

Integrative Literature Review: Styles of Learning for Autism Spectrum Disorders and Human Resource Development: Informing Performance Management

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Abstract

Autism Spectrum Disorders have been studied for a number of years. In this integrative literature review, the styles of learning associated with Autism Spectrum Disorders are compiled and compared with some commonly known Human Resource Development styles of learning. When managers and practitioners are familiar with these styles, effective performance management may take place, reduce stress and anxiety for employees, and aid in employee success. Knowledge of the diverse styles of learning in the workplace and associated behaviors will create supportive work environments. A brief history of autism and Aspergers syndrome is provided to understand some of the learning traits and social deficits of individuals who have an ASD. This article calls for additional research in how managers can provide feedback through performance management.

Keywords: Autism Spectrum Disorders, Human Resource Development, styles of learning

1. Introduction

Even though Autism Spectrum Disorders (ASDs) have been studied since 1943, there is still more information needed about the implications for ASDs in the workplace (DSM, 2011; Frith, 1991; 1993). Employees who have an ASD may have social skill deficits, lack communication skills, have a specialized style of learning, and may not be able to communicate their needs with peers and managers. More awareness is needed by managers and Human Resource Development (HRD) practitioners who may be working with employees who have diverse styles of learning that influence the workplace. This is true as the workplace changes and more employees may have an Autism Spectrum Disorder.

2. Purpose of Literature Review

The purpose of this integrative literature review is to understand the history of Autism Spectrum Disorders and associated styles of learning. Through a comprehensive analysis of ASDs styles of learning and styles of learning in HRD, the gaps in the literature will be identified. This knowledge can inform managers and HRD practitioners in how they implement performance management for the various styles of learning. The intended audience is training and development practitioners who may be consulted on this topic. Additionally, managers should be familiar with this material, as they may supervise people in a diverse workplace, with diverse skill sets.

3. Methodology

A comprehensive a review, analysis, and synthesis of the literature about ASDs and styles of learning were conducted. Based on the methodology of Torraco (2005), an integrative literature review “is a form of research that reviews, critiques, and synthesizes representative literature on a topic in an integrated way such that new framework and perspectives on the topic are generated” (p. 1). According to Torraco (2005), these types of literature reviews can explore “mature topics or new, emerging topics” (p. 2). The author should identify the need for the review, state why they are interested in the topic, and identify the importance and how the knowledge contributes to the field of study (Torraco, 2005). Torraco’s methodology has been used extensively in the literature (Burke & Hutchins, 2007; Estes & Wang, 2008; Gegenfurtner, Veermans, Festner, & Gruber, 2009; Zula & Chermack, 2007).

An exhaustive review of literature was conducted regarding Autism Spectrum Disorders, styles of learning for ASDs, and HRD styles of learning. Databases used for this search included: Academic Source Premier, Business Source Premier, Business Source Complete, ERIC, Family Society Studies Worldwide, Google Scholar, MEDLINE, Mental Measurements Yearbook, PsycARTICLES, Psychology and Behavioral Sciences Collection, PsycINFO, Social Science Abstracts (H.W. Wilson), and Social Works Abstracts. Only articles with keywords listed in the search and abstract were used for this review of literature. Keywords used in searches included: adult, assessment, Autism, Buckingham, development, employment, feedback, Human Resource, inventory, Kolb, learning, learning styles, learning theory, management, organization, performance management, social styles, strengths, supportive environment, True Colors™, and work. Some of these keywords were used in combinations to find related content.

4. Autism in the Workplace

Organizations should consider how to support the changing workforce and support individuals with autism based on their needs according to the National Autistic Society (NAS) (Hesmondhalgh, 2010):autism is a lifelong developmental disability. It is part of the autism spectrum and is something referred to as an autism spectrum disorder, or an ASD. The word ‘spectrum’ is used because while all people with autism share three main areas of difficulty, their condition will affect them in very different ways. Some are able to live relatively ‘everyday’ lives; others will require a lifetime of specialist support (p. 1).

Some of the work difficulties for those with ASDs are anxiety, not understanding personal space, talking too much or not enough, lack of independence from supervisors and co-workers, being too rigid, and poor personal habits (Mawhood & Howlin, 1999). Communication is another skill that may be difficult for individuals on the spectrum. Individuals with autism may have more difficulties with communication than other skills according to Hesmondhalgh (2010).

In supported environments, employees can be successful. Studies indicated that better understanding from managers about ASDs and how to support the needs of their employees, reported successful employees when fitting work with their abilities, who stayed employed and reported being satisfied with their work (Barnhill, 2007; Mawhood & Howlin, 1999). Employers and those who manage employees with ASDs should be able to support the behaviors and environments for these individuals (Van Wieren, Reid, & McMahon, 2008, p. 306). Muller, Burton, and Yates (2003), suggested that supporting employees with job coaches would aid their "unique difficulties with cognition and habit formation" for the work interests, obstacles to successful employment, communication, job matching and ASD-specific supports and many others (p.173).

