Children*, *34*(3), 1–14.

Nation, K., Clarke, P., Wright, B., & Williams, C. (2006). Patterns of reading ability in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *36*, 911–919. doi:10.1007/s10803-006-0130-1

National Academies. (2010). *Rising above the gathering storm, revisited: Rapidly approaching category 5*. Washington, DC: The National Academies Press.

National Longitudinal Transition Study–2 (n.d.). Retrieved from http://www.nlts2/org/fact-sheets/index.html

National Professional Development Center on Autism Spectrum Disorders. Available from http://autismpdc.fpg.unc.edu/

National Research Council. (2001). *Educating children with autism*. Washington, DC: National Academy Press.

Newman, L. (2007). *Secondary school experiences of students with autism: Facts from NLTS2*. Washington, DC: National Center for Special Education Research.

Noens, I. J., & van Berckelaer-Onnes, I. A. (2005). Captured by details: Sense-making, language and communication in autism. *Journal of Communication Disorders*, *38*, 123–141. doi:10.1016/j.jcomdis.2004.06.002

Norbury, C., & Bishop, D. M. (2002). Inferential processing and story recall in children with communication problems: A comparison of specific language impairment, pragmatic language impairment and high-functioning autism. *International Journal of Language & Communication Disorders*, *37*, 227–251. doi:10.1080/13682820210136269

Noterdaeme, M., Wriedt, E., & Hohne, C. (2010). Asperger's syndrome and high-functioning autism: Language, motor and cognitive profiles. *European Child & Adolescent Psychiatry*, *19*, 475–478. doi:10.1007/s00787-009-0057-0

Office of Special Education and Rehabilitative Services, U.S. Department of Education. (2008). *Thirtieth Annual Report to Congress on the Implementation of the Individuals With Disabilities Education Act, Parts B and C. 2008*. Retrieved from http://www2.ed.gov/about/reports/annual/osep/2008/parts-b-c/index.html

Organization for Autism Research. Available from http://www.researchautism.org/

Peck, C. A. (1985). Increasing opportunities for social control by children with autism and severe handicaps: Effects of student behavior and perceived classroom climate. *Journal of the Association for Persons with Severe Handicaps*, *10*, 183–193.

Pennington, R. C., & Delano, M. E. (2012). Writing instruction for students with autism spectrum disorders: A review of literature. *Focus on Autism and Other Developmental Disabilities*, *27*, 158–167. doi:10.1177/1088357612451318

Plavnick, J., & Hume, K. (2013). Observational learning by individuals with autism: A review of teaching strategies. *Autism: International Journal of Research and Practice*. Advance online publication.

Polychronis, S. C., McDonnell, J., Johnson, J. W., Riesen, T., & Jameson, M. (2004). A comparison of two trial distribution schedules in embedded instruction. *Focus on Autism and Other Developmental Disabilities*, *19*, 140–151. doi:10.1177/10883576040190030201

Randi, J., Newman, T., & Grigorenko, E. L. (2010). Teaching children with autism to read for meaning: Challenges and possibilities. *Journal of Autism and Developmental Disorders*, *40*, 890–902. doi:10.1007/s10803-010-0938-6

Ricketts, J., Jones, C. R., Happé, F., & Charman, T. (2013). Reading comprehension in autism spectrum disorders: The role of oral language and social functioning. *Journal of Autism and Developmental Disorders*, *43*, 1–10. doi:10.1007/s10803-012-1619-4

Rosenthal, M., Wallace, G. L., Lawson, R., Wills, M. C., Dixon, E., Yerys, B. E., & Kenworthy, L. (2013). Impairments in real-world executive function increase from childhood to adolescence in autism spectrum disorders. *Neuropsychology*, *27*, 13–18. doi:10.1037/a0031299

Rothman, R. (2012). A common core of readiness. *Educational Leadership*, *69*(7), 10–15.

