

Putting the Pieces Together

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Abstract

Students who are non-verbal can struggle with communication and expression. The purpose of this study is to explore strategies that may support pre-kindergarten students who are non-verbal in constructing and communicating reading comprehension. It was done in their classroom as part of the curriculum. Data were collected by observation and

collection of student work samples. I interviewed teachers and specialists using semi-structured questions to collect and examine their ideas and opinions on comprehension strategies. I used constant-comparison analysis methods to determine what strategies work best for the students.

Introduction

Reading is a complex skill that is being taught at earlier ages than ever. Nowadays, children are expected to start kindergarten already knowing several high frequency words. Imagine that you are a child with autism and you are nonverbal. Do you think that you will enter kindergarten at the same level as your peers? Probably not. Even if you could recognize the words, it is a struggle for you and your teacher to really detect your reading ability. There are data that show that reading ability within this demographic is lacking (Nation, Clark, Wright, Williams, 2006). This data resulted in two perspectives. The first perspective is that poor language skills put children at a higher risk of literacy failure. The second is that since students on the autism spectrum already had language impairments, it is expected that they are going to have a more difficult time learning to read (Nation et al., 2006).

Now imagine that you are a student with autism in 8th grade and you are learning about World War I in history. You have limited verbal skills and you cannot tell your history teacher that you comprehend the timeline leading up to the war. That would be frustrating for you and your teacher. Now you are in your resource class and your resource teacher knows that you enjoy drawing and asks you to draw the timeline leading up to WWI. You draw a detailed timeline from the beginning events leading up to the war to events that occurred post-war. Now your history teacher knows that you

comprehend what she is teaching and you feel good because someone knew you and allowed you to show your strengths in a manner in which you could.

Purpose of Study

There are more and more children being diagnosed with autism recently. Since this is occurring more and more children are having difficulties in reading and their literacy development. From my experience, children on the autism spectrum are extremely intelligent, and we as teachers need to be able to come up with strategies and skills that will increase these students' literacy development. We need to be aware of the strengths that students with autism have, and every student is different. We also need to be in the know of literacy skills and strategies that are available to help the literacy development of children on the autism spectrum.

However, before we come to the solution, we need to know and understand the causes behind the language impairments of children with autism. We need to understand the inner workings of the child and the process of learning to read. The ultimate goal of reading is comprehension and to obtain this goal children must go through a rigorous process in learning. Oral language skills play a huge role in the reading process. Davidson and Weismer (2013) claim that an individual's oral language can be a predictor of one's reading abilities. This is why teachers need to come up with ways to help children with autism spectrum disorder (ASD) with their literacy development.

Problem Statement

This is important because many children with ASD are brilliant and more often than not, understand what we are telling them or asking them. We may have to modify how we ask them, but they are able to comprehend it; they are able to make meaning of

what you are asking or telling them. I am teaching two classes of students who are in pre-kindergarten and most of them are on the autism spectrum. We utilize the High Scope curriculum at our center, which is basically a student centered curriculum based on play and socialization (highscope.org). Many of our students are nonverbal, therefore lacking their oral language skills. My colleagues and I are constantly observing our students and looking for ways for them to show us what we are asking of them and develop their social skills. We use sign language, picture boards, and modeling as some of our techniques. However, as the school year continues, we will start to assess their ability to comprehend what is being read to them during read alouds. We are continually trying to come up ways in which we will be able to do this.

This is a continuous struggle for us. We care about our students and want them to succeed; that is why this study of uncovering skills and strategies to use with children with ASD is important. However, as stated above, we need to be able to understand the reading process and the processes that students with ASD use when learning to read. As of a few years ago, very little was known about the reading processes of students with learning disabilities, however, students with ASD can acquire decoding skills that are needed to obtain the goal of the reading process (Davidson & Weismer, 2013). According to the National Reading Panel Report (2000), students also need to demonstrate phonemic awareness, an understanding of phonics, fluency, and vocabulary, which leads to reading comprehension.

As I researched strategies and skills that have been used to teach students with ASD, I tested out those theories in my classroom to record which ones I could use in my classroom with my preschool students with ASD. I observed my students and I also

interviewed and surveyed the speech, autism, and occupational therapists in my building to gather their insight. I wanted to be able to answer my research questions, How do teachers of students with ASD know if they comprehend a story? How can students who are nonverbal demonstrate that they comprehend?

As I accumulated my data I developed a strategy and skill toolkit that will be available for teachers and other education professionals to have access to and to use.