Adults on the Autism Spectrum experienced high unemployment and underemployment, changed jobs and made less money than their counterparts, and had issues adjusting to the workplace (Hendricks & Wehman, 2009, p. 81).They found that recent research was focused on design strategies to reduce poor behaviors, match communication needs with a job, and increase retention. Dew and Alan (2007) state that with different skills and abilities of individuals on the spectrum, employment needs and opportunities vary. They note that it has been difficult for individuals to find and keep employment. Professionals should “plan for the transition to ensure adolescents and young adults are armed with the appropriate skills and supports needed to be successful ... [they] spend much more of their lifetime outside of the educational system than in the system” (Hendricks & Wehman, 2009, p. 84).

These studies demonstrate some of the issues employees with ASDs can face along with possible solutions to create supportive environments for their social needs. Based on this previous research about ASDs in the workplace, this review of literature will be used to create an understanding of the diversity of styles of learning for adults with ASDs in the workplace.

5. History of Autism Spectrum Disorders (ASDs)

Autism Spectrum Disorders have a history that has developed over the years. As research found new information about autism and Asperger syndrome, the classifications have changed and so have the diagnosis. Table 1 outlines the history of autism and Asperger syndrome. In 2013, the DSM-5 was updated and released for the psychiatric field. The new criteria for Autism Spectrum Disorders (ASDs) according to the DMS-5 classification were used for the purposes of literature review, summarized in Table 1.

Table 1: Historical Overview and Description of Autism and Asperger Syndrome

Year	Event	Source
1943	Leo Kanner “introduced the label <i>early infantile autism</i> for a type of disorder hitherto unrecognized as a clinical entity, although it is possible to find earlier case descriptions” (p. 93). Kanner determined common traits: <ul style="list-style-type: none"> • Preference for aloneness • Desire on sameness • Repetitive activities • Mutism or reversal of pronouns • Remarkable skills in areas with deficits in other areas 	Frith, 1991, pp. 93-121
1943- 1944	Hans Asperger submitted his thesis in '43 which was published the following year. The topic was <i>autistic psychopathy</i> (p. 6). Similar developmental disorder described but included non-verbal communication, lack of humor, and pedantry (p.10) The definition from Kanner and Asperger were used for forty years.	Frith, 1991, pp. 1-36
1981	Lorna Wing describes “autistic triad” <ul style="list-style-type: none"> • Social abnormalities • Social communication abnormalities • Social imagination abnormalities 	Frith, 1991, pp. 93-121
1994	First time that Asperger Syndrome coded in the <i>Diagnostic and Statistical Manual Disorders (DSM-IV)</i>	Wolf et al., 2009, p. 11
2012	Center for Disease Control and Prevention estimates one in 88 children in the U.S. have autism spectrum disorder	CDC, 2012
2013	Recommended changes to the <i>Diagnostic and Statistical Manual Disorders (DSM-V)</i> <ul style="list-style-type: none"> • New name for the category, Autism Spectrum Disorder • Include autistic disorder (autism), Asperger’s disorder childhood disintegrative disorder, and pervasive developmental disorder not otherwise specified. • “Triad” become two categories: <ul style="list-style-type: none"> ○ Social/communication deficits ○ Fixated interests and repetitive behaviors 	DSM-5, Overview, 2011
2014	Center for Disease Control and Prevention estimates one in 68 children in the U.S. have autism spectrum disorder	CDC, 2014

Even with the Autism Spectrum Disorders classification, individuals on the spectrum may share some characteristics but these may appear differently for each individual; no two individuals are the same (Dew & Alan, 2007).

6. Conceptual Framework

Little research has been done with adults who are on the autism and Asperger’s spectrum. In their writings, Grandin (2008), Muller, Schuler, Burton and Yates (2003), Schall (2010), and Wolf, Brown, and Bork (2009) have called for research with adults in the workforce. There are many books, articles, and resources for children with autism and Asperger’s, parents, and teachers. The school systems and communities have various programs to assist children as they engage in their social world. If students choose to attend college, they must seek and advocate for their own resources to assist with their learning. After high school, there are few resources for high functioning adults with ASDs.

Wolf et al. (2009) state: the matter of successful employment after graduation is typically not addressed in much depth, if at all, by DS [Disability Service Professionals] staff. ... As a consequence, these students frequently encounter painful rejection after rejection from large numbers of job interviews. If they are to be hired, many face a troubled relationship with their employers (p. 175).

These statements are the foundation for this review of literature. The Torracco (2005) model for literature reviews was used to publish findings for HRD practitioners and managers to become informed about the diversity of the workforce.

