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A Day Through My Eyes: Improving Visual Perceptual Training For School Staff Members Working With Students With Autism Spectrum Disorder

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A DAY THROUGH MY EYES: IMPROVING VISUAL PERCEPTUAL TRAINING FOR SCHOOL STAFF MEMBERS WORKING WITH STUDENTS WITH AUTISM SPECTRUM DISORDER

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By

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ABSTRACT

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Capstone supervised by Jeryl Benson, EdD, OTR/L

A Day Through My Eyes focuses on the topic of visual perception in school-age children with autism spectrum disorder (ASD). This program addresses a need to improve the training, knowledge, and skills within the area of visual perception amongst school staff members working at Bridgeway Academy. This program contains three interrelated components to address these needs: an all staff training, development of an occupational therapy based assessment tool for visual perception, and the training of occupational therapy staff members on the use of the assessment too as well as incorporating visual perception resources into treatment. Results of this program indicate an increase in knowledge and skills of the staff members regarding the topic of addressing visual perception with individuals with autism. This study demonstrates a need for similar and more extensive programing in other facilities working with this population.

DEDICATION

This Capstone Project is dedicated to all students and staff members at Bridgeway Academy.

Thank you for giving me a place to shine.

ACKNOWLEDGEMENT

I would like to first thank the Occupational Therapy Department at Duquesne University for guiding and motivating me throughout the last five years of my educational journey. This program has been like a family to me and has shaped me into the professional that I am now. I would especially like to thank Dr. Jeryl Benson for always believing me, even when I didn't and for fueling my love of pediatrics. Thank you to Dr. Ann Cook for facilitating my Doctoral Experiential Component at Bridgeway Academy and also for being the mentor I needed to get through this program. Finally, thank you to all the staff and students of Bridgeway Academy for helping me find my true passion and my place in the field of OT. You have all contributed immensely to my professional and personal development and this project would not be what it is without each of you. Thank you.

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LIST OF ABBREVIATIONS

- Activity of Daily Living: ADL
- Autism Spectrum Disorder: ASD
- College of Optometrists in Vision Development: COVD
- Doctoral Experiential Component: DEC
- Ecology of Human Performance: EHP
- Instrumental Activity of Daily Living: IADL
- Occupational Therapist: OT
- Visual Perception: VP

CHAPTER 1: THE PRACTICE SCHOLARSHIP CAPSTONE PROJECT

According to Coulter (2009), individuals with Autism Spectrum Disorder (ASD) are susceptible to visual perceptual and information processing impairments. The visual system is the dominant sensory system; people rely heavily on the timing and accuracy of eye movements in order to update and use sensory information coming in about the social and physical environment, in order to coordinate actions (Johnson, Lum, Rinehart, & Fielding, 2016). If the visual processing system is not functioning properly, learning and engaging in school-related tasks can be more difficult or even impossible for a student. A study by Du Plessis, Coetzee, & Pienaar (2015), indicates that visual perception is critical and that motor tasks can only be carried out if sensory information is perceived correctly. It is important in working with school-age individuals that practitioners and school personnel have an understanding of the visual system and visual perceptual skills to include this focus in treatment (Goldstand, Kosolowe, & Parush 2005). Evidence reports that training programs can be effective in improving the skills of teachers and therapists who are treating students with developmental disabilities (LeBlanc, Gravina, & Carr, 2009). The program described here aims to improve the treatment of visual perceptual deficits within this population by improving the knowledge of Bridgeway Academy teachers and therapists and by creating a tool that can be used to screen students' visual perception (Olaniyan & Oho, 2008).

Bridgeway Academy is a school and therapy center that serves students with a diagnosis of autism spectrum disorder or other developmental disabilities. A needs assessment conducted at this school determined several potential areas of occupational performance that could be addressed. Over three days spent at the site this researcher utilized observations, informal interviews, a focus group, and a survey to collect data and determine potential areas for program

development from therapy staff, classroom personnel, administrators and other staff, and the directors. The topic of vision and visual perception repeatedly emerged as one of the most prominent needs. A survey created and implemented through SurveyMonkey, and opened to all staff members of the school, helped build consensus that the focus of program development would be starting a vision-screening program at the school. As discussions of the scope of program planning continued, it became clear that teaching the staff members about these topics was needed and could improve their work with students, prior to the beginning of a formal school-wide screening program. Therefore, the focus selected for this proposed program is the creation and implementation of a comprehensive training program on the visual system including effective screening and implementation of techniques that address visual perceptual skills in all aspects of Bridgeway programming. The aim of the program is to increase staff knowledge of the visual system and related topics and to improve their skills in identification of students with visual deficits.

CHAPTER 2: REVIEW OF RELEVANT LITERATURE

Thesis Statement

Thesis: Understanding the function and dysfunction of the visual perceptual system in school-age individuals with autism spectrum disorder is critical to creating and providing interventions that improve performance, and this understanding can be effectively improved through training and instruction specific to the topic. Research in this review addresses the development of the visual system and how deficits may be presented and treated. It also illustrates the importance of vision and visual perception for school-age children and how to address this when working with individuals with a variety of diagnoses, including autism. The

effectiveness of staff training programs that specifically address visual perceptual issues in children with autism has not been broadly studied within the literature.

Synthesis of the Literature

As the prevalence of ASD is increasing, the need for care and services for these individuals is also rising. Autism is characterized as a developmental disability commonly presenting with social and communication impairments, restricted areas of interest, and frequently includes the presentation of repetitive behaviors (Christensen et al., 2016). Some of the typical areas of occupation that are impacted include participation in activities of daily living (ADLs) and instrumental activities of daily living (IADL), education, work function, leisure identification and participation, play, and social skills (Scott, 2011). Individuals with ASD often exhibit deficits in sensory processing abilities, including the visual processing system (Coulter, 2009). According to the College of Optometrists in Vision Development (COVD) (2009), "symptoms of autism may include visual components such as lack of eye contact, starring at light or spinning objects, fleeting peripheral glances, side viewing and difficulty attending visually" (n.p.).

"In children with complex or multiple disabilities, visual and indeed ocular problems are relatively common but may be overlooked as the focus may be on other aspects of health or management (Salt & Sargent, 2017, p. 1163). The main focus of treatment is often on the primary disability or deficit, leaving visual problems undetected and untreated (Kaur, Thomas, Jindal, & Bhatti, 2016). Children with a disability are at a significantly greater risk for a visual impairment and ocular disorders, than children without a disability (Kaur, Thomas, Jindal, & Bhatti, 2016; Salt & Sargent, 2017) and specifically, evidence states that individuals with ASD are often seen to have impaired ocular motor control (Johnson, Lum, Rinehart, & Fielding,

2016). Among individuals with developmental disabilities, Salt and Sargent (2017) report that 10.5% of these children have a comorbid visual impairment compared to 0.16% of children without a disability who also have a visual impairment. Kaur, Thomas, Jindal, & Bhatti (2016) report that ocular problems occur in 25.7% of children with autism and visual problems are seen in 57% of individuals with autism, with the most common deficits being refractive error and strabismus. Dusek, Pierscionek, & McClelland, (2010), emphasized that children with learning disabilities are also more susceptible to visual deficits. Thier study reported that symptoms such as burning/stinging sensations, asthenopia, eyestrain, blurred vision at near and distance, and diplopia are significantly more frequently reported in children with reading difficulties (Dusek, Pierscionek, & McClelland, 2010). Other studies, such as Marco, Hinkley, Hill, & Nagarajan (2011) illustrated the discrepancies in visual processing abilities of individuals with ASD, such as reports that visual attention to detail is enhanced, studies showing no difference in ASD versus control individuals, while other studies show impairment in specific skills such as object detection (Marco, Hinkley, Hill, & Nagarajan, 2011).

Many behaviors seen in both students that are typically developing as well as those on the spectrum, may be indicative of problems with vision or visual perception (Coulter, 2009). Common symptoms of ASD, such as communication and sensory processing deficits, make visual perceptual problems particularly challenging to identify and address (Coulter, 2009; McPartland, Law, & Dawson, 2016). For example, if an individual has spent his or her whole life seeing the world one way, they may be unaware that there is something different or inaccurate about what they are seeing. Communication deficits present in individuals with ASD can prevent them from being able to express to an adult that they are having vision problems (McPartland, Law, & Dawson, 2016). It is likely that these visual difficulties may go unnoticed in a child

unless a visual assessment is performed (Dusek, Pierscionek, & McClelland, 2010). Another noteworthy argument to be made regarding the importance of addressing visual deficits in these students is that individuals with autism are often seen as being visual learners (Rao & Gagie, 2006). Providing visual supports to learning is critical to the individual processing the entire message and "visual supports allow the student with autism he freedom to engage in life, regardless of his or her impairment in communication" (Rao & Gagie, 2006, p. 27). Including visual interventions in treatment with these students can promote their learning and development in the classroom and other settings. For these reasons, as service providers to these students, it is important to be aware of and treat their visual processing deficits.

Vision and visual perception impacts all aspects of all children's lives including reading and writing, interacting with others, and picking out clothes for the day. It is often identified as the primary sensory system by researchers (Du Plessis, Coetzee, & Pienaar, 2015). Du Plessis, Coetzee, & Pienaar (2015), indicate that visual perception is essential and motor tasks can only be carried out if sensory information is perceived correctly. Effective visual perception is also critical in the development of cognition and conceptual skills in children (Ayhan, Aki, Mutlu, & Aral 2015). Children with visual difficulties may be at an educational disadvantage to their visually normal peers with regard to educational attainment and are a greater risk of developmental setback in areas such as sensorimotor understanding, verbal comprehension, expressive language, social development and behavioral status (Dusek, Pierscionek, & McClelland, 2010). Even a minor visual problem needs to be identified and addressed early on in order to successfully promote students' social and academic performance (Kaur, Jindal, & Bhatti, 2016).

Once the impairment has been identified, therapists can use their clinical intervention skills to both treat the issue as well as adapt activities based on what the student is seeing. A common goal of professionals working with children with ASD is to improve participation in academic and social contexts (McPartland, Law, & Dawson, 2016). Identifying deficits and treating the visual system can be a key step in the addressing these goals. Interventions with all children addressing visual perceptual skills both in occupational therapy and in the classroom setting can improve academic performance (Case-Smith, Frolek Clark, & Schlabach, 2013; Chang & Yu, 2017; Goldstand, Koslowe, & Parush, 2005). By focusing on developmentally appropriate interventions with professionals such as OTs, visual perceptual and visual motor skills can be improved (Case-Smith et al.,, 2013). This ultimately leads to improvements in participation and peer interaction as well as handwriting in students with a variety of disabilities (Case-Smith et al., 2013 & Chang & Yu, 2017).