Literature Review

In this section I will discuss the inception of the autism diagnosis, widespread diagnosis of autism, and the characteristics of autism spectrum disorder (ASD). Today, many specialists are still trying to determine the cause of autism. That being said, there are 1 in 45 children between the ages 3-17 who fall somewhere on the autism spectrum (autismspeaks.org) and teachers need to be able to help their students succeed, even if the specifics are still unknown. My literature review will also address the inception of autism, autism as an epidemic, characteristics of autism, and strategies that are linked to teaching students with autism spectrum disorder.

The First Diagnosis of Autism

Leo Kanner first diagnosed autism in 1943 (Oller & Oller, 2010). In its early inception, autism was classified as a problem behavior. More recently it is classified as a pervasive developmental disorder (PDD). According to Oller & Oller (2010), autism is now the most common PDD in recent time. Both of these authors of *Autism: The Diagnosis, Treatment, and Etiology of the Undeniable Epidemic* claim that that autism may not be related to genetics. With this being said, the authors claim that autism is defined by its characteristics. These characteristics include withdrawal from social

interactions and lack of language skills. More physical characteristics of autism include hand flapping, spinning, toe walking, head banging, and rocking just to name a few.

Some of these physical characteristics can become self-injurious.

Autism as an Epidemic

In their book, Oller & Oller discuss the “autism epidemic” (2010, p. 29). They use this terminology to signify the rapid increase of children being diagnosed with autism. They report that in the year 1993, less than 200 children between the ages of 6-22 in the United States and outlying areas were diagnosed with autism. This is compared to the year 2006 where the cumulative percentage growth increased 700 percent, which means 1400 children diagnosed with autism. Why the drastic increase? Oller and Oller claim that the dramatic increase is caused because 50 percent of the cases were being diagnosed with intellectual disabilities and many of the children in these early cases in fact had communication difficulties. With this trend spreading and the common theme of lack of communication skills, these cases were grouped into being diagnosed with autism.

This epidemic is the reason why I am conducting the study. Since there is such an increase of students coming into classrooms with autism, teachers need to understand the characteristics of these students, along with their capabilities and their struggles. With this information, teachers will then be able to give their students with autism, especially those who are nonverbal, strategies and skills that they can use to show that they comprehend what is being read to them. This in turn will help these students learn skills that they can use throughout their educational career.

Characteristics of Autism

A lack of social interactions and communication skills are the major characteristics of students with autism. That being said, there have been several studies that focus on the comprehension skills of students with autism. McCleery, Ceponiene, Burner, Townsend, Kinnear, and Schreiberman (2010) have done one of those studies. In the background of their study they state that behavior and neuroimaging studies have found that students with autism spectrum disorder (ASD) exhibit abnormalities in semantic processing. They go on to say that it is not known if these semantic deficiencies are more verbal issues or semantic processing issues. In their study, they looked at students with an average age of 5.8 and with high-functioning autism. They studied these students using event-related potentials (ERPs). ERPs are voltages or wave from the brain that are stimulated by a specific event or stimuli (Sur & Sinha, 2009). The results of the students with autism were then compared to their typically developing peers. The researchers decided to look at this age group because lexical/semantic impairments are associated with children with autism at an early age; they wanted to find out the nature and extent of this particular deficit. They took a look at the neural-processing of single-item semantics: the meaning of words or phrases. These neural processes “go through several “stages” which include, encoding of physical stimulus attributes, mapping them onto within-modality semantic representation, and the pre-activation of associated semantic representations in other modalities or even other cognitive domains” (McCleery et. al, p. 278, 2010). This testing helped the researchers to examine brain activity, which included event-related potentials (ERPs).

Once they understood the brain activity, the researchers began their study. The study included 14 participants with ASD. The average age was 5.8 years. Their nonverbal

IQ was 108.1, verbal IQ was 99.8, Receptive Language was 97.7, and their expressive language was 108.1. There were also 14 typically developing participants that were compared to those with ASD. The average age of the typically developing student was 6 years old. Their nonverbal IQ was 113 and their verbal IQ was 120.2. The typically developing students receptive language was 113.6 and their expressive language was 117.1 (McCleery, et. al, 2010).

All of the participants in this study were given standardized assessments. The assessment that was given was the Differential Ability Scale. This test assessed intellectual functioning, Expressive One Word, and Receptive One Word. The results of these assessments showed that the students with ASD scored lower than those who are typically developing (McCleery, et. al, 2010).

There were several other tests and assessments given to all of the participants in this study. The results of all of the assessments combined concluded that students with high-functioning autism do indeed show impairments when it comes to the automatic activation of semantic representations for single word meaning at the neural level. Furthermore, these results show that these impairments may indeed be confined to the verbal domain. This leads to a lack in comprehension skills and suggest that these impairments are related to social/linguistic functioning (McCleery, et. al, 2010).