7. Delimitations and Parameters

This literature review compared nine styles of learning for Autism Spectrum Disorders and Human Resource Development (HRD). The ASDs styles of learning were identified from the literature, thus assumptions were made about the styles of learning for ASDs. As part of the review of literature for styles of learning, associated behaviors emerged. The HRD styles of learning were chosen for this study based on our experiences and use of these styles of learning in the practical and organizational settings.

8. Styles of Learning

Learning style can be defined as how an individual processes information, behaves in situations, and feels while learning (Conti, 2009). An individual’s learning style is based on their preference when engaging in the learning cycle (Kolb & Kolb, 2004). Each person’s learning style can be influenced by personality, jobs, education, and experiences (Kolb, 1984).

9. Autism Spectrum Disorders Styles of Learning

Three styles of learning for Autism Spectrum Disorders emerged in the literature. These styles are Specialized Brains, Learning and Communication Styles, and Visual, Auditory, Kinesthetic Learning Styles (VAK). There are two behavioral theories influencing learning; these theories are Theory of Mind Thinking (ToM) and Positive Support Behaviors (PBS). A figurative model (Figure 1) was developed to assist in summarizing the review of literature.

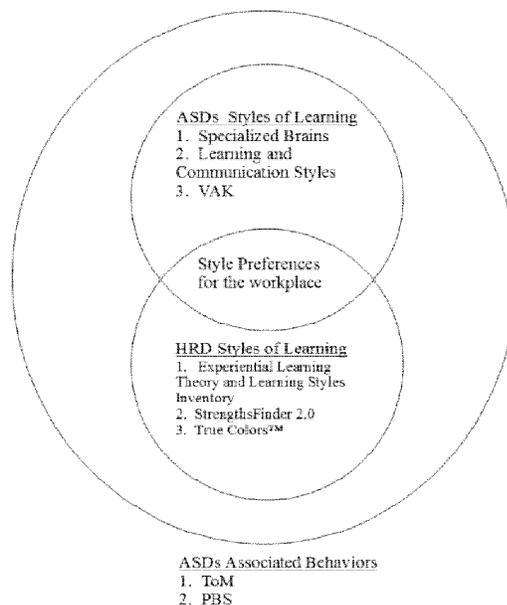


Figure 1: Summary of Styles of Learning Reviewed (Colorosa, 2014)

9.1. Specialized Brains

Three types of specialized brains (Table 2) have been defined for individuals on the Autism Spectrum (Grandin, 2006). Over the years Grandin has met with hundreds of families and individuals with Autism and she has observed there are actually different types of specialized brains. All people on the spectrum think in details; she discussed that there are three basic categories of specialized brains. Some individuals may combine these categories (2006, p. 28).

Table 2: Specialized Brain Characteristics and Career Options as Observed by Grandin

Specialized Brain	Characteristics	Career Options	Source
Visual	Think in photographically specific images. Duties should not have a lot of math or short-term memory recall; long-term memory recall is better.	Drafting, graphic design, training animals, auto mechanics, jewelry making, construction, factory automation, plant engineer, veterinary technician, web designer.	Grandin, 2006, pp. 28-29. Grandin & Duffy, 2004, pp. 88-89.
Music and math thinkers	Excel in math, chess, and computer programming. Notice patterns and relationships. Often play music by ear, are good with numbers, facts, and music. Written language is not required for pattern thinking.	Computer programming, chemistry, statistics, engineering, music, scientific researcher, mathematical stat mining analyst, actuary, physicist.	
Verbal logic thinkers	Love history, foreign languages, weather statistics, and stock market reports. Strong long-term memory is better than short-term memory recall. Good with words, lists, and numbers.	Language translation, journalism, accounting, speech therapy, special education, library work, stock and bond analyst, technical writer, legal searcher, copy editor, historian, bookkeeper, and recorder keeper, financial analysis.	

Grandin's categories provide detail about how a person thinks and processes information and possible career options related to the way of thinking. It is important to note that specialized brains are not distinct categories, where individuals fall into one category, but rather people may possess one than one way of thinking.

9.2. Learning and Communication Styles

Categories of learning styles have been identified by Wolf et al. (2009) and suggest students should identify their learning style to facilitate the appropriate way to navigate education and the workforce. Table 3 summarizes these two learning style categories.

Table 3: Learning and Communication Styles Identified

Learning Styles	Communication Style	Source
Verbal	Explanation and written	Wolf, Brown, & Bork, 2009, p. 11.
Visual	Demonstrations, flow chart and guides	

Wolf et al. (2009) state that the learning styles "should not be goals in and of themselves, but should provide a baseline, with the ultimate goal of enabling the student to independently apply the steps and procedures identified in each setting he may encounter" (p. 178). These same goals may be applied to the workplace.

9.3. Visual, Auditory, and Kinesthetic Learning Styles(VAK)

It was defined that "the use of learning style assessments and consequential synchrony with learning opportunity can help remove obstacles to learning generally and can be beneficial to and supportive for adult learners with intellectual difficulties" (Lisle, 2007, p. 24).