Training individuals in the workplace can have an impact on their skills in a specific task area. “Training not only may affect declarative knowledge or procedural knowledge, but also may enhance strategic knowledge, defined as knowing when to apply a specific knowledge or skill” (Aguinis & Kraiger, 2009, p. 454). According to Olaniyan & Ojo (2008), training involves developing knowledge, skill, and attitudes in order to perform correctly at a particular task. They also state the importance of ensuring a staff is competent in the material they are being trained on through the use of evaluations and assessments (Olaniyan & Oho, 2008). Training can occur through many different methods of delivery such as, digital videoconferencing, intensive weeklong training programs, and short training sessions with feedback (Koegel, Matos-Fredeen, Lang, & Koegel, 2011). Advantages of training in a face-to-face manner include opportunity for discussion, providing large amounts of information to a large group, facilitation of interactions,

ensuring that trainees complete the program, and instructor facilitated motivation among trainees (Williams & Zahed, 1996). These could include modeling and role-playing with feedback from the trainer (LeBlanc, Gravina, & Carr, 2009). Overall, classroom-based staff training is an effective way to provide instruction to a large group and to ensure positive outcomes. Most importantly to this program however, evidence has shown that it is important to provide effective training to individuals working with people with developmental disabilities, either through live or video training formats (LeBlanc et al., 2009). LeBlanc and colleagues (2009) emphasized unique aspects of training those who work with people with disabilities like autism, and demonstrated how important consistent training is for these professionals. Training, such as hands-on training, is needed to ensure that professionals have the necessary skills to work with individuals with autism (Donaldson, 2015). Teacher training programs are necessary for working with students with autism to ensure the required skills and expertise (Koegel et al., 2011). This supports the design of a comprehensive training program to be provided to all staff across disciplines to follow the same procedures for the process (LeBlanc et al., 2009). Refer to Appendix A for the literature used in this review.

Summary

To summarize, individuals with ASD often demonstrate difficulties with visual perceptual deficits (Coulter, 2009) that impact their ability to function in tasks such as reading and writing, interacting with others, and picking out clothes (Du Plessis et al., 2015). Identifying and treating visual system deficits can be a critical step in improving function of these individuals. The use of interventions addressing visual perceptual skills both in occupational therapy and in the classroom setting can improve academic performance and overall function for all children (Case-Smith et al., 2013; Chang & Yu, 2017; Goldstand, Koslowe, & Parush, 2005).

Research also states the importance of training staff members who work with these individuals to be competent at identifying and treating visual perceptual deficits in these students. LeBlanc, Gravina, & Carr (2009) illustrate that training individuals who work with students with developmental disabilities is especially important, and that training helps professionals to develop the ability to apply and use specific knowledge or skills (Aguinis & Kraiger, 2009). The program being proposed is rooted within this evidence.

CHAPTER 3: THEORETICAL, CONCEPTUAL, OR QUALITY IMPROVEMENT FRAMEWORK

The proposed program is shaped by the occupational theory of Ecology of Human Performance (EHP) (Dunn, Brown, & McGuigan, 1994). EHP focuses on the interdependent nature of a person and their environment. In this model, environment includes the cultural, temporal, social, and physical aspects of the contexts where performances occur. This model identifies five intervention categories: establish/restore, alter, adapt, prevent, and create (Dunn, Brown, & McGuigan, 1994). Therapeutic intervention involves interaction of the person, the family, and the professionals working with the client in an effort to meet the occupational needs. The figure below depicts the constructs of EHP and how they interact together (Dunn, Brown, & McGuigan, 1994). Refer to figure 1 throughout the next section in reference to the components and how they coincide with the proposed program.

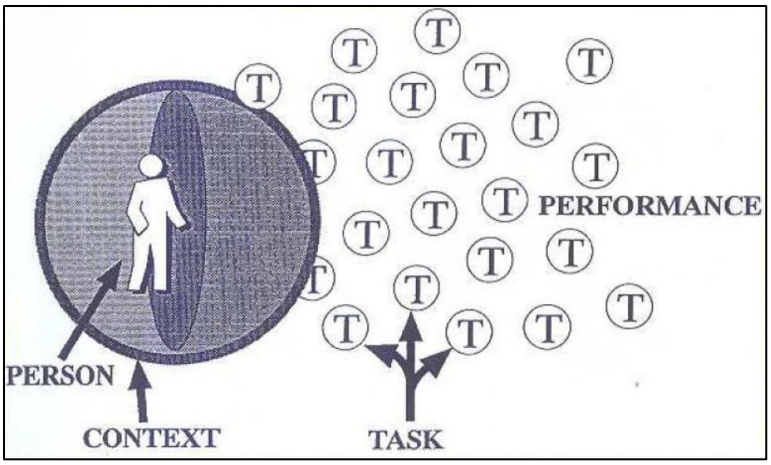

Figure 1: Visual representation of the Ecology of Human Performance framework. (Dunn, Brown, & McGuigan, 1994).

All aspects of the EHP model are related to the proposed program. The person is a unique being with skills, values, and experiences (Dunn, Brown, & McGuigan, 1994). When applying this EHP model at Bridgeway Academy, the "person" refers to Bridgeway staff members. Staff members in the program include teachers and classroom aids, therapists, and administrative staff, all who work with the students both directly and indirectly. The focus of this program is increasing knowledge and skills of the professionals in order to ultimately improve their interactions with the students.

Secondly, the context consists of the environment the person is functioning in. As the context changes, the person must adapt and change with it (Dunn, Brown, & McGuigan, 1994). The environment that the staff members are working in directly affects how they will perform. Whether this is the Bridgeway classrooms or therapy spaces, how the individual interacts with the context is key. Understanding the characteristics and demands of the environment the person is working in promotes more successful outcomes and goal achievement. The addition of this training program to the context of Bridgeway Academy will also change the performance of the

staff members who participate, increasing their attention to visual perceptual concerns in the students and addressing them.

Tasks are the steps we complete in order to attain goals and one way that the person engages within the environment (Dunn, Brown, & McGuigan, 1994). In this training program, the tasks the staff were asked to complete included attending and engaging in the training, completing a knowledge pre- and post-test, and utilizing the materials provided in the training to work with students. These tasks are direct steps in order to achieve the ultimate goals of the program. The goal following the training is to enable the school staff members to complete the process of identifying students in need of screening and then for the OTs to be able to screen for and treat these deficits. Some of the tasks they may be required to complete once they have engaged in the training include observation of students, referral to occupational therapists, completing the screening assessment, and intervening based on assessment results.

The final component of EHP is performance. Performance is defined as, how a person completes the task within their environment (Dunn, Brown, & McGuigan, 1994). Performance outcomes as a result of trainings are measured through observations and a knowledge assessment conducted with the training session, as well as an observed increase in students with visual perceptual deficits being identified within this school based setting. Through the creation of the all-staff training, the OT screening tool, and the OT specific training, the ultimate goal is to improve how professionals interact with the students to achieve successful outcomes.

Additionally, this theory looks at five intervention categories: establish/restore, alter, adapt, prevent, and create (Dunn, Brown, & McGuigan, 1994). The proposed program can be seen as a combination of two of these intervention categories, establish/restore and create. Dunn, Brown, and McGuigan (1994) identify that establish/restore occurs when a therapist remediates

or improves a person's abilities to improve their performance. The intervention category of create occurs when the therapist creates "circumstances that promote more adaptable or complex performance in context" (Dunn, Brown, & McGuigan, 1994, 604). The program being proposed here can be situated within these two intervention categories as it intends to create a process for improving the identification of visual perceptual deficits so that they can be addressed within treatment, "establishing a person's skills and abilities" (Dunn, Brown, & McGuigan, 1994). Through the implementation of this program, therapists working with these students can use their skills to improve their performance.

The theory of Ecology of Human Performance addresses the interrelated components of the person, environment, tasks, and performance of an individual. Focusing on these four aspects during creation of this program allows for comprehensive development of each component individually as well as together. This program aims to create a change in the process of identification and treatment of visual perceptual deficits through developing each of these four aspects of the EHP theory.

CHAPTER 4: DESCRIPTION OF THE PRACTICAL SCHOLAR CAPSTONE PROJECT

Title of Project

A Day Through My Eyes.

Program Goals

A Day Through My Eyes has three distinct goals as a program, and each goal has 2 objectives to determine the program has successful outcomes:

1. By the middle of June, 90% of Bridgeway staff will demonstrate increased knowledge of the function of the visual perceptual system, its impact on student performance, and how

to identify students with deficits as evidenced by the results of a pre- and post-training knowledge test.

   a) By mid-June, 90% of Bridgeway staff will attend training in a one-hour session on the visual perceptual system and related topics.
   b) By the end of training, 85% of staff will review "Checklist of Visual Problems" with their respective therapy and classroom team.

2. By the beginning of August, 100% of OT staff will demonstrate competency on the screening tool for the identification of student who would benefits from a referral to a developmental optometrist.
   a) 100% of OT staff will attend a face-to-face 1-hour training on the implementation of the screening tool.
   b) 100% of OT staff will complete a case study activity following the training to assess competency.
3. 90% of OT staff will independently demonstrate at least 2 accurate strategies for incorporating developmental optometry recommendations into therapy sessions and the environment within 6 months from attendance of training.
   a. 100% of OT staff will verbally identify one example of a deficit the developmental optometrist would identify from a case study example. The case study can be found in Appendix B.
   a) 100% of OT staff will demonstrate 1 technique from developmental optometry recommendations on a peer, with supervision.

Brief Program Description

New/Existing

A Day Through My Eyes will be a new program at Bridgeway Academy. At this point, there is no formal vision program at the school. Some students do have visual perceptual goals that have been made based on observation or formal visual diagnoses. However, the school does not have a screening tool or identified procedure in place to identify students who may need further evaluation. The school also has not conducted a training regarding the visual perceptual system in the past for staff members.

Theoretical Framework

The program is shaped by the Ecology of Human Performance (EHP) practice model (Dunn, Brown, & McGuigan, 1994). EHP focuses on the interdependent nature of a person and their environment and how function is impacted by this interaction. In this model, environment or context depicts the cultural, temporal, social, any physical aspects of the environment. Integrating EHP into the creation and implementation of the proposed program allows all aspects to be fully developed and to be appropriate for the staff and students, the settings, and the goals.

Rationale for Program Design

The body of evidence currently available supports the creation of the components of this program. The key points from the evidence are summarized in appendix A. Visual perceptual skills are critical for academic, social, and everyday success (Goldstand, Koslowe, & Parush, 2005). Students with ASD are often being affected by the function of their visual systems and their perceptual abilities (Coulter, 2009). These deficits often include challenges such as difficulty with binocularity, visual sensitivity, oculomotor dysfunction and processing difficulties (Coulter, 2009; Guy, Mottron, Bertiaume, & Bertone, 2015, and Johnson, Lum, Rinehart, &

Fielding, 2016;). To determine level of functioning, testing must be done on students' entire visual system to determine if deficits are present and if there is a need for specialized services such as vision therapy (Coulter, 2009). A key aspect to enforcing change and improvements in the students' visual processing abilities is making professionals aware of the impact of the visual system. A comprehensive training program in order to improve the abilities of staff can be effective to achieve the goals of the program (Aguinis & Kraiger, 2009). The three components of this program focus on staff training. Once knowledge has been established with the staff, future students will benefit more naturally from the program.