The study that I am conducting with my pre-kindergarten students deals with the comprehension aspect of reading. Many of my students have nonverbal autism or lack communication skills and I want to explore strategies that I can use to better help my students' comprehension skills. The study by McCleery, Ceponione, Burner, Townsend, Kinnear, and Schreiber mann (2010) definitely gave me concrete evidence related to my

study in that students with autism do indeed have deficits when it comes to comprehension.

Another study that solidifies evidence for my study was conducted by Bopp, Miranda, and Zumbo (2009), however, this study focused on behavior problems and how they are connected to verbal impairments. This study had 69 child participants and took place in British Columbia, Canada. Out of the 69 participants, 55 of them were diagnosed with autism and 14 were diagnosed with pervasive developmental disorder-not otherwise specified (PDD-NOS). The researchers point out that the children were diagnosed by clinicians that were not involved in this particular study. This study was conducted over a two-year period. The children were tested at six months, 12 months, 24 months, and then later. However, the children received year round early intervention. Fifteen to twenty hours a week of intervention was given for the 2-year period. These interventions took place at three different intervention sites within the province. Many of the participants also attended preschool as well. The assessment team gave the children multiple assessments within different subcategories. They first measured child development by measuring their vocabulary skills and language skills. The next set of measureable data was that of child problem behavior. They first identified the relevant predictor variables then the relevant item indicators. The third step in measuring the problem behaviors was to choose the item indicator. They then converted the items into dichotomous response, eliminate item overrepresentation, calculate the coefficient alphas, and calculate composite scores (Bopp, et. al, 2009).

From this process, they were able to analyze their data. With their results, they were able to make predictions about the children's vocabulary and language development.

For example the results showed that two of the five-behavior variable measured at 6 months predicted significant changes in language or vocabulary development (Bopp, et. al, 2009).

The purpose of this study was to explore the relationship between problem behaviors and language development. Language production was the component that could be predicted prior to the onset of early intervention. Even though this study concluded that with early intervention there is little correlation between problem behaviors and language development, not all students with autism are able to receive such an extensive intervention program. These students may act out due to the fact that they cannot communicate. I have a student in my class that has a few verbal skills, yet he has a very difficult time communicating. If my co-teachers or myself cannot understand what he is trying to say, he tends to get extremely frustrated and will run out of the classroom (Bopp, et. al 2009). Therefore, I think that behavior and language development are related.

Considerations Prior to Study

Before conducting my study, I came up with a few theories that could be the result of my research questions. I was thinking about ways that I could be able to tell if my students were engaged in the read aloud or not. I used my experiences in the classroom, knowing my kids, and the review of literature to come up with them. I thought about their behaviors during read alouds: stories that are read aloud to the student, that I have done prior to this study. I know motivation is key for my students to be engaged. The book needs to have some kind of catchy phrase or wording.

Cartwright, Marshall, and Wray (2015) agree that motivation is an essential component of engagement and comprehension. Although these authors discuss motivation in regard to typical, verbal students, the ideas behind their thinking go along with my students too. They claim that intrinsic motivation is driven by the individual's want and need for success during tasks. I completely agree that students who feel that they are successful in certain tasks will be more motivated to participate in them. This is extremely important for students with ASD or those who cannot communicate as well. Teachers need to figure out how their students exhibit their pride of success and feed into it.

Another type of motivation I thought about was the idea that students are more motivated to become engaged if they are interested in a certain topic. A study by Clark and Kamhi (2014) proves just that. They conducted a study with fourth and fifth graders, however it is applicable to pre-kindergarten students as well. They used the Qualitative Reading Inventory-4 (QRI-4) produced by Leslie & Caldwell (2006). The QRI-4 is considered an informal assessment. The students were asked a series of questions based on prior knowledge and interest on a topic. They predicted that interest should have a positive impact on reading comprehension. They concluded that interest had little impact on reading comprehension, but it did however, have an impact on engagement and willingness to read.

While doing research for my study I came across a book online that talks about listening comprehension and I had an ah-ha moment. This is basically what I am asking my students to do. Although I am reading them stories and asking them to tell me what it was about, I am also focusing on their listening comprehension and how well they listen

to what I am saying. For example, Ur (2013) claims that when we are listening to someone talk or tell a story, we are, in a sense, obligated to give some sort of response. We can verbally answer questions or nonverbally shake or nod our head or make facial expressions in response to what the person is telling us. I came to the realization that this is one way that I can tell if my students comprehend the story: by giving nonverbal gestures.