The VAK looks at visual, auditory, and kinesthetic styles of learning and assesses and enhances multiple modalities of the learner; these modalities are summarized in Table 4. The VAK assesses the various styles of learning for adults with intellectual difficulties. If a learner has a primary and secondary learning style, the VAK would be able to identify the styles and enhance the learning for both (Lisle, 2007).

Table 4: Summary of VAK Modalities

Modalities	Characteristics	Source
Visual learners	Prefers images, diagrams, charts and other visual information	Lisle, 2007, p. 30.
Auditory	Uses aural communication, sounds, dialogue, discussion, rhythmic patterns and reading materials	
Kinesthetic	Active listeners, prefers practical tasks and activities	

Lisle (2007) found that of the learning styles autism and Asperger's syndrome tend to have learning preferences of kinesthetic, visual, then auditory. In a similar study, Roberts (2010) stated that if an individual with an ASD is a kinesthetic learner and is in a lecture, he/she may not learn as much. A better situation would be to include "hands-on" activities with the lecture to achieve learning.

10. Autism Spectrum Disorders and Associated Behaviors

In addition to the Autism Spectrum Disorders styles of learning that emerged from the literature, two associated behavioral theories were reviewed, Theory of Mind Thinking and Positive Behavior Support. These theories can influence learning and are described the following sections.

10.1. Theory of Mind Thinking

Grandin (2008) discusses various research studies that analyze how people on the spectrum engage in the social world and she states that people on the spectrum struggle with Theory of Mind (ToM) thinking. This is the ability to perceive what is being said or interpret a situation from the another person's perspective (Grandin, 2008; Rotheram-Fuller & Kasari, 2011; Spek, Scholte, & Berckelaer-Onnes, 2009). These skills are developed at such an early age, except individuals with an ASD may not be able to interpret the nonverbal and interpersonal communication that completes the whole message (Grandin, 2008; Rotheram-Fuller & Kasari, 2011). This lack of interpretation is part of the social skill interaction that can cause frustration and anxiety among employees and management within the workforce. Key pieces of information may be missing from messages, due to each person's own communication and learning styles.

Each person has his/her own learning and communication styles. Individuals on the spectrum may be more concrete thinkers than others (Grandin, 2008). For those who are concrete thinkers, interpreting "logic or involve emotions and social relationships are difficult for us to grasp, and even more difficult to incorporate into our daily lives" (Grandin, 2008, p.143). Grandin suggests four "cornerstones of social awareness" (2008, p. 143) that aid in social thinking and functioning. The cornerstones are:

- Perspective-taking – making sense of the world by understanding the differences in people's emotions and thinking
- Flexible thinking – being able to accept change and being flexible to changing situations and knowing alternatives
- Positive self-esteem – having a "can-do" attitude to be successful in many situations
- Motivation – moving toward goals and understanding that things happen, yet striving to be successful.

Grandin shares the "single most important aspect of functioning that determines the level of social success" is being able to perceive what another person is thinking (2008, p.143). For an individual who is navigating the workplace, this information can be used to engage with others in social situations. Employee can advocate for themselves based on how they perceive a social situation by using the cornerstones as a guide for social interaction. Managers should know these various cornerstones as they provide some basic tools for engaging all employees in workplace. When managers know that there are social skill deficits and anxieties for employees, they can employ some of the strategies used by college educators.

10.2. Positive Behavior Support

Schall (2010) presents a case study about the Positive behavior support (PBS) intervention model. Despite good job training, attention to detail, a high degree of accuracy, and a dedication to work, people with ASD are frequently underemployed and serially unemployed (Schall, 2010). People with ASDs have “symptoms most associated with ASD include impairments in verbal and non-verbal communication, deficits in social interaction, insurances on maintaining routine, stereotyped motor movements, and vocalizations, and unusual responses to sensory stimuli” (Schall, 2010, p. 110). An individual with these behaviors may need additional support in the workplace.

The PBS model is a scientific functional behavioral assessment to identify what behaviors are problematic, create positive behaviors for those situations, and identify behaviors to use in the workplace when stressful or anxious situation arise. The end goal for PBS is a “replacement [of] behavior that will functionally replace the problem behavior” (Schall, 2010, p. 112). By implementing the PBS model in this single case study, Schall (2010) was able to demonstrate that the employee had choices that were not disruptive to the work environment and allowed the employee to make choices during stressful situations. Schall (2010) called for research to be conducted so that independence and support can be achieved at work.

11. Human Resource Development Styles of Learning

The Human Resource Development (HRD) styles of learning reviewed here are a thumbnail about the history of a few assessment tools utilized by HRD practitioners to identify styles of learning for employees. Research has been conducted on these assessments and these assessments have been tested for their reliability and validity. The purpose of this section is to provide a brief overview for the purposes of this literature review. The assessments reviewed include: Experiential Learning Theory and Learning Styles Inventory, StrengthsFinder 2.0, and True Colors™.