Sample or Population

The sample for this program included teachers and classroom aids, occupational, speech physical and music therapists, psychologists and administrative staff at Bridgeway Academy. The sample was comprised of 43 out of the approximately 170 total staff members at the school. Only individuals employed at Bridgeway Academy who spent some time interacting with students were included in the program. Individuals who did not work directly with students, such as receptionists, were excluded. Participants were recruited in two ways, existing staff received flyers advertising the training while the program was included as mandatory training for newly hired staff members. The flyer used for recruitment can be found in Appendix C. Based on the data collected from the training, 43 out of 170 total staff members attended the training from many different disciplines, all of whom met the inclusion criteria by being employed at Bridgeway and working directly with students in some capacity. From this group of 43 participants, 22 (52%) participants were mandated to attend as new staff members, leaving 21 (48%) attending voluntarily.

Program Structure

There were three interrelated components to the program, categorized according to the goals specified above: all staff training, OT vision screening training, OT vision intervention training. The intention of the researcher was to complete the aspects of the program in order of the listed goals above. This timeline was altered because of the changes in the schedule that occurred during the summer months and start of the next school year. The timeline that was completed was in the following order: OT department staff training on screening tool and use of toolkit for intervention together, and then the all staff training. Changes to the wording of the original goals to reflect this change in the timeline will be explained throughout this section of the paper. The new goal 1 has a timeframe of the end of the 16-week DEC and objective 1a now has a timeframe of the end of August. In objective 2b the length of time for the training was changed from 1-hour to 30 minutes, as that was the length of time of the training delivered. The wording of goal 3 and objective 3a and 3b were changed to reflect the information provided in the training, and the time frame of goal 3 was changed because only 1 month was available after the training was provided to assess the goal. The new goals and objectives for this component are as follows:

1. By the end of the DEC, 90% of Bridgeway staff will demonstrate increased knowledge of the function of the visual perceptual system, its impact on student performance, and how to identify students with deficits as evidenced by the results of a pre- and post-training knowledge test.
    a) By the end of August, 90% of Bridgeway staff will attend training in a one-hour session on the visual perceptual system and related topics.

b) By the end of training, 85% of staff will review "Checklist of Visual Problems" with their respective therapy and classroom team.

2. By the beginning of August, 100% of OT staff will demonstrate competency on the screening tool for the identification of students who would benefits from an in depth assessment of visual perception.
    a) 100% of eight total OT staff (OTRs and COTAs) will attend a face-to-face 30 minute training on the implementation of the screening tool.
    b) 100% of OT staff will complete a case study following the training to assess competency.
3. 90% of OT staff will independently demonstrate at least 2 accurate strategies for incorporating visual perceptual interventions into therapy sessions and the environment within 1 month of attendance of training.
    a) 100% of OT staff will demonstrate one example of an intervention technique that could be used with an individual from a case example.
    b) 100% of OT staff will demonstrate 1 technique for incorporating visual perceptual interventions on a peer, with supervision.

The OT screening tool was created over the 16-week DEC time period with input from the OT department at Bridgeway and vision specialists such as developmental optometrists and vision therapists. This tool was intended to identify visual perceptual skill deficits that would be evident within therapy and the classroom. At this time, there is no developed screening tool that is comprehensive and quick to be utilized for the purpose of identifying visual perceptual deficits. This first portion of the training was created to help the therapists understand when to determine a student needs screened, how to use the tool, and how to determine if a student needs

referred to a full evaluation. The training ensured there was consistency in use of the screening measure. An example decision-making tree for this process can be found in Appendix D.

The next step of this training consisted of training OT staff on implementation of visual perceptual interventions from the resource toolkit into interventions sessions identified as a result of the screening process. It was important to ensure that once a student is assessed using the screening, if deficits are identified, there is carry-over within therapy and the student's classroom environment. If no deficits are identified with the tool, no further intervention with visual perception would be needed. The training was intended to determine if the tool and toolkit were effective to streamline this process in the most effective way possible. The toolkit training was held in conjunction with the training on the OT assessment tool. A copy of the assessment tool provided to each individual accompanied the training.

The final component of the program was the implementation of a training program for all staff members at Bridgeway Academy. This training provided information about the visual system and its function, how vision impacts student performance, deficits that may be present, how these deficits can be identified and addressed at Bridgeway and the role of the developmental optometrists. The participants were provided with information on a document titled "Checklist of Visual Problems". This checklist is intended to be used by classroom and/or therapy staff to document observations of student behaviors that may indicate a need for a VP screening. This document can be found in Appendix E. The primary investigator worked to ensure the most applicable content for the training by sythesizing the relevant literature and observing and interviewing developmental optometrists in order to gather an idea of the scope of visual perceptual problems, how these impacts students' performances, what testing would

consist of, and how treatment occurs. An outline of the training session that occurred can be found in Appendix F.

Program Implementation

The three components of this training occurred over the 16-week course of the doctoral experiential component (DEC). The second and third components of the program were provided together to the OT department at Bridgeway first. For these components, a singular training was provided on the tool and the accompanying toolkit during a 30 minute lunch meeting in the OT therapy space. During this training, the researcher provided the eight OT staff members with information regarding why this program was being implemented, the screening tool was explained, and the toolkit and resources were discussed and demonstrated. The toolkit is contained in a hard copy format, with files for each visual perceptual skill area. This collection of materials was made available to all therapists, with copies being held at both locations of the facility. Sections of the toolkit correspond with the screening tool categories: Visual Discrimination, Spatial Relations, Form Constancy, Figure Ground, Visual Closure, Visual Memory, Visual Scanning/Tracking, Convergence/Divergence, and Visual Motor Integration. Time for questions was included at the end of the training. An outline of this training is included in Appendix G. The screening tool is included in Appendix H.

The all staff training program occurred after the OT training was delivered. This occurred during a one-hour time slot utilized for weekly staff trainings, which are regularly held at the school. Informed consent procedures occurred at the beginning of the training. The program was explained and outlined and all staff members signed an informed consent form prior to the start of the initial session. It was held in a classroom environment equipped with a presentation screen. Paper copies of the presentation were provided to all attendees at the beginning of the

session. A copy of the presentation is included in Appendix I. The participants were also provided with a copy of the "Checklist of Visual Problems" handout (Appendix E). The training lasted approximately one hour, including time for questions and to collect paperwork. A total of 43 staff members from the school attended this training, including occupational therapists, certified occupational therapy assistants, physical therapists, speech language pathologists, music therapists/music therapy interns, psychologists, intervention specialists, classroom staff, and other administrative staff. This training was offered one time to the staff at this time.

Since this program was training based, cost to run the program was minimal. Copies provided to the participants were made from materials already present at the facility. The training times were built into the workday so no additional pay was provided to attendees of either the all staff or the OT trainings.

Program Evaluation

The two trainings provided to the different groups of staff were evaluated using different outcome measures. For the first training, the OT department staff was evaluated using non-standardized observations. The OT staff training was intended to be evaluated using more rigorous measures. The researcher aimed to use a competency checklist to determine if each staff member gained the skills needed to use the screening tool and the resource toolkit following the training. This method would have determined if the program effectively increased competency in the OT staff to use the screening and toolkit. However, the researcher failed to either restructure the goals of the program based on the timeline that changed as the DEC period went on or to ensure the completion of the competency testing, making this method of data collection not possible in the amount of time left after the training.

In order to collect data on the competency of the OTs to use the assessment tool and toolkit, non-standardized observation data were collected following this training. The eight staff members who attended the training were asked to inform the researcher when they would be trialing the screeinng tool and resources with a student so that the researcher could observe and assist. Observation data was collected regarding if each staff member used the screening tool, if they used it appropriately and required any assistance, if they used the toolkit, if they required assistance with use, and if they provided any feedback to the researcher regarding either components. This information was recorded in the form of field notes, taken by hand in a notebook by the researcher immediately after the observations were made.

A pre- post-test design was utilized in order to measure the effectiveness of the all-staff training component of this program. A 12-question knowledge assessment was administered to the staff members at the beginning of the training and then at the end of the session to evaluate the effectiveness of the training. The test was performed on paper and pencil for both the pre-test and the post-test. In order to ensure anonymity, participants were assigned a number to be used on both the pre-test and post-test. This knowledge test is found in Appendix J. In a study by Arciniegas Calle, Lobelo, Jimenez, Paez, Cortes, de Lima, & Duperly (2016), researchers conducted a pre-test post-test assessment of a one day workshop training program for Physician Assistants. They concluded that utilization of a pre-test post-test design allowed them to determine that the training program was effective in increasing the education of the professionals (Arciniegas Calle, et al., 2016). According to their research, a normalized gain of 30% in a population indicates an effective program; with the results of their study showing a 46% normalized gain. The researchers also utilized the results to draw conclusions regarding which topics were effectively addressed and if revisions to the program needed to be made (Arciniegas

Calle, et al., 2016). This is in line with one of the intended uses of the pre-test post-test design with this proposed program.

Additionally, two days after the training, a 10-item SurveyMonkey was sent by email to all staff who attended the training session in order to gather data regarding the quality of the session. This was sent through an email from the training coordinator and the participants were given a little over a week to respond. Questions addressed the applicability of material, interest in information provided, enjoyment of session, and if additional changes needed to be made to the program. This survey is found in Appendix K.

CHAPTER 5: RESULTS

The results of the program that was implemented can be described based on the three measurement tools that were utilized. From the data that was collected through the pre/post knowledge test, the non-standardized observations, and the satisfaction survey, the researcher could determine if the intended goals of the program were met. The data collected through the pre/post test assessment indicates that the first goal, to increase staff knowledge of the VP system and its impact on students, was met by the program implemented. The data required to evaluate goals two and three, demonstration of competency with the screening tool and toolkit, was not gathered within this program. However, non-standardized observation data was gathered for these goals, which is reported here, Lastly, data from a satisfaction survey utilized with the participants of the all staff training was gathered to determine an overall positive opinion of the training provided. This data is broken down within this results section.

In regards to the effectiveness of the all staff training, data from the pre/post test was coded in Microsoft Excel for 43 participants. Demographic data indicated that nearly half of the participants, 48% of the staff trained, were teachers and more than half, 52% of participants,

have been employed at Bridgeway for less than one year at the time of training. Of the 43 participants, 22 (52%) were employed for less than one year, indicating the number of individuals required to be in attendance. See Table 1 for complete listing of demographic data. Statistical analyses including a paired sample T test and repeated measures ANOVA were performed with the data gathered from this measure. Of the individuals who attended the training, the groups had a pre-test mean score of 8.44 items correct (*SD* = 1.868), and a post-test mean score of 10.45 items correct (*SD* = .993). A paired sample T Test showed that there was a statistically significant difference in the scores on the post-test from the pre-test. The post-test group mean (*M* = 10.45, *SD* = .993) was significantly higher than the pre-test group mean (*M* = 8.44 items, *SD* = 1.868), $t(4) = 6.899$, $p < .000$. Additionally, a repeated measures ANOVA was conducted to determine if the number of years employed at Bridgeway effected the test scores from pre to post training. Based on this test, the years of experience did not have a statistically significant effect, $F(1)= 3.896$, $p= 0.056$.