I also started to think of ideas and strategies that I could use in my study to aid in my students' reading comprehension success. Many of my students use assistive technology (AT) in some capacity. According to IDEA, the Individual with Disabilities Educational Act, assistive technology means any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of a child with a disability (idea.ed.gov). I want to incorporate the use of assistive technology to its full capacity. Most of my students use PECS to communicate their wants and needs. PECS are used as a Picture Exchange Communication System (pecsusa.com). PECS were originally developed by Andrew Bondy and Lori Frost. The purpose of PECS begins by teaching an individual to give a picture of a desired item to a "communicative partner", who immediately honors the exchange as a request. The system goes on to teach discrimination of pictures and how to put them together in sentences. In the more advanced phases, individuals are taught to answer questions and to comment. Specific PECS will be created based on the books that will be read aloud during my study.

Multiple themes became apparent when reviewing the literature. The first theme is that the diagnosis of autism is on the rise and that there are several theories as to why.

The second theme is that students with ASD have the ability to acquire the skills necessary to comprehend readings, however the way these skills are taught to students with ASD needs to be differentiated based on their strengths and areas of need.

Methodology

The purpose of my study is to explore strategies that teachers use or can use when teaching reading comprehension skills, especially when it comes to teaching these skills to students with autism spectrum disorder (ASD) and who are nonverbal. Within this study, I intended on answering two research questions. The first question is how do teachers of students with ASD know if the students comprehend a story? The second question is how can students who are nonverbal demonstrate that they comprehend a story? At the end of the study, I created a toolkit of strategies that will be helpful to students with ASD and the teachers that teach students with ASD.

My study took place at a non-profit center that specializes in working with families that have children with ASD. The goal of this center is to eventually get the students with ASD to become integrated into classrooms with their typically developing peers. The students in this center range from infants to five years of age. I focused on students between the ages 3-5 years old. This center has self-contained classes as well as integrated classes, typically one of each for each age level. There are several services that are provided at the center: speech, occupational and physical therapy, ABA clinics, autism clinics that are 1:1, music therapy, social work, and home visits.

This center is located in a suburb in upstate New York. The population of the suburb consists of working class families. The median household income in this suburb is \$52,509 (city-data.com). According to this website, the median price for a house is

\$119,532. Even though this center is located in a particular suburb, the students come from all over the county in which the center is located, as well as an adjoining county. Students that are old enough are bussed in from their home districts. When at the center, students receive a morning snack, lunch, and an afternoon snack. The students at this center come from multiple ethnicities; Caucasian (60%), Iranian (5%), Hispanic/Latino (10%), Pacific Islanders/Asians (5%), and African American (20%).

There were 17 students who were potential participants for this study. These 17 students were chosen as possible participants because they are students in my self-contained 8:1:3 classes. However, I only had 9 student participants. Their parents signed the Informed Consent form that was sent home. All of my students have an Individualized Education Plan (IEP), however they were not chosen based on the fact that they have an IEP. As stated above, the age group of my students is 3-5 years old. The study with my student participants took place in the classroom. I chose this instead of pulling them out of the classroom because this is a familiar setting for my students and sometimes transitioning from room to room is a struggle for some of my students. I wanted to limit the risk of frustration for my students.

There were 10 adults who were potential participants for this study. However, I only had 2 responses. These adults were chosen because of their occupation at the center. I focused on other teachers and specialists in the building. Adult participants were asked to give informed consent. Since I work at the center, I sent out a center wide email with the information of the study and I asked them if they would like to participate. The participation of the adults included a semi-structured interview. The interviews were to

take place outside of the classroom. Due to time constraints, the interview questions were emailed to the adult participants and they responded via email.

Researcher Positionality

I am the sole researcher of this study. I am also a participant observer in the study. I observed my participants through a non-biased lens. I am Caucasian, married, part of the working class, and a liberal. I am also a graduate student studying Literacy Education (B-12) at The College at Brockport, State University of New York (SUNY). My graduation date is the summer 2016. I obtained my Bachelors of Arts degree from State University of New York (SUNY) at Brockport. I have worked at this center for about a year. Prior to this, I was a substitute teacher at four local school districts for a year and a half. I also taught preschool for six years prior to earning my Bachelors of Arts degree.

Since I have become a special education teacher I have been interested in autism spectrum disorder (ASD). The characteristics of ASD are fascinating and there are several developmental levels in my classroom. I wanted to use my students' strengths and their areas of need to come up with strategies and skills that they can use to develop their reading comprehension. I believe that no matter what developmental level students are at, they can acquire the skills to become successful.