11.1. Experiential Learning Theory and Learning Styles Inventory

The Experiential Learning Theory (ELT) and Learning Styles Inventory (LSI) were created in 1984 by Kolb and were based on the works of Lewin, Dewey, and Piaget, with theories that analyzed how experience plays a role in the learning process. The ELT combines "experience, perception, cognition, and behavior" (Kolb, 1984, p. 21). The model was further developed with Dewey's model, which took into account the higher-order of learning such as impulses, feelings, and desires to create concrete experiences (Kolb, 1984). Using Piaget's contributions, to understand how adults' experience a concept, reflections and actions creates knowing; this process is considered learning (Kolb, 1984; Kolb & Kolb, 2005). Piaget outlines the stages of learning through life experiences and how these experiences create meaning. Experiential learning occurs between the person and their environment where "learning is the process whereby knowledge is created through the transformation of experience" (Kolb, 1984, p. 38). New and existing experiences create learning (Kolb & Kolb, 2005). This knowledge helps shape a person's development. Based on this theory, Kolb developed the Learning Styles Inventory.

The Learning Styles Inventory is a four stage cycle based on the foundation of Lewin's model of training and feedback (Kolb & Kolb, 2005). The four stages are concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experiment (AE) (Kolb, 1984, p. 21). Figure 2 is a diagram of the learning styles with the associated approaches to learning.

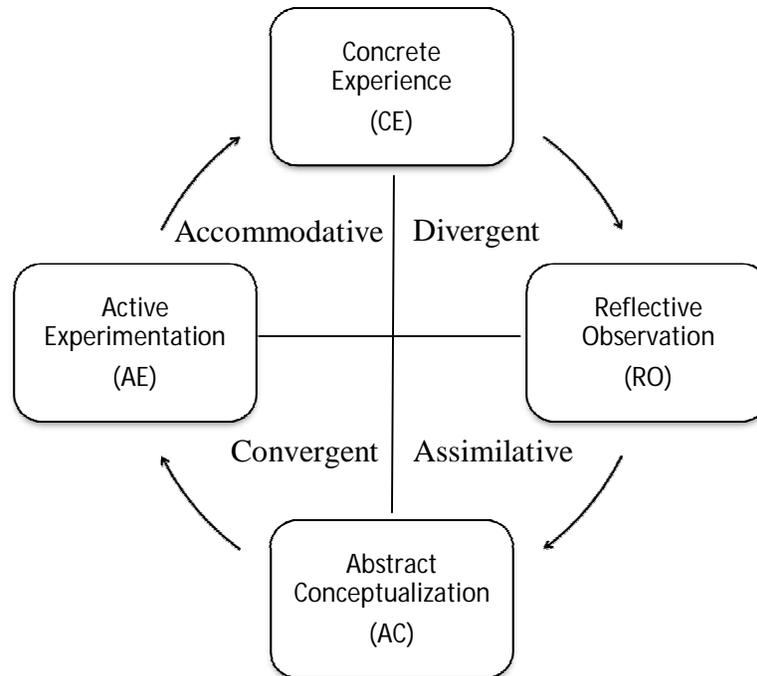


Figure 2: Kolb's Learning Styles (Kolb, 1984)

The four quadrants of the Learning Styles Inventory (Figure 2) show the cycle of learning as described in the theory. As people engage in different types of learning and experiences, people will use different styles (Kolb, 1984; Mahmud et al., 2004). The "four styles of learning that are associated with different approaches to learning: diverging, assimilating, converging and accommodating" (Kolb & Kolb, 2005, p. 196). The styles are a paired combination of the CE, RO, AC, and AE to make up the "approaches to learning" which are divergent, assimilative, convergent, and accommodating (Kolb & Kolb, 2005, p. 196).

11.2. StrengthsFinder 2.0

The Gallup Organization studied what one million employees needed from their workplace for twenty-five years (Buckingham & Coffman, 1999). From this, the first version of the Strengths Finder assessment was created. This assessment creates a language for employees and managers to communicate about people's strengths, not weaknesses in the workplace (Buckingham & Clifton, 2001; Rath, 2007; Rath & Conchie, 2008). A strength is defined as "the ability to consistently produce a positive outcome through near-perfect performance in a specific setting. Additionally, a strength is the ability to consistently recommend the perfect products and services for a customer" (Gallup, Inc. 2008, p.1). The components of a strength are skills, knowledge, and talents (Gallup, Inc. 2008; Rath, 2007; Rath & Conchie, 2008).

The assessment tool provides 34 themes upon completion of the assessment. These themes can be used to form a language for personal and professional successes (Buckingham & Clifton, 2001; Rath, 2007). The Strengths Finder 2.0 is the latest version of the assessment tool to identify strengths. This assessment is taken by employees and reports the top five strengths (themes). Strengths Finder 2.0 makes suggestions for how to apply these themes (Rath, 2007).