Table 1. *Demographic Data*

Participant Characteristics	Total Sample (n=42)
Profession, n (%)	
Teacher	20 (47.6%)
Speech Language Pathologist	6 (14.3%)
Occupational Therapist	5 (11.9%)
Certified Occupational Therapy Assistant	2 (4.8%)
Administration	2 (4.8%)
Music Therapist	2 (4.8%)
Music Therapy Intern	2 (4.8%)
Intervention Specialist	1 (2.4%)
Physical Therapist	1 (2.4%)
Psychologist	1 (2.4%)
Years of Employment at Bridgeway, *mean (SD)*	2.4 (3.6)
Less than 1 year, *n (%)*	22 (52.4%)
1-2 years	5 (11.9%)
2.1-4 years	5 (11.9%)
4.1-6 years	4 (9.5%)
6.1-8 years	1 (2.4%)
8.1-10 years	1 (2.4%)
More than 10.1 years	3 (7.1%)

Results of the OT department training were gathered through the use of non-standardized observations taken to determine the amount of staff who used the tool and toolkit and gather narrative data regarding their use. The results of these observations indicated that 100% of the OT staff members employed at Bridgeway were trained on the screening tool and the toolkit. A majority (75%) of the OTs who were trained utilized the screening tool and half (50%) of the OTs who were trained used the resource toolkit. Observations taken during the administration of the screening tool included that they used it appropriately and successfully. Observations also determined that all six of the OTs who used the screening did so with no more than verbal cues for assistance. The students that the OTs screened ranged from early intervention through high school aged, presented with a wide range of functional abilities, and employed different forms

and levels of communication. The OTs using the screening volunteered feedback that included four therapists providing lists of students to utilize the materials with, two OTs brainstorming and trialing adaptations to the screening tool, and one individual stating that this was a much needed addition to the department. This program aimed to train 100% (8/8) of the therapists in the department, which was achieved as evidenced by the data collected from the observations. While competency was not tested with a formal evaluation tool, the majority of the trained therapists used the screening and half of the therapists used the toolkit, indicating its receptiveness by the department. A case study was not implemented following the training, as indicated in the objectives, leaving these objectives of the program not evaluated at this time.

To determine participants' perception of the quality of the training session, a survey was sent to the 43 participants, which 40% (17) of the attendees completed. The results of the survey following the training are depicted in Table 2. Based on the data collected, the majority of respondents, 15 out of 17, indicated the training met their expectations, 17 out of 17 indicated the training was adequate in length and that the topics were applicable, 15 out of 17 indicated they gained knowledge and skills from the training and also enjoyed the training, and 11 out of 17 indicated they feel the training should be mandatory for all new staff. When asked if anything should be added to the training, 4 people stated that they would like more time or additional trainings added and 2 people stated wanting more activities to practice skills. When asked what should be removed from the training, 9 participants indicated that nothing should be removed. Comments from the staff included that this was a different training compared to previous trainings, the information as useful for immediate application to students and individual job responsibilities, and that the handout/resources were helpful.

Table 2. *Satisfaction Survey Results*

Item Phrase	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Met Expectations	7	8	2	0	0
2. Adequate time in training	6	11	0	0	0
3. Applicable topics	11	6	0	0	0
4. Knowledge gained from training	7	8	2	0	0
5. Skills gained from training	5	10	2	0	0
6. Enjoyed training	10	5	2	0	0
7. Should be required for all new staff	6	5	3	3	0

Item Phrase	Responses	Number of Responses
8. Additions to training?	• More activities to practice	2
	• More time/more trainings	4
	• Nothing	2
9. Removed from training?	• Nothing	9
10. Comments	• Different training that they have not had	1
	• Able to use information to identify a student	1
	• Applicable to job	1
	• Handout was helpful	1

CHAPTER 6: DISCUSSION

The results of this program evaluation show the program succeeded in increasing the knowledge of the staff following a training session, the developed screening tool and resource toolkit were utilized by the OT staff, however competency in these techniques can not be determined from the data gathered. Based on the results of the all staff training, participants showed an increased in their knowledge of the visual perceptual system, how it impacts learning and function, and how to identify “red flags” in students. This was evidenced by the results of the pre/post knowledge assessment administered at the training. This training was created in response to an identified need that emerged during the needs assessment visit. The staff

demonstrated an interest and desire to gain more information and skills related to visual perception with their students. For this reason, success in the gain of knowledge from the training can be partially attributed to the receptiveness of the staff to engage in the program. Additionally, the success seen in this training can be attributed to the material being presented at an appropriate educational level for the staff attending. Based on the data from the satisfaction survey, the staff members did not indicate a lack of understanding or need to change the material presented in the training. It can be noted that all of the staff members have a basic understanding of working with students with autism, as they are all employees of Bridgeway, and therefore understood the language used and the population of the program. It is important to point out that the number of years of employment at Bridgeway had no significant effect on the results of the pre/post test differences. This could be due to many different factors, however one that is important to note is that the issue of visual perception with students with autism is a newer topic being studied in the literature. While having more years of practice at Bridgeway may impact the staff members' knowledge and skills in generally serving students with autism, it may not have a significant effect on their knowledge of interventions for visual perception.

In regards to the screening and toolkit, explicit data was not collected regarding the effectiveness of the OT department training in increasing the competency to administer the screening tool and use the toolkit with students. Based on the observational data collected, however, the OTs did report they felt the components were needed additions and could see their utility with students. This feedback indicates that the therapists are more attuned to the issue of VP in the functional abilities of the students, and now have tools to incorporate into treatment. The data indicated a majority of the staff trained in the department used the screening, further supporting the applicability within their practice. Making the connection between the issue of

visual perception and the students at Bridgeway is a first step in improving their function and skills within the school and in life. By starting at the level of the OTs working directly with the students, the screening and toolkit can add to their plan of care for the future. These items also create a foundation on which to develop future research endeavors regarding their effectiveness and impact on student function.

Results of the satisfaction survey indicated an overall positive opinion regarding the training provided. The data gathered from this survey indicated that the group of staff who attended the training and completed the survey felt it was applicable to their jobs, met their expectations, and that they gained knowledge and skills from the information provided. These results are important for shaping future implementations of the training materials. This data could have been strengthened with a larger return on the survey, a limitation that will be explained further.

The literature reviewed through both the primary search and subsequent secondary search can be used to situate the findings of the study. Understanding VP deficits and their impact is critical to working with any individual, but especially this population within the school setting. Vision and visual perception play a key role in an individual's function in motor tasks, cognition, and academic skills (Ayhan, Aki, Mutlu, & Aral 2015; Du Plessis, Coetzee, & Pienaar, 2015). Additionally, the presence of school-based deficits, such as reading, handwriting, etc., occurs most often alongside a visual deficit (Goldstand, Koslowe, & Parush, 2005), making a statement for the size of this problem within the population. The results of this program showed an overall increase in the staff knowledge of these topics, an important factor when working with students with these deficits. The results, while sample sizes were small, do make a point that following the all staff training and OT department training, the staff were more aware of the visual deficits

that may be present. The OTs were also provided with tools to intervene with these deficits in their students, leading to a potential improvement in motor and academic skills (Ayhan, Aki, Mutlu, & Aral, 2015; Du Plessis, Coetzee, & Pienaar, 2015). The research also emphasizes that training employees impacts the ability to use knowledge within context, known as strategic knowledge, which is the focus of the program overall (Aquinis & Kraiger, 2009). Ultimately, improving the staff's abilities to use knowledge of the VP system within the context of working with a student to identify their need for evaluation will benefit the students.

Three main limitations occurred in the implementation and data collection of this program. First, throughout the 16-week DEC experience, the intended schedule and timeline for the program implementation did not go as planned. Due to the change in the hours and days at the site, summer schedules and the start of the school year, changes were made multiple times to the dates of the trainings resulting in the trainings occurring at the end of the DEC, limiting the time left to collect data. This prevented full evaluation of the goals as written. This could have been prevented however, if the researcher would have more effectively managed the scheduling process and communicated with the team regarding scheduling issues. Additionally, changes could have been made to the structure of the goals earlier on in the process to reflect the new timeline. Either of these solutions could have allowed for more robust data collection. The next limitation, lack of demographics taken, limited the number of covariants. Taking demographics such as age or gender of the participants could allow statistics to be used to determine the effect these categories have on the scores of the participants. The last limitation of the program was the low attendance to the all staff training and then return on the surve. Of the approximately 170 staff members at Bridgeway, 43 professionals, 25%, attended the all staff training and then 17 staff members, 40% of the attendees, returned the survey. These numbers could have been

improved and therefore would have improved the scope of the data collected, increasing the confidence of the results. This could have been increased with more advertisement of the training done both earlier in the DEC process and through additional methods to the flyer and email correspondence. Overall, these limitations effected the outcomes of the program as well as the possibilities of analyses, however, the program was still implemented to some degree of success.

Revision of this program could include measures to lessen the discussed limitations from occurring. To further the efforts of this program, the training can be converted to a multiple unit program that could be delivered in person or through an online forum. Creating an online training program for this information would be ideal. Bridgeway could then use this online training program with new staff in order to be confident that the information remains unchanged from the original source. Additionally, this information could be formulated into a similar training for the parents/families of the students, either online or in person, to help bridge the gap between school and home life with this topic area.

CHAPTER 7: CONCLUSION

In conclusion, the issue of addressing visual perception in students with Autism Spectrum Disorder is one that is under-researched but critical to working with these individuals. The program aimed to hit three main targets, address the need to improve knowledge of the staff members regarding visual perception and streamline the process of identification of students needing to have their visual system tested. This problem was addressed through a three part program: developing a screening assessment and resource toolkit, providing a training to the OT department on these materials, and providing an all-staff training regarding the importance of the visual perceptual system. This project did elicit some successful and important information regarding this more recently identified problem area within the group of individuals with autism.

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Appendix A: Key Studies Informing the Study

Citation (1st author & year only)	Study Purpose/Research Question	Design	Sample	Data Collection Strategies	Findings that Inform This Study
Aguinis (2009)	Provides a review of training and development literature since 2000.	Systematic Review	600 articles, books, and chapters published in psychology, human resource management, instructional design, human resource development, human factors, and knowledge management.	Section 1: benefits of training for individuals and teams, benefits for organizations, benefits to society Section 2: activities before training, training design and delivery, training evaluation.	Training activities have a positive impact on the performance of individuals and teams. Training not only may affect declarative knowledge or procedural knowledge, but also may enhance strategic knowledge, or knowing when to apply a specific knowledge or skill. Comprehensive training program in order to improve the abilities of staff can be effective.
Ayhan (2015)	What is the correlation between conceptual development and visual perceptual skills among six year old Turkish children?	Correlational study	140 typically developing children 47.1% female and 52.9% male 103 children 60-72 months old and 35 children over	Bracken Basic Concept Scale-Revised (BBCS-R) and Frostig Developmental Test of Visual Perception (FDTVP)	Conceptual development of children is found to be associated with visual perception. Preschool programs should provide appropriate activities to develop visual perception. Attention should be made to the environment of preschools and appropriate visual stimulation should be available.