Data Collection

As a non-biased observer, I took field notes by using a double entry journal. This technique of note taking allowed me to be able to go back and analyze my notes and write my thinking side by side my observations. I also used anecdotal note taking in order for me to write down exactly what happened while I was reading a story or the students were listening to a story on the iPad. I wrote the notes immediately after observing the

students participating in my study so that my note taking would not distract my students' participation.

I collected the data from my student and adult participants for a total of six weeks. I met with my student participants 2-3 times a week for observation and strategy building. During the six-week period I sent my interview questions to my adult participants via email.

I collected observation field notes on my student participants' engagement level during read alouds. Figure 1 shows an example of my field notes using a double entry journal.

Observations	Thoughts/Reflections
2/22/16: Pete the Cat and His White Shoes to the group- only 2 out of 6 were engaged	2/22/16: Maybe I wasn't putting enough changes in my voice. other students were playing. my group watching their peers
2/24/16: Reread Pete the Cat to student #1. Seemed somewhat engaged-easily distracted. Asked to tell me what colors Pete's shoes turned 1st- pointed to red PEC	2/24/16: More engaged because 1:1? was able to use PECS and point to color
2/26/16: Read Pete the Cat to small group; #2, #4, #5- on iPad. All 3 engaged- moving with the music	2/26/16: students more engaged because they can watch the story. Has a catchy song and music plays in the background

Figure 1. Example of double entry journal notes

The read alouds were conducted in both small and large group settings. I read some of the stories aloud and others were read aloud by using an iPad or CD player. I wanted to compare their engagement level within different modes of reading and see if that had any impact on the students' listening comprehension. I looked at their body language and gestures to gauge their engagement level. I used anecdotal notes to record my observations.

Date	Time	Notes
3/2/16	2:46 PM	Self-Read <i>Bear Sees Colors</i> . (Small group= 5 students) Students sitting on rug. Student 1 engaged and names the colors. Student 3, 4, 7 are distracted by other students in the classroom. Student 4 lying down, 3 keeps turning her head, 7 keeps yawning. Student 2 is showing no emotion.
3/4/16	2:30 PM	Listening to iPad- <i>Bear Sees Colors</i> . Same small group= students 1, 2, 3, 4, 7. Students 1, 2, 3 are sitting straight up. Student 4 is pointing to the book in excitement. Student 7 is claps when Bear sees red and he says 'red'

Figure 2. Example of anecdotal notes on engagement

I also collected observation field notes on their ability to demonstrate listening comprehension. During read alouds, I would stop and ask questions about the story. I asked the student participants to point to pictures in the book to gauge whether or not they were following along. Once the story was read, I asked them a series of close-ended

questions about the story. The student participants answered the questions by using a modified Picture Exchange Communication System (PECS). Most of the PECS used for the study were made from pictures in the story. I also copied pictures from the each story and had the student participants partake in sequencing tasks.



Figure 3. Example of PECS that were used for students to answer questions about *Bear Sees Colors*

The two adult participants answered five semi-structured questions based on their process during read alouds, their strategies for engagement and measuring student comprehension, and what strategies they use in their classroom or clinic to make sure that their students are successful. Each participant wrote detailed, extended responses to each question.

Adult Participant Interview Questions
1. What is your process while reading a story to a student who has autism and is nonverbal? What is the reason why you chose this process?
2. How are you able to tell if the student is following along or not?
3. After the story is over, how do students retell the story? Please explain.
4. Are there any strategies that you use to enhance your students' comprehension? Please explain.
5. Are there any strategies that can be used to enhance student engagement while reading? Please explain.

Figure 4. Actual interview questions asked of the adult participants

Triangulation

I triangulated my collection of data. I observed my student participants during different times of the day, in different sized groups, and with different modes of reading. The adult participants were from different backgrounds. Erin, the speech therapist is roughly twenty years older than the special education teacher, Jenn. The triangulation of my data demonstrates that my study is valid and reliable.

Since I had multiple methods of data collection, multiple participants, and collected data over time, my study is trustworthy.

Instructional Procedures

On a typical day in my classroom, I typically conduct read alouds in the same manner as I did throughout my study. The read alouds are done in a small or large group setting. I introduce the book and the author and illustrator. Based on the cover, I explain what the story will be about. Then I read the book and ask close-ended questions a couple of times to make sure they are following along. Again, the students use PECS to answer the questions and they participate in a teacher directed task based on the story. These tasks include, but are not limited to sequencing, matching, or a project that deals with the book.

Study Procedures

To answer my first research question, how do teachers of students with ASD know if the students comprehend a story? I used my data from the interviews of the teachers and specialists. Since this time of the school year teachers are swamped with IEPs, CPSE meetings, annual reviews, and quarterlies, I allowed my adult participants to write the answers down instead of being interviewed.