Buckingham (2006) states that strengths should be given more attention and time in the workplace, so employees get better at the activities they are already good at, what employees are not good at, or weak at should be managed. Weaknesses can be managed by either not engaging in activities related to those weaknesses, limiting the time spent doing those tasks, or finding someone whose strength is in that area (Buckingham, 2006; 2007). Managers should help people engage in tasks that are their strengths so they feel empowered and are helping with productivity.

11.3. True Colors™

The True Colors™ assessment tool was founded by Don Lowry in 1978 (True Colors™ International, 2014). This tool is for understanding “your personality and the personalities of others using True Colors™ provides you with insights into different motivations, actions, and communication approaches” (True Colors™ International, 2014, para. 3). The color codes are easy to remember and used in a variety of settings such as educational, personal, or professional.

True Colors™ history goes back to Hippocrates in analyzing human temperaments and is based on the psychology of Adickes, Jung, Spranger, Kreschmar, Fromm, and Keirsey (True Colors™ International, 2014). True Colors™ uses four colors to describe human temperaments where “the core of the True Colors™ systems identifies intrinsic values, motivations, self-esteem, sources of dignity, and worthiness, causes of stress, communication styles, listening styles, non-verbal responses, language patterns, social skills, learning styles, environmental motivators...” (True Colors™ International, 2014, para. 4). True Colors™ color coding system is blue, gold, green, and orange. The descriptions of the colors are (True Colors™ International, 2014):

- Blue describes the emotions such as friendships, love, and helping others.
- Gold describes a strong work ethic, detail oriented, dependable, and efficiency.
- Green describes logic and analytical thought processes.
- Orange describes the active, playful, spontaneous actions.

Each person’s coding includes all four colors, with a primary color indicated. The color coding allows for understanding and a common language in a visual manner without needing to know formulas or letters (True Colors™ International, 2014).

12. *Synthesis of Styles of Learning for Human Resource Development*

Managers and practitioners should know how individuals on the spectrum think and their preferred style of learning for various interactions in the workplace. Of course, it would be best for managers to know these styles and have a conversation with the employees to identify the appropriate style of learning and where social skill deficits may exist.

12.1. Commonality among Styles of Learning for Autism Spectrum Disorders

Through this comprehensive analysis of the Autism Spectrum Disorders’ styles of learning, it was determined that there are commonalities among the various models even with some overlap for the ASDs styles of learning. The three models, Specialized Brains, Learning and Communication Styles, and VAK model include visual learning, which takes place when information is given through pictures, flow charts, images, and color (Grandin, 2006; Grandin & Duffy, 2004; Lisle, 2007; Wolf et al., 2009). The Specialized Brains and Learning and Communication Styles models identify that some individuals with ASDs learn through verbal interactions, such as language and explanation (Grandin, 2006; Grandin & Duffy, 2004; Wolf et al. 2009). Lisle (2007) described this style of learning as auditory, where a person learns through communication and sounds.

All three models concur that learning takes place through verbal or auditory methods, even though the authors use different terminology to define this style of learning. The VAK model has kinesthetic as an additional learning style, which does not align with the other styles. A person with the kinesthetic learning style learns from listening and participating in activities and tasks (Lisle, 2007). Lastly, the Specialized Brains model has music/math as a style of learning that the other two models do not include (Grandin, 2006; Grandin & Duffy, 2004).

12.2. Style Preferences for the Workplace

There are some similarities and differences between the Autism Spectrum Disorders styles of learning and the Human Resource Development styles of learning, based on the assessment outcomes. From the HRD styles of learning, there are some components of the assessment outcomes that can be applied to the ASD styles of learning that practitioners and managers should be familiar with.

While there may be some commonalities for the ASDs and HRD styles of learning, the assimilating and converging styles of the ELT/LSI may be closely related to the style of learning for adults with ASDs. Grandin (2008) stated that individuals with an ASD and who are concrete thinkers may have trouble interpreting social situations.

From this rationale, the assimilating and converging styles of learning are more in line with how someone on the spectrum may process information. The assimilating style describes someone who thinks in logical concepts through reading and exploring (Kolb & Kolb, 2005). The converging style describes someone who engages in technical tasks and does not engage in social experiences (Kolb & Kolb, 2005). The other styles of learning for the ELT/LSI are not as connected to the ASDs styles of learning, unless the assessment is given to the individual.

Identifying the top five strengths, according to the Strengths Finder 2.0 for an individual with an ASD, would be difficult. Since the thirty-four themes are based on skills, talents, and knowledge, the information from the assessment is very personalized (Gallup, Inc. 2008; Rath, 2007; Rath & Conchie, 2008). Each person has vast experiences leading to skills, talents, and knowledge.