			73 months old		
Case-Smith (2013)	What occupational therapy interventions promote the motor performance of children ages 0-5 years?	Systematic Review	24 articles included in review	Articles reviewed from Medline, CINAHL, PsychINFO, ERIC, Cochrane Database of Systematic Reviews	Understanding of development is essential to designing interventions for young children Interventions with occupational therapy have been shown to improve visual motor skills in preschool age students Peer interaction and play are related to visual motor improvements
Chang (2017)	Does a program addressing visual-perceptual and haptic-perceptual skills improve handwriting performance in children with handwriting deficits?	RCT	28 children with dysgraphia in grades 1 and 2	Test of Visual Perceptual Skills-Third Edition (TVPS-3), Tactual Performance Test (TPT), and Battery of Chinese Basic Literacy (BCBL)	After sensorimotor intervention program, improvement was seen in visual perceptual skills but not on the tactile performance test. This indicates that intervention with children can improve their visual perceptual skills. Handwriting was also seen to improve. The program itself was seen to positively influence the handwriting abilities. This also shows important implications for teaching handwriting, illustrating the connection between visual–perceptual improvements and handwriting accuracy.
Christensen (2016)	To provide ASD prevalence estimates for 8 year old children living in catchment areas of the ADDM Network sites in 2012. To describe the proportion of children with ASD	Surveillance Summary	Not specified	Phase 1: screening and abstracting comprehensive evaluations performed by professional service providers in the community Phase 2: review of all abstracted	For 2012, 1 in 68 children (aged 8 years) have a diagnosis of Autism within the ADDM network states (Arkansas, Arizona, Colorado, Georgia, Maryland, Missouri, New Jersey, North Carolina, South Carolina, Utah, and Wisconsin) Significantly higher prevalence in boys than girls and in non-Hispanic white children than no-Hispanic black children and Hispanic children.

	with an intellectual disability.			evaluations by trained clinicians to determine ASD surveillance case status	
Coulter (2009)	To provide an overview of the literature regarding visual symptoms found in individuals with ASD.	Systematic Review	96 articles reviewed	Research studies, case reports, literature reviews and first-hand accounts were reviewed	Individuals with ASD often have difficulty processing sensory information, including visual information. Children with ASD have higher incidence of refractive error, differences in ocular motility function, hyper and hypo-sensitivity, hypersensitivity to color, photosensitivity, differences in visual spatial processing, inability to integrate vision with other senses, and visual processing difficulties. Gaze aversion, lateral gaze, and hand flapping are often used to screen for visual processing conditions
Du Plessis (2015)	To determine the interrelationship of visual-motor integration, visual perception, and motor coordination with object control skills.	One time cross-sectional design	880 typically developing grade 1 learners in North-West province of South Africa	Developmental Test of Visual Motor Integration (4th ed.) Test Battery (VMI-4) and Test of Gross Motor Development-2 Test Battery (TGMD-2)	Medium correlation between visual-motor integration, visual perception, motor coordination, and object control skills, with visual perceptual being the strongest. Results indicate that visual perception is critical for tasks, motor action can only be carried out by perceiving sensory information correctly and reacting to it.
Dusek (2010)	To describe and compare visual function measures of school age children (6-14 years of age)	Cohort study	Group with reading and writing difficulties= 825	Questionnaire: standard clinical questions to ascertain whether they were	High proportions of visual function anomalies in children with reading difficulties in an Austrian population. Importance of full assessment of binocular visual

	attending a specialist eyecare practice in Austria, one group referred from educational assessment centers diagnosed with reading and writing difficulties and the other, a clinical age-matched control group.		Control group= 328 All participants attended mainstream schools Excluded: individuals in control group with reading difficulties (n=10) and subjects with ocular pathology or learning difficulties (n=8)	experiencing any specific visual/ocular problems. Visual acuity: Zeiss Polatest Refractive Error: standard distant static retinoscopy Ocular posture: standard cover-uncover test Ocular motility: keep head still and follow pen with eyes Accommodation: push up test, flipper lenses, Monocular Estimation Method (MEM), alternating cover test and mirror bar Convergence: fixate on pen/light while it moves closer and further from eyes, flip prism 3ΔBI/12ΔBO Reading speed: The Salzburg Reading Test	status to detect and treat deficits in order to prevent visual problems form having impact on educational performance. Children with visual difficulties may be at an educational disadvantage to their visually normal peers with regard to educational attainment and are at greater risk of developmental setback. Likely that visual difficulties may go unnoticed unless student receives comprehensive vision assessment, visual problems may be overlooked because kids attend mainstream schools and are seen as intellectually and visually 'normal'. If untreated, can lead to difficulties in reading and writing that will increase as educational demands grow, can have impact on sporting performance, balance and coordination and self-confidence.
Goldstand (2005)	To compare visual and visual	Group comparison	71 seventh graders	Altalef Reading Screening Test,	Even among proficient readers, a high number of students revealed visual deficits.

	processing skills between children with and without mild reading and academic problems and examine the incidence of visual deficits within them.	design	classified as proficient and non-proficient readers	Tikva Reading Test, Modified Clinical Technique (MCT), Developmental Test of Visual-Motor Integration, 4th Edition, Revised (VMI-4), Motor Free Visual Perceptual Test (MVPT-R), Revised Conners Parent and Teacher Rating Scale, and Academic Performance Questionnaire	Significant differences in academic performance between proficient and non-proficient readers indicates a correlation between increased number of visual deficits in non-proficient readers and lower academic performance. Children with reading problems have higher prevalence of deficient visual efficiency skills (oculomotor, binocular, and accommodative skills). Illustrates importance of examining visual functioning and efficiency of school-age children who demonstrate difficulty with academic tasks.
Guy (2015)	Assessment of age related changes in global and local visual perception in participants with ASD	Cross-sectional study	39 individuals with ASD and 40 typically developing (TD) participants, ages 6-16	Observation of selective attention task performance	Global and local visual processing develops at a similar rate in children and adolescents with ASD. Children with ASD may be slower to respond to global stimuli than TD individuals. Trajectories for development of visual perception is similar between individuals with and without ASD.
Johnson (2016)	To determine if there is oculomotor dysfunction in ASD	Systematic review and meta analysis	28 studies of eye movements and ASD	Comprehensive Meta-analysis Software Version 2.0	Impairments in ocular-motor control in ASD impact visual perception, eye-hand coordination, and social attention. Ocular-motor disturbances in ASD include saccade dysmetria, difficulty inhibiting prepotent

					saccadic responses and impaired tracking of moving targets.
Kaur (2016)	To assess visual function and ocular status of children with disabilities other than visual impairment. To identify the preventable and treatable causes of visual impairment.	Cohort study	404 children with disabilities age 3-16 studying in rehabilitation centers and special schools in Ludhiana	Ocular exam: conducted in diffuse illumination with flashlight to observe head posture and facial anomalies Visual acuity: Snellen's E chart or Cardiff's preferential looking tests/Cambridge Cards Visual axis and strabismus: Hirshberg light reflex test and cover uncover test Ocular movements tested, presence of nystagmus checked, anterior segment examined using torch light and magnifying loupe of 6X to rule out any abnormalities of eyelids, conjunctiva, cornea, anterior chamber, iris and lens, direct and consensual papillary light reflexes checked. Subjective correction of refractive errors attempted in 12+ year olds.	Ocular disorder present in 43% of children tested 69.3% children with Cerebral palsy, 25.1% with Hearing impairment, 53.3% with ADHD, 25.7% with Autism, 69.2% with Down syndrome and 46.3% with Mental retardation. Children with disabilities are dependent on visual inputs for personal and educational needs. Visual deficits will affect overall development of child much more than typically developing child. Children with disabilities are at significantly higher risk for visual impairment. Refractive errors and strabismus most common. "Protocols should be made regarding, mandatory vision screening at the time of admission in the schools, an annual comprehensive eye examination, early intervention and treatment if an ocular disorder is detected" (p. 3-4).

				Cycloplegic retinoscopy using 0.3% cyclopentolate eye drops done in all children aged 3-12 years and those who were unco-operative for subjective refraction. A detailed fundus examination after dilatation was done by direct ophthalmoscope either after cycloplegic retinoscopy or after dilating the pupils with 1% tropicamide eye drops.	
Koegel (2011)	To provide a summary of research-based intervention for students with ASD in an inclusive school setting by teachers and classroom staff.	Article review	Not specified	Not specified	Teacher training programs need to be created to provide teachers with required skills and expertise for working with students with autism. Number of possible ways to deliver training to school staff: distance videoconferencing, brief, focused week-long training programs, and short practice with direct feedback regarding application. Preprofessional programs and autism training within educational programs have been suggested to help with costs and time required for training in the workplace. Intervention should be focused on the individual

					client/student based on a comprehensive assessment.
Marco (2011)	To review literature on neurophysiology in individuals with autism with a focus on processing of simple sensory input in auditory, visual, and tactile modalities.	Article review	Not specified	Not specified	More than 96% of children with autism have hyper- and hyposensitivities in multiple sensory domains. Individuals with ASD demonstrate atypical visual behavior, seen as attempting to avoid or seen visual input. Considerable discrepancy in neurophysiological findings (enhanced detail perception, atypical early peaks with impairments in object boundary detection, decreased contrast detection ability, undifferentiated responses for mid- and high spatial frequency gratings, difficulties with effective integration of incoming stimuli that is magnified with more nuanced tasks). Children with autism may respond more robustly to neutral and detailed, high spatial frequency information and less robustly to rapid low-frequency processing.

Appendix B: OT Training Case Study

OT Training Case Study

A 10-year-old boy is a student has recently started receiving occupational therapy services at his school, 3 times a week for 30 minutes. Per his evaluation, the OT has been working on handwriting, 3-step sequencing, and dressing tasks. His OT has noticed recently that he is having difficulty writing on a line and often lays his head on the desk while reading or writing. He also is clumsy and often runs into furniture when moving about the therapy space. His teacher has reported that he squints when looking at the bored and rubs his eyes often during the day. The classroom staff have also told the OT that he has difficulty with many age appropriate tasks such as iSpy activities, matching games, and sorting. The OT has been collecting observations regarding the boy's vision and visual perception in order to determine the need for a screening and further intervention/assessment.