I was the person that read the stories aloud to my student participants and I designed strategies that allow my students to demonstrate their listening comprehension skills. This allowed me to answer my second research question, how can students who are nonverbal demonstrate that they comprehend a story? I observed my students while they showed me their skills and they worked on their strategies after the story was read aloud to them.

Data Analysis

My initial data resulted in three insights that I took with me throughout the process. These insights were ultimately condensed into one finding that was a result of my data regarding my student participants. I used a coding process for analyzing my data. I took my field notes and observations and color-coded the times when I read the story to the participants and times when they listened to the story via a CD or iPad. I used the constant comparative analysis method as presented in *Understanding Research* (Clark & Creswell, 2015). With my field notes separated, I then looked at student work samples or their answers to comprehension questions to gauge what read aloud method led to greater comprehension among my student participants. I looked at my anecdotal notes to see the engagement level and body language of each of my student participants during each read

aloud. With these notes I was able to identify different strategies that my participants used to demonstrate their meaning making skills.

I conducted the same color-coding process when it came to the data collected from my adult participants. I took the two sets of interview questions and I looked at each question one by one. When I looked at the answers of each question, I coded similar keywords pink and coded different keywords blue. With these results I was able to get different perspectives from a speech therapist and a special education teacher.

Finding 1: Higher Engagement Levels Result in Higher Comprehension

The first finding was that my students are more engaged when listening to stories on the iPad or book on CD than they are when I was reading the story. I think the reason for this is because books being read with technology usually have music in the background. My students are extremely attentive and they participate during music, so it really is no surprise that they attended more to a book on the iPad or CD. When I used the iPad or a CD, the more the student participants demonstrated comprehension.

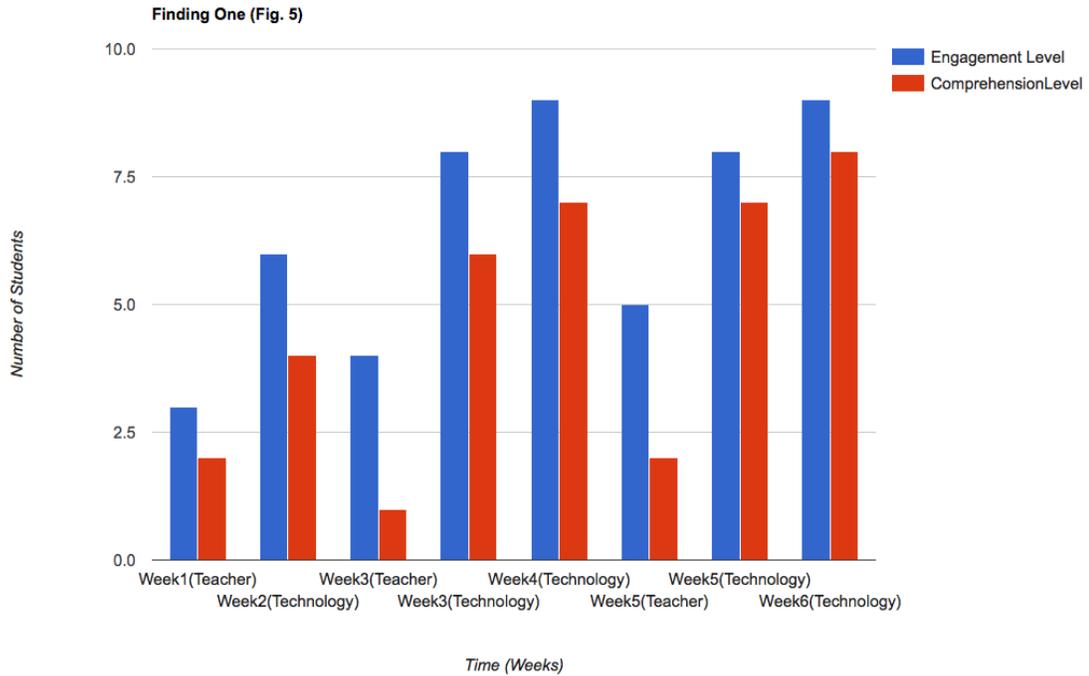


Figure 5. Depicts the relationship between engagement and comprehension.

The above graph depicts the notion of the higher the engagement level, the higher the comprehension level. The highest number of students that could have shown engagement and comprehension was nine. For example, during week one of the study, three students showed that they were engaged in the read aloud. Out of those three students, two of them demonstrated comprehension of the story. That is how the rest of the graph is constructed.