Within the True Colors™ assessment, most likely an adult with an ASD would have green and/or gold preferences. Green indicates that someone processes information using analytical, logic, and math skills. The gold preference is for someone who uses rigor when engaging in situations, which relates more to the concrete experiences than the literature showed for Autism Spectrum Disorders. This is not to say that a person on the spectrum does not have a blue or orange style in their preferences. The blue color being emotions and feelings would be less likely one of the primary color preference for an individual with ASDs. In the workplace, the tasks are about business and emotions are not part of the decision making process. Orange is about spontaneity and activities. While someone with an ASD may like to be physically active, the individual would not make spontaneous decisions in the workplace. An adult with an ASD would use innate experiences and knowledge to engage in the workplace.

13. Implications for Human Resource Development

Managers and practitioners should be familiar with all the styles of learning, engage the employee through conversation and observe to see what their styles may be, and use assessments to determine the style preferences. As managers engage in performance management, there has been a shift in performance philosophies for employee evaluations, career developments, and merit based pay (Gilley, Quatro, Hoekstra, Whittle, & Maycunich, 2001). Simply put, performance management has evolved over the course of the last decade to be a tool for addressing many different variables within the larger picture of human resource management, including learning and performance (Yang, 2004).

There is an abundance of research surrounding performance management, one technique is feedback. Goodman and Wood (2005) determined that “people should be given more specific feedback in the initial stages of learning” (p. 819). For Human Resource Development practitioners and managers, feedback ensures that the manager and employee are in sync and agree on the standards and expectations of the work to be performed (Lee, 2006). This literature review evaluated and established that there are other factors that should be considered when identifying styles of learning, such as associated behaviors which can impact how the information is communicated, understood, and how employees learn and perform. It is recommended that managers and practitioners understand the ASD and HRD styles, and ASD behavioral theories, so employees succeed and reduce obstacles to help employee succeed and effectively manage performance.

14. References

- Autism Spectrum Disorders (ASDs) (2012). Retrieved from Center for Disease Control and Prevention <http://www.cdc.gov/ncbddd/autism/data.html>.
- Autism Spectrum Disorders (ASDs) (2014). Retrieved from Center for Disease Control and Prevention <http://www.cdc.gov/ncbddd/autism/data.html>.
- Barnhill, G.P. (2007). Outcomes in adults with Asperger syndrome. *Focus on Autism and Other Developmental Disabilities*, 22(2), 116-126. doi:10.1177/10883576070220020301.
- Buckingham, M. (Producer) (2006). *Trombone wanted*. [Informational Series]. Beverly Hills, CA.
- Buckingham, M., & Clifton, D. (2001). *Now discover your strengths*. New York, NY: The Free Press.
- Buckingham, M. & Coffman, C. (1999). *First, break all the rules: What the world's greatest managers do differently*. New York, NY: Simon & Schuster.
- Colorito, R. (2010). Autism enters into the equation. *Workforce Management*, 89(11), 3-4.
- Conti, G. (2009). Development of a user-friendly instrument for identifying the learning strategy preferences of adults. *Teaching and Teacher Education*, 25(6), 887-896. doi:10.1016/j.tate.2009.02.024.