1. What observations are important for the OT to record regarding vision/visual perception?

2. Would you perform the screening tool? Why?

3. What would be the expected results? Use the assessment tool to determine which areas he would perform poorly on.

4. What potential interventions could you use with the student in future sessions?

Appendix C: Recruitment Materials

Duquesne University
Institutional Review Board
Protocol #:2017/06/3
Initial Approval: 07/14/2017
Expires: 07/13/2018

BRIDGEWAY ACADEMY

A Day Through My Eyes:

Staff Training Program

Do you know a student who:

- Squints when they read?
- Lays their head down to complete work?
- Cannot maintain attention to the board?
- Can spell verbally but not on paper?

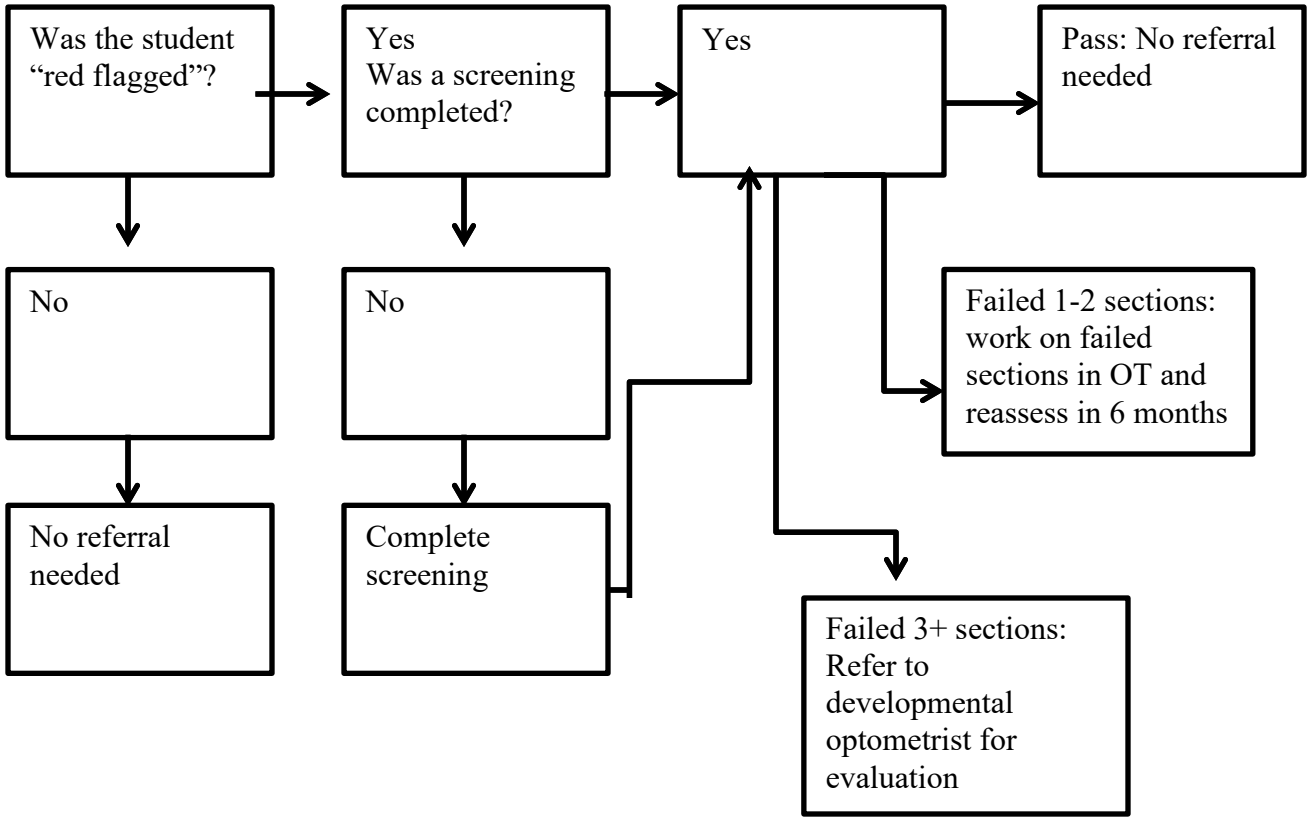
This training session will contain information regarding the different aspects of the visual perceptual system, how they impact student performance, how deficits can be identified, and what you can do!

Friday, August 25, 2017
3-4 pm in lower level

only at
Bridgeway Academy

Questions? Contact: Abbey Moonis, moonisa@duq.edu [614-205-5016]

Appendix D: Decision-Making Tree



Appendix E: Checklist of Visual Problems

Visual Problems Checklist- Please provide to OT

STUDENT'S NAME: _____DATE: _____

Completed By: _____

Check the column which best represents the occurrence of each symptom.

Observations/Complaints of:	NEVER	ONCE IN A LONG WHILE	SOMETIMES	A LOT	ALWAYS
1. Blurring when when looking at near					
2. Double Vision					
3. Headaches with near work					
4. Words run together reading					
5. Burn, itch, watery eyes					
6. Falls asleep reading					
7. Sees worse at the end of the day					
8. Skips/repeats lines reading					
9. Dizzy/nausea with near work					
10. Head tilt/close one eye when reading					
11. Difficulty copying from chalkboard					
12. Avoids near work/reading					
13. Omits small words when reading					
14. Writes up/down hill					
15. Misaligns digits/columns of numbers					
16. Reading comprehension down					
17. Poor/inconsistent in sports					
18. Holds reading too close					
19. Trouble keeping attention on reading					
20. Difficulty completing assignments on time					
21. Always says *I can't* before trying					
22. Avoids sports/games					
23. Poor hand/eye (poor handwriting)					
24. Does not judge distance accurately					
25. Clumsy, knocks things over					
26. Does not use his/her time well					
27. Does not make change well					
28. Loses belongings/things					
29. Car/motion sickness					

Appendix F: All Staff Training Session Outline

Staff Training Program Outline:

- **The Visual Perceptual System**
  - Anatomical System
  - How it functions
  - What we use it for

- **Visual Perceptual Skills**
  - Visual Discrimination
  - Visual memory/sequential memory
  - Form constancy
  - Figure ground
  - Visual closure
  - Spatial relations
  - Visual scanning/tracking
  - Visual motor integration
  - Convergence & Divergence

- **VP and Learning**
  - What we need visual perception for

- **VP and Autism**
  - How it is impacted by ASD
  - How deficits present in ASD

- **Potential Deficits and Symptoms**

- **"Red Flags"**
  - What to look for in classroom, therapy room, outside, at home, etc.
  - What might by VP and not behavioral or sensory

- **Developmental Optometrists and Vision Therapy**
  - What they do
  - What they bring to the child's team
  - How to refer/inform parents

- **How to Integrate into Treatment**
  - What you can do in classroom/therapy space

Appendix G: OT Staff Training Outline

Assessment Tool/Intervention Strategies Training Session Outline:

- **Why this program was created**
  - Needs assessment process and data
  - Why this tool is necessary

- **Explanation of assessment tool**
  - How to administer
  - How to score

- **Explanation of toolkit/resources**
  - Describe each section
  - Show examples from each section
  - Explain examples of use of toolkit

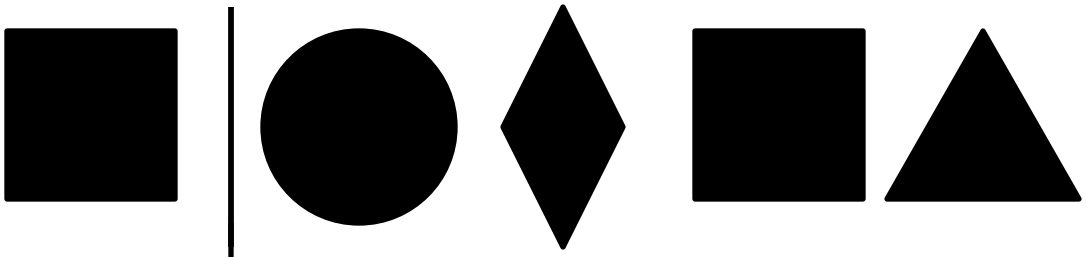
- **Questions?**

Appendix H: Screening Tool

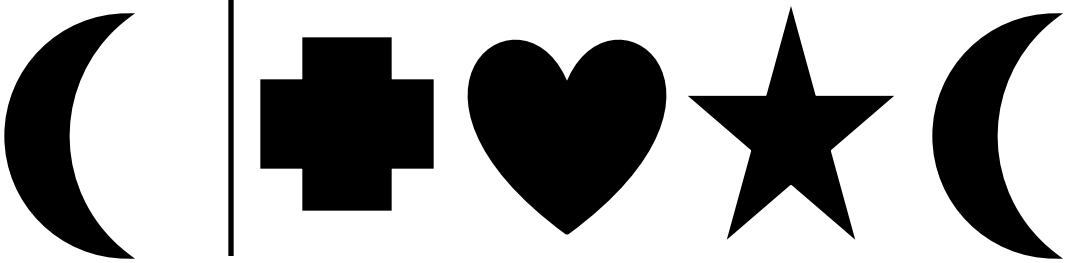
Visual Discrimination

1. Find and circle the shape that is the SAME as the first shape:

a)



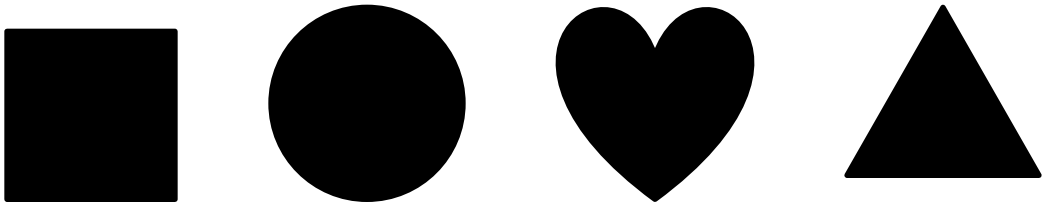
b)