Each week I observed my students while I read to them or they listened to a story being read on an iPad or a CD. The student participants in my study were more engaged in books that have catchy phrases or ones that are being sung as they are being read to

them. For example, some of their favorites are *Sing and Dance in Your Polka Dot Pants* (Litwin, 2015), *Pete the Cat and His Four Groovy Buttons* (Litwin, 2012), *Shape Song Swing-along* (Songs, 2011), or any other Barefoot Book published books. All of these books have a repetitive catch phrase or song within them. The tone of the music is upbeat and fun. So again, it was no surprise that they students favor these books.

Since the student participants are nonverbal or have limited verbal skills, one may ask how I know what they prefer or what they are engaged in. The answer is simple. I was able to tell by their gestures or their body language. For example, they would sway or move their heads to the music in the story if they liked it. On March 24, 2016, I had a moment when I could tell that a participant was truly engaged in a book that was being read. We were reading *Port Side Pirates* (Seaworthy, 2011) and the pirate ship in the story started to sink. The student made sounds of distress and even started to cry while he pointed to the book. When the ship resurfaced, the student's expressions changed. He started to smile and the tears were wiped off.

I could also tell if they were not engaged if they were looking around the classroom or focusing on what their peers were doing and not looking at the book. Sometimes they would lie down on the rug if they were not engaged. Another example of lack of engagement during the study was when the students were listening to *Shape Song Swingalong* (Songs, 2011) on the iPad; one of the students walked over to the iPad, looked at it and proceeded to run around the classroom. This action distracted his peers and one student even said, "Oh, no! Student 6* is running!"

Recognizing the participants' listening comprehension was not as easy as noticing their engagement level. Since they are nonverbal, I used a Picture Exchange

Communication System (PECS) so they could answer my questions. There are generic PECS that we use in the classroom so they can communicate their wants and needs; however, I had to create specific PECS based on the stories that I chose to use with them. I made copies from the books so that they could look back and answer my questions.

During week one, I read to my participants three times that week. On average, three out of nine participants demonstrated engagement in the story. Out of the three that were engaged, only two of them showed comprehension of the story. Their comprehension was based on sequencing pictures from the story. For example, on the second day this week I read aloud *Bear Sees Colors* (Wilson, 2014). I read this book in a large group setting with all nine student participants. Three of the nine students were engaged. Student 1, who is diagnosed with autism and had limited verbal skills, was saying each color that Bear saw during the story. Students 4 and 5, both are very limited in speech were pointing and attempting to say the colors. Students 2, 3, 6, 7, and 8 were distracted by student 9 who was not even participating in the group. He was screaming and climbing on the furniture. On this day the students were asked to sequence using pictures from the book. The task was to put the colors in order of what Bear saw. The pictures below are an example of what the students pointed to or manipulated to answer the questions, “What color did Bear see first?” “What color did Bear see next?” “What color did Bear see last?”

During the comprehension task, student 1 and 5 were the two that demonstrated comprehension of the story. They were both able to answer the questions correctly using the pictures and saying the colors. Student 4, who was also engaged in the story, only answered what color Bear saw first correctly by using the pictures. As for the remaining

five students, I am not sure they fully understood what I was asking of them. Student 2 and 3 covered their ears, student 6 shut down and did not want to participate, student 7 ran away, and student 8 threw the pictures on the floor.



Figure 6. Shows the pictures students used to answer questions about *Bear Sees More* (Wilson, 2014)

I solely used the iPad during week two. The reason for this was because I wanted to compare results from teacher read-alouds to technology read stories. This was done in a large group setting and from observing the participants, six out of the nine were engaged. Out of the six that showed engagement, four of them demonstrated comprehension. Their comprehension was measured as a result of answering questions by looking back and pointing to pictures in the book. The participants also answered questions by using PECS that were created to go along with the story.

During this time, six of the students were swaying, rocking, and bopping their heads up and down. Student 1 was signing along. The other 3 students were resistant about sitting and attending during the group. One of them began to cry, one got up and left, and the other one just lay on the floor. For their comprehension of this story, I was focusing on the characters. I asked the students to point to the picture of the character of the name I was asking for. For example, I asked, “What picture is Mama Nut?” They had three pictures to choose from. These pictures are the ones that were used during this task.

The four students that showed comprehension of the story correctly identified Mama Nut, Papa Nut, and Wally Nut. Student 1 pointed to each picture and said the correct name. Students 4 and 5 pointed to Papa Nut and said, “Papa.” One of the remaining students was able to identify only Mama Nut and the other student only identified Papa Nut.