- Dew, D.W., & Alan, G.M. (Eds.). (2007). Rehabilitation of individuals with autism spectrum disorders (Institute on Rehabilitation Issues Monograph No. 32). Washington, DC: The George Washington University, Center for Rehabilitation Counseling Research and Education.
- DSM-5 Overview: The Future Manual (2011). Retrieved from American Psychiatric Association DSM-5 Development: <http://www.dsm5.org/about/Pages/DSMVOverview.aspx>.
- Estes, B. & Wang, J. (2008). Integrative literature review: Workplace incivility: Impacts on individual and organizational performance. *Human Resource Development Review*, 7: 218-240. doi: 10.1177/1534484308315565.
- Frequency Asked Questions (2011a). Retrieved from the U.S. Department of Labor: <http://webapps.dol.gov/dolfaq/dolfaqBYsubtopic.asp?subtopicid=163&topicid=11>
- Frequency Asked Questions (2011b). Retrieved from the U.S. Department of Labor: <http://webapps.dol.gov/dolfaq/dolfaqbytopic.asp?topicID=11>.
- Frith, U. (1991). Asperger and his syndrome. In U. Frith (Ed.), *Autism and asperger syndrome*. (pp. 1-36). Cambridge, UK: Cambridge University Press. Retrieved from <http://sites.google.com/site/utafirth/publications-1/autism>.
- Frith, U. (1993). Autism. *Scientific American*, 268, 108-114. Retrieved from <http://sites.google.com/site/utafirth/publications-1/autism>.
- Gallup, Inc: StrengthsFinder 2.0 Report and Reference Guide (2008). Retrieved from Gallup, Inc. <https://www.gallupstrengthscenter.com>
- Gilley, J.W., Quatro, S. A., Hoekstra, E., Whittle, D. D., & Maycunich, A. (2001). *The manager as change agent: A practical guide for developing high-performance people in organizations*. Cambridge, MA: Perseus Publishing.
- Goodman, J. & Wood, R. (2004). Feedback specificity, learning opportunities, and learning. *Journal of Applied Psychology*, 89(5), 809-821. doi:10.1037/0021-9010.89.5.809.
- Grandin, T. (2006). *Thinking in pictures: My life with autism*. New York, NY: Random House.
- Grandin, T. (2008). *The way I see it: A personal look at autism and Asperger's*. Arlington, TX: Future Horizons.
- Grandin, T., & Duffy, K (2004). *Developing talents: Careers for individuals with Asperger syndrome and high-functioning autism*. Shawnee Mission, KS: Autism Asperger Publishing Co.
- Hendricks, D.R., & Wehman, P. (2009). Transition from school to adulthood for youth with autism spectrum disorders: Review and recommendations. *Focus on Autism and Other Developmental Disabilities*, 24(2), 77-88. doi: 10.1177/1088357608329827.
- Hesmondhalgh, M. (2010). Autism at work. *Occupational Health*, 62(2), 32-34.
- Kolb, A., & Kolb, D. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of Management Learning & Education*, 4(2). 193-212.
- Kolb, D. A. (1984) *Experiential learning: Experience at the source of learning and development*. Englewood Cliffs, NJ: Prentice-Hall, Inc.
- Lee, C. (2006). Feedback, not appraisal. *HRMagazine*, 51 (11), 111-114.
- Lisle, A. M. (2007). Assessing learning styles of adults with intellectual difficulties. *Journal of Intellectual Disabilities*, 11(1), 23-45. doi:10.1177/1744629507073997.
- Mawhood, L., & Howlin, P., (1999). The outcome of a supported employment scheme for high-functioning adults with autism or Asperger's syndrome. *Autism*, 3: 229-254. doi:10.1177/1362361399003003003.
- Muller, E., Schuler, A, Burton, B. & Yates, G. (2003). Meeting the vocational support needs of individuals with Asperger Syndrome and other autism spectrum disabilities. *Journal of Vocational Rehabilitation*, 18(2003), 163-175.
- Rath, T. (2007) *Strengths finder 2.0*. New York, NY: Gallup Press.
- Rath, T. & Conchie, B. (2008). *Strengths bases leadership*. New York, NY: Gallup Press.
- Roberts, K. (2010). Topic areas to consider when planning transition from high school to postsecondary education for students with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities*, 25(3), 158-162. doi: 10.1177/1088357610371476.
- Rotheram-Fuller, E., & Kasari, C. (2011). Peer relationship and challenges and interventions. In Hollander, E., Kolevzon, A., & Coyle, J.(Ed.), *Textbook of Autism Spectrum Disorders (555-564)*. Arlington, VA: American Psychiatric Publishing, Inc.

- Scattone, D. (2007). Social skills interventions for children with autism. *Psychology in the Schools*, 44(7), 717-726. doi: 10.1002/pits.
- Schall, C. M. (2010). Positive behavior support: Supporting adults with autism spectrum disorders in the workplace. *Journal of Vocational Rehabilitation*, 32, 109-115. doi: 10-3233/JVR-2010-0500.
- Spek, A., Scholte, E., & Berckelaer-Onnes, I. (2009). Theory of mind in adults with HFA and Asperger syndrome. *Journal of Autism Development Disorder*, 40, 280-289. doi:110.1007/s10803-009-0860-y.
- Torraco, R. (2005). Writing integrative literature reviews: Guidelines and examples. *Human Resource Development Review*, 4: 356-367. doi:10.1177/1534484305278283.
- True Colors™ FAQ. (2014). Retrieved from True Colors™ International <http://truecolorsintl.com/about-us/>.
- Van Wieren, T., Reid, C., & McMahon, T. (2008). Workplace discrimination and autism spectrum disorders: The National EEOC American with Disabilities Act Research project. *Work: A Journal of Prevention, Assessment, and Rehabilitation*, 31(2008), 299-308.
- Ward, L.P. (2005). Learning styles of radiography students during clinical practice. (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (Accession Order No. UMI 3401001.)
- Wolf, L., Thierfeld-Brown, J., & Kukiela Bork, G (2009). *Students with Asperger syndrome: A guide for college personnel*. Shawnee Mission, KS: Autism Asperger Publishing Co.
- Yang, B. (2004). Can adult learning theory provide a foundation for human resource development? *Advances in Developing Human Resources*, 6(2), 129-145. doi: 10.1177/1523433204263325.
- Zula, K. & Chermack, T. (2007). Integrative literature review: Human capital planning: A review of literature and implications for human resource development. *Human Resource Development Review*, 6(3): 245-262. doi: 10.1177/15344843072303762.