2. Find the letter "A":

4 7 9 A 2 3

3. Find and CIRCLE/POINT TO the SQUARE:



Spatial Relations

4. Complete all that are appropriate for student:
    - Print first name on line:

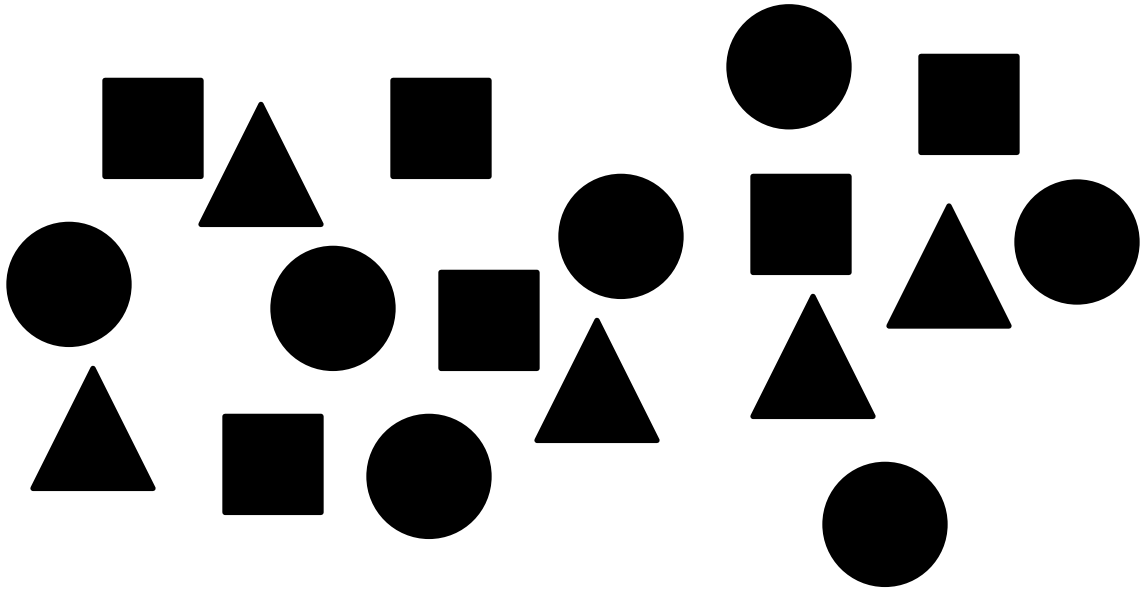
    - Draw a circle with the bottom touching the line:

    - Draw a straight line, stopping when the line touches the baseline:

5. Have student place 5 pieces of peg puzzle. Record number of pieces successfully placed independently (not taking fine motor deficits into account):
   Number placed: _____

Form Constancy

6. Circle/color/point to all of the circles:



7. Circle/color/point to all of the squares:

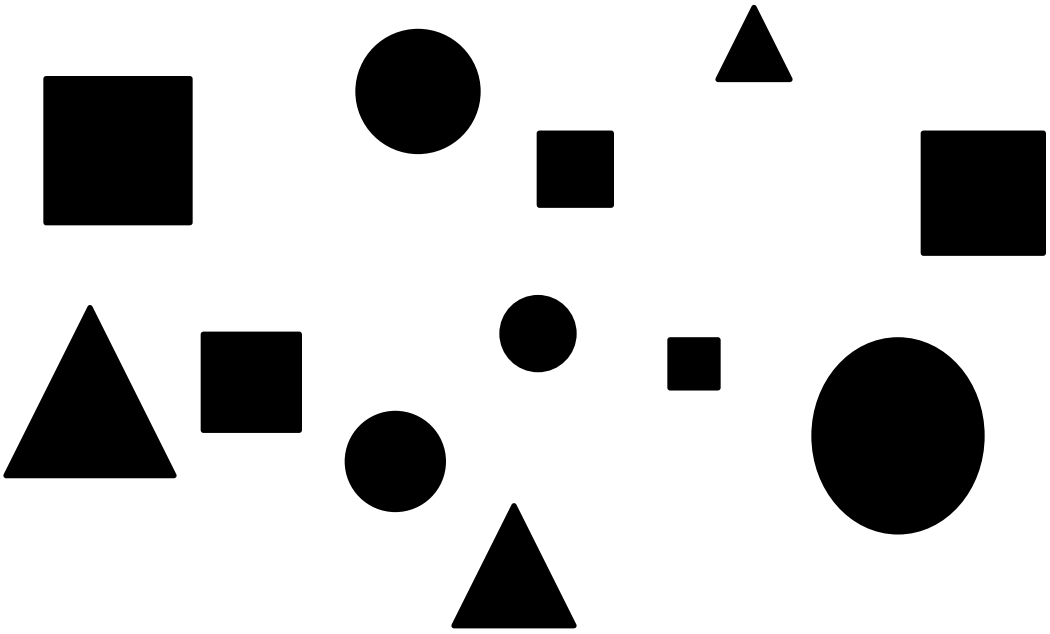


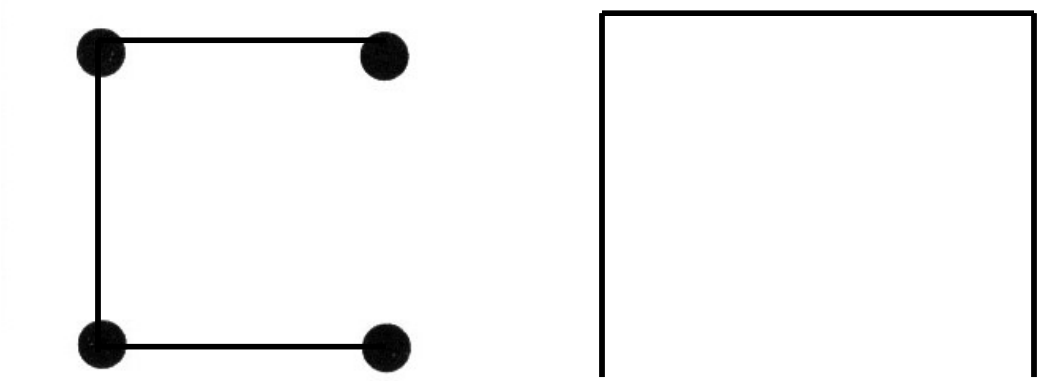
Figure Ground

8. Ask student to locate following items from picture:
    a) ball
    b) glasses
    c) airplane
    d) letter K
    e) fork

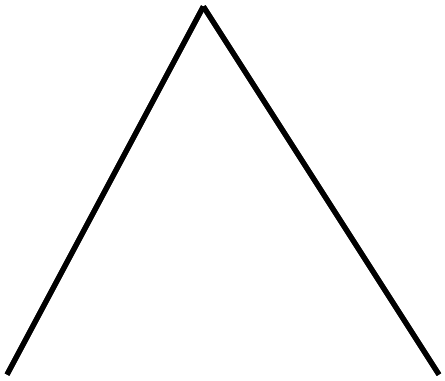
9. Find a letter F somewhere on this page.

Visual Closure

10. Complete the square(s):



11. What would this shape be if it were completed?



Visual Memory

12. Show student these 4 shapes, then cover and ask to recall: number correct _____

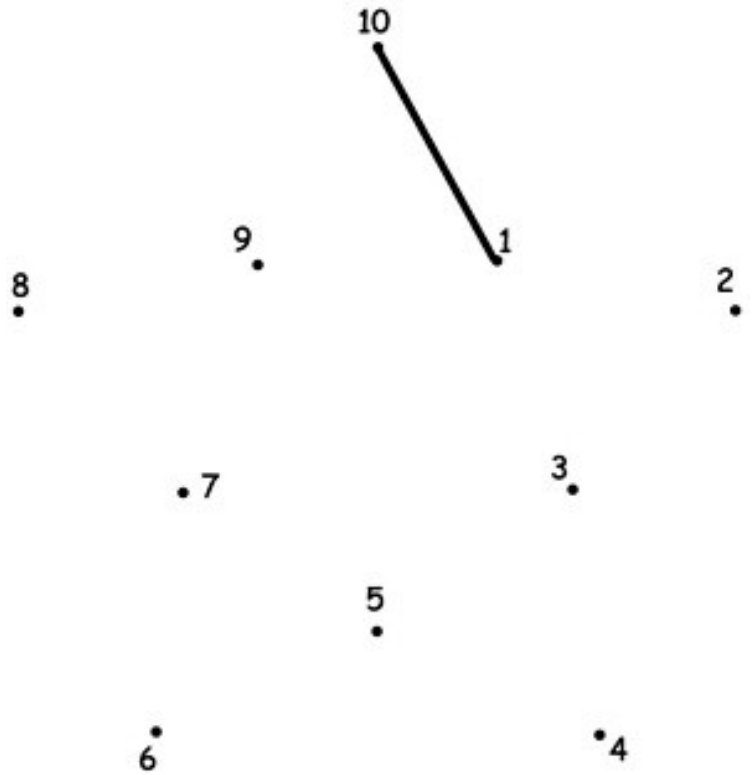
- If too difficult, name shapes to student then cover and ask to recall.

13. Create pattern using colored blocks and ask student to copy pattern.
    - With model remaining present
    - Removing model

Visual Scanning/Tracking

14. Sit in front of student, facing them. Hold pointer at eye level. Instruct them to hold head still and follow pointer with eyes only. Move pointer from left to right, then top to bottom, making a plus sign.
    a) Followed with both eyes and no head movement entire sequence _____
    b) Followed with one eye and no head movement entire sequence _____
    c) Followed entire sequence with head movement _____
    d) Followed part of sequence _____
    e) Could not follow _____
    f) Did not make eye contact with pointer _____

15. Have student complete dot-to-dot activity:



Convergence/Divergence

16. Sit in front of student, facing them. Hold pointer at eye level. Instruct them to hold head still and follow pointer with eyes only. Move pointer from about 1.5 feet away form face towards face.
    a) Eyes come together to follow pointer to about 2 inches from nose _____
    b) Eyes come together to follow to _____ inches from nose _____
    c) Eyes cannot come together to follow pointer _____

Appendix I: All Staff Training Presentation

A DAY THROUGH MY EYES: ALL STAFF TRAINING

Abbey Moonis, BS, OTD Candidate

August 25, 2017 | 3-4 pm
Bridgeway Academy, Secondary School

BRIDGEWAY ACADEMY

Introduction

- Abbey Moonis, BSOT, OTD Candidate
- Duquesne University, Pittsburgh, PA
  - Completed masters February 2017
  - Will complete OTD program December 2017
  - Will start here as OT in January 2018
- Pediatrics & Autism
- Where this project came from?
- Goals of DEC
  - 3 more weeks
  - Assessment tool, toolkit, training

Agenda

- Informed consent & knowledge pre-test
- Learning objectives
- What is visual perception
- Visual perceptual skills
- Visual perception & learning
- Visual perception & autism
- Potential deficits & symptoms
- Developmental optometry
- What can you do/resources
- Knowledge post-test

KNOWLEDGE PRE-TEST

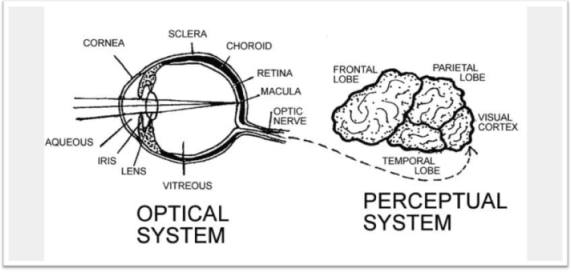
Learning Objectives

1. To develop an understanding of the visual perceptual system, how deficits may present, and how it affects students' learning.
2. To understand how to identify deficits and how to provide intervention to the student to make learning easier.