Samson, F., Mottron, L., Soulières, I., & Zeffiro, T. A. (2012). Enhanced visual functioning in autism: An ALE meta-analysis. *Human Brain Mapping*, *33*, 1553–1581. doi:10.1002/hbm.21307

Sansosti, F. J., Powell-Smith, K. A., & Cowan, R. J. (2010). *High-functioning autism/Asperger syndrome in schools: Assessment and intervention*. New York, NY: Guilford Press.

Saunders, A. F., Spooner, F., Browder, D., Wakeman, S., & Lee, A. (2013). Teaching the common core in English language arts to students with severe disabilities. *Teaching Exceptional Children*, *46*, 22–33.

Silverman, S. M., & Weinfeld, R. (2007). *School success for kids with Asperger's syndrome*. Waco, TX: Prufrock Press.

Stodden, R., & Mruzek, D. (2010). An introduction to postsecondary education and employment of persons with autism and developmental disabilities. *Focus on Autism and Other Developmental Disabilities*, *25*, 131–133. doi:10.1177/1088357610371637

Taylor, J. K., & Seltzer, M. M. (2011). Employment and postsecondary educational activities for young adults with autism spectrum disorders during the transition to adulthood. *Journal of Autism and Developmental Disorders*, *41*, 566–574. doi:10.1007/s10803-010-1070-3

Thompson, J. L., Wood, C. L, Test, D. W., & Cease-Cook, J. (2012). Effects of direct instruction on telling time by students with autism. *Journal of Direct Instruction*, *12*, 1–12.

U.S. Department of Education. (2005). *Alternate achievement standards for students with the most significant cognitive disabilities: Non regulatory guidance*. Washington, DC: U.S. Department of Education Office of Elementary and Secondary Education.

VanBergeijk, E., Klin, A., & Volkmar, F. (2008). Supporting more able students on the autism spectrum: College and beyond. *Journal of Autism and Developmental Disorders*, *38*, 1359–1370. doi:10.1007/s10803-007-0524-8

Wei, X., Blackorby, J., & Schiller, E. (2011). Growth in reading achievement of students with disabilities, ages 7 to 17. *Exceptional Children*, *78*, 89–106.

Wei, X., Lenz, K. B., & Blackorby, J. (2013). Math growth trajectories of students with disabilities: Disability category, gender, racial, and socioeconomic status differences from ages 7 to 17. *Remedial and Special Education*, *34*, 154–165. doi:10.1177/0741932512448253

Wei, X., Yu, J. W., Shattuck, P., McCracken, M., & Blackorby, J. (2012). Science, technology, engineering, and mathematics (STEM) participation among college students with an autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *43*, 1–8. doi:10.1007/s10803-012-1700-z

Whitby, P. J. (2012). The effects of solve it! On the mathematical word problem solving ability of adolescents with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities*, *28*, 78–88. doi:10.1177/1088357612468764

Whitby, P., & Mancil, G. (2009). Academic achievement profiles of children with high functioning autism and Asperger syndrome: A review of the literature. *Education and Training in Developmental Disabilities*, *44*, 551–560.

Williams, D. L., Goldstein, G., & Minshew, N. J. (2006). The profile of memory function in children with autism. *Neuropsychology*, *20*, 21–29. doi:10.1037/0894-4105.20.1.21

Williamson, P., Carnahan, C. R., & Jacobs, J. A. (2012). Reading comprehension profiles of high-functioning students on the autism spectrum: A grounded theory. *Exceptional Children*, *78*, 449–469.

Zakas, T., Browder, D. M., Ahlgrim-Delzell, L., & Heafner, T. (2013). Teaching social studies content to students with autism using a graphic organizer intervention. *Research in Autism Spectrum Disorders*, *7*, 1075–1086. doi:10.1016/j.rasd.2013.06.001

Zandt, F., Prior, M., & Kyrios, M. (2007). Repetitive behaviour in children with high functioning autism and obsessive compulsive disorder. *Journal of Autism and Developmental Disorders*, *37*, 251–259. doi:10.1007/s10803-006-015