20/20 Vision Isn't Enough

- Based on measurement of distance reading
- Children with learning disabilities often have 20/20 vision but difficulties in other visual skills
- Testing for 20/20 vision does not measure:
  - Eye focusing
  - Eye coordination
  - Eye teaming
  - Eye movement
  - Visual perceptual skills
  - Color vision

The Visual Perceptual System



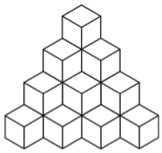
The ability to see and interpret visual information

The Visual Perceptual System

- Visual Perception= VP
- Allows us to understand, evaluate, and interpret what is seen
- Incorrect processing of visual information prevents integration with other senses and leads to distraction

"Visual perception is a process that establishes responses to visual stimuli, so that the individual may understand what is happening in the outer world and the connection between these and his own body"

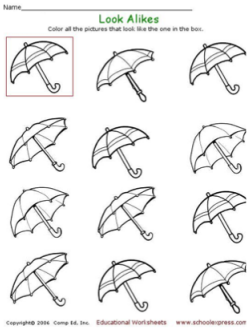
(Ayhan, Akl, Mutlo, & Aral, 2015)



VISUAL PERCEPTUAL SKILLS

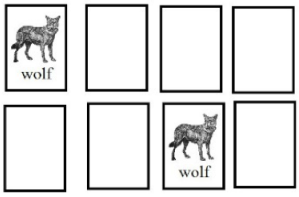
Visual Discrimination

- Ability to identify differences and similarities between colors, forms, shapes, patterns, and sizes
- Allows you to compare and distinguish one set of visual features from another



Visual Memory/Sequential Memory

- **Visual memory:** ability to remember items, numbers, objects, letters, figures, and/or words which have been previously seen
- **Visual Sequential Memory:** ability to put movements, sights, sounds, thoughts, objects, numbers, or letters in consecutive order according to time and space



Form Constancy

- Ability to identify or sort objects, shapes, symbols, letters, and/or words, despite differences in size or position

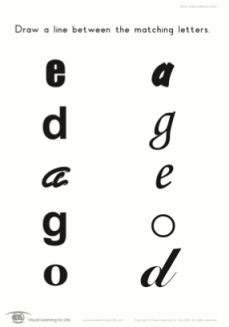


Figure Ground

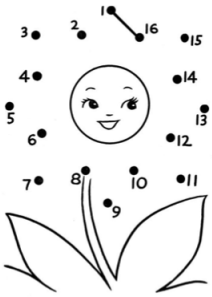
- Ability to perceive the foreground from the background in a visual presentation

Visual Closure

- Ability to identify forms or objects from incomplete presentations

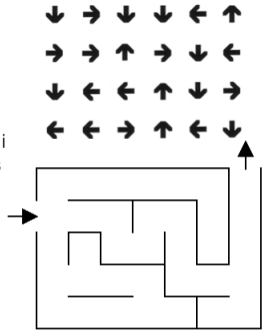
Spatial Relations

- Ability to perceive two or more object's position in space relative to oneself and in relation to each other
- Involves the ability to understand directions, reversals, and identify left and right on one's own body



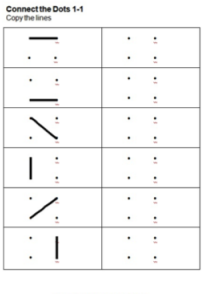
Visual Scanning/Tracking

- **Scanning:** the ability to use vision to search in a systematic manner
- **Tracking:** efficiently focusing on an object as i moves across a person's visual field



Visual Motor Integration

- Ability to interpret visual information and respond with a motor action



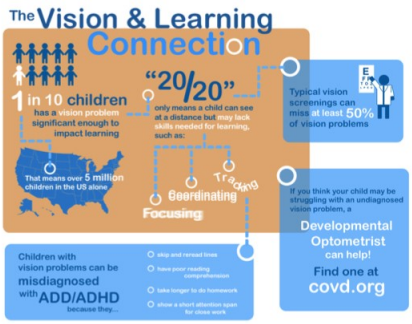
Convergence

- The simultaneous movement of both eyes inward toward each other, usually in an effort to maintain singular binocular vision when looking at an object

Divergence

- The simultaneous outward movement of both eyes away from each other, usually in an effort to maintain singular binocular vision while viewing an object

VP & Learning



VP & Learning

- Vision plays a key role in the interrelated process of learning
- Visual system is the primary sensory system
- Children often do not complain because they think what they are seeing is normal
  - May have 20/20 vision but have eye focusing or eye teaming disorder
- 25% of students have some trouble with near vision, which makes functioning in school difficult or impossible

VP & Autism

- Visual components of ASD:
  - Lack of eye contact
  - Staring at light or spinning objects
  - Fleeting peripheral glances
  - Side viewing
  - Difficulty maintaining visual attention
  - Difficulty coordinating central and side vision
  - Trouble focusing on object
- Visual sensitivity
- May lead to difficulty processing information

PSA: Vision and Autism

Potential Deficits & Symptoms

- Eye teaming problems
  - **Convergence insufficiency**: eyes tend to turn out
  - **Convergence excess:** eyes tend to turn in
- Eye focusing problems: unable to quickly and accurately relax or contract the focusing muscle
- Eye tracking problems: eye movements are slow, inaccurate, or require finger or head movements to keep the eyes on track
- Perceptual deficits

"Red Flags"

- **Desk Work**
  - Squints
  - Poor reading comprehension
  - Holds things very close
  - Moves head excessively when reading
  - Loses space/skips lines when reading
  - Difficulty recognizing shapes/letters
  - Poor speller
  - Sloppy handwriting and drawing
  - Cannot stay on/in lines
  - Can respond correctly orally but not in writing
  - Reverses letters and words
  - Gives up easily when reading or writing
- **Visual Attention Tasks**
  - Short attention span
  - Poor recall of visual information
- **Home Tasks/ADLs**
  - Does not wear matching outfits
  - Cannot find lunchbox/backpack
  - Cannot find items in drawer/on shelf
- **Social**
  - Cannot maintain eye contact
  - Fixates visually on one spot while communicating
- **General Physical Signs**
  - Rubs eyes frequently
  - Closes/covers one eye
  - Has headaches
  - Runs into objects
  - Lays head on desk while reading or writing

Developmental Optometrists & Vision Therapy

- Uniquely qualified to work with individuals with developmental disabilities, including autism
- A comprehensive vision exam by a developmental optometrist checks all aspects of eye health, vision, and visual skills
- Therapy is individually designed to treat present issues and treatment is adjusted periodically as individual progresses

Developmental Optometrists & Vision Therapy

- Goal is to retrain the learned aspects of vision, possible because of neuroplasticity
- Aims to develop or improve fundamental visual skills, improve visual comfort and ease, and change how the patient processes visual information

College of Optometrists in Vision Development
Prevention • Enhancement • Rehabilitation

What can YOU do?

1. If you notice a "red flag" with a student or client, tell the student's occupational therapist
2. Ask your OT for specific activities and strategies
3. Decrease visual stimuli when performing class work or asking student to engage in a visual activity
4. Break down visual activities into smaller tasks
5. Understand that a "behavior" or "sensory reaction" may actually be caused by a visual perceptual deficit

Resources

- **Tools to Grow**
- **Eye Can Learn**
- **COVD**
- **iPad Apps**
  - Dexteria VMI
  - Flow Free
  - Pot Smash
  - Kids Learning Puzzles: Farm Animals Tangrams
  - My Mosaic
  - Spot the Dot
  - Basic Matrix & Matrix Game
- **Board games**
  - Squint
  - Spot It
  - Tricky Fingers
  - Stack Up
  - Blokus
  - Pixy Cubes
  - Blink
  - Doodle Quest
  - Connect 4
  - Acuity
  - Rush Hour

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KNOWLEDGE POST-TEST

Appendix J: Knowledge Test

Visual Perception Training Knowledge Test

Participant Number: _____ **Date: _____**

Instructions: Please indicate your answer below by filling in the blank or circling your response(s) for the multiple-choice questions, .

Demographic Questions:

1. What is your job title at Bridgeway Academy? _____

2. How long have you been employed at Bridgeway Academy? _____

Questions:

1. If a child has 20/20 vision, it indicates that a child has functional visual acuity, eye teaming and focusing.
   True or False: _____

2. Signs of eye teaming or focusing problems include (circle all that apply)
   a) Fatigue
   b) Words moving
   c) Loss of place when reading
   d) Headaches
   e) None of the above

3. Students may not complain about visual issues because the student may feel this is "normal".
   True or False: _____

4. Treatment of eye teaming disorders can lead to improvement in all of the following academic performance areas except:
   a) Reading comprehension
   b) Attention
   c) Listening comprehension
   d) Fluency and speed of reading

5. Visual perception is defined as the ability to see and _____ the visual information in our environment.
   a) Interpret
   b) Hear
   c) Touch
   d) Learn

6. _____ is the ability to detect distinctive features of a visual stimulus to determine whether it is the same/different from others.
    a) Visual attention
    b) Spatial relations
    c) Visual discrimination
    d) Visual acuity

7. _____ is the ability to perceive a form visually, and to find this form in a hidden background.
    a) Form constancy
    b) Visual acuity
    c) Depth perception
    d) Visual figure ground

8. Which visual perceptual skill helps us judge distances between objects?
    a) Spatial relations
    b) Form constancy
    c) Visual discrimination
    d) Convergence

9. Which deficit occurs when you're your eyes have difficulty staying together when focusing on a nearby object?
    a) Diplopia
    b) Myopia
    c) Visual motor deficit
    d) Convergence instability

10. An example of an activity using figure ground is iSpy worksheets.
    True or False: _____

11. Demonstrating letter reversals is an example of a spatial relations deficit.
    True or False: _____

12. Vision therapy directly treats learning disabilities and dyslexia.
    True or False: _____

Appendix K: Staff Survey

Visual Perception Staff Training Feedback

Please provide answers to the following questions regarding the training session you attended on August 25th:

1. The staff training met my expectations.
    - O Strongly Agree
    - O Agree
    - O Neutral
    - O Disagree
    - O Strongly Disagree

2. The time spent in training was adequate.
    - O Strongly Agree
    - O Agree
    - O Neutral
    - O Disagree
    - O Strongly Disagree

3. The topics covered were applicable to me as a professional.
    - O Strongly Agree
    - O Agree
    - O Neutral
    - O Disagree
    - O Strongly Disagree

4. I feel I gained knowledge in the topics of visual perception and working with students with Autism.
    - O Strongly Agree
    - O Agree
    - O Neutral
    - O Disagree
    - O Strongly Disagree

5. I feel I gained skills in identifying students with visual perceptual needs.
    - O Strongly Agree
    - O Agree
    - O Neutral
    - O Disagree
    - O Strongly Disagree

6. I enjoyed the training session.
    - O Strongly Agree
    - O Agree

O Neutral
O Disagree
O Strongly Disagree

7. I feel all new staff members should be required to attend this training.
O Strongly Agree
O Agree
O Neutral
O Disagree
O Strongly Disagree

8. What should be added to the training to make it more comprehensive or applicable?

_____

9. Was there anything that should be taken out of the training?

_____

10. Any other comments?

_____