Figure 7. Pictures that students used to answer questions about *Sing and Dance in Your Polka Dot Pants* (Litwin, 2015)

At the third week of my study I decided to use a combination of technology and teacher read stories. This week, the readings were done in a small group setting. One group had five students and the other had four students. On average, when I was the one that read the stories, only four out of nine demonstrated engagement in the story and from those four, only one showed comprehension by sequencing the story with pictures. When it came to reading the story via technology, eight out of the nine showed some sort of engagement and out of those eight, six participants exhibited comprehension by pointing to shapes that were in the story.

The focus book for this week was *Shape Song Swingalong* (Songs, 2011). When I read the book to the first group of five students, student 1 would point out all of the shapes. He would say, “Look, there’s a square.” This would get students 2 and 3 excited and they would point after each time student 1 said something. The second group of

students was less engaged. Student 9 got up and took my hand to close the book and said, “all done.”

After I read *Shape Song Swingalong* (Songs, 2011), the first small group of four students was engaged. This is a class favorite, so I think that played a role in their engagement level. However, only one of those four students (student 1) was able to correctly tell me all of the shapes that were in that story. Students 4, 5, and 6 shut down and wanted to go play. Student 6 started to cry when I asked him to point to shapes that were in the book.

The other small group of five students hardly showed any engagement whatsoever when I read the book. They would not sit on the rug. Student 2 lay down, student 3 and 7 ran around the classroom, student 8 went to the bathroom and missed the whole story, and student 9 closed the book and said, “all done” in sign language. I could not get any of these students to participate in the comprehension task.

During the same week, the participants were in the same groups, but they listened to the *Shape Song Swingalong* (Songs, 2011) on the iPad. In the first group, student 1 sang along, students 2, 3, 4, and 5 were moving their bodies to the music and trying to sing along. The second group was also more engaged. They were rocking in their seats and student 6 got out of his seat and walked closer to the iPad. I used shape PECS so the students could show me what shapes were mentioned in the book. These shapes were the ones that were used. The book repeatedly says the words, “line, circle, square, and triangle.” I put the star shape in the mix to truly determine their listening comprehension.

Six out of the eight engaged students were able to tell me exactly what shapes were in the book by using the shape PECS. Student 1 correctly identified the shapes by

pointing to the shape and saying them. Student 2, 3, 4, 6, and 7 correctly identified the shapes my pointing to the shape PECS.

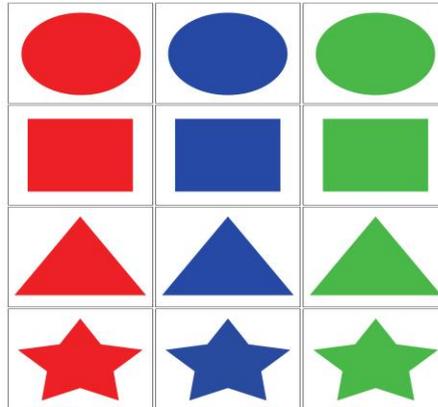


Figure 8. PECS used by students to tell me what shapes were in *Shape Song Swingalong* (Songs, 2011)

Nine out of nine participants showed engagement during week four of the study. They were moving their bodies, some of them were signing along. Student 4 would put his hands on his head every time Pete's buttons popped off and rolled away. Student 6 would laugh every time that happened. Student 9, who typically does not participate, sat down and was swaying his body from side to side with the music. This week the students used technology for the read alouds. Six out of the nine students demonstrated their comprehension during this week as well. Their comprehension was measured by answering close-ended questions with PECS.

The focus book was *Pete the Cat and His Four Groovy Buttons* (Litwin, 2012).



During this read aloud, student 5 demonstrated engagement by saying the words “oh no!” and putting his hand on his forehead every time one of Pete’s buttons would pop off. All the students were bopping their heads up and down. The close-ended questions were number related. The students were basically counting backward by answering the questions. I took pictures of the book and asked, “How many buttons does Pete have on his shirt after one popped off and rolled away?”

Figure 9. Pictures from *Pete the Cat and His Four Groovy Buttons* (Litwin, 2012) that students used to answer questions

During the comprehension task, the students with speaking ability were answering the questions like the way it sounds in the book. It was like they were reading. For example, Pete started with four buttons and when I asked how many buttons did Pete had left after one popped off and rolled away, students 1, 4, and 5 would said, “Three. Four minus one equals three.” Students 2, 3, and 6 were able to point to the correct pictures to answer my questions.

During week five, a combination of technology and teacher read alouds were observed. When I read the story, only five out of nine participants exhibited engagement in the story and out of those five, only two participants showed comprehension. When the iPad was used, eight out of nine participants were engaged and out of those eight, seven participants showed comprehension by sequencing the story.

The book that was read this week was *Animal Boogie* (Harter, 2011). Again, this was read in a large group and the levels of engagement varied. When I read the book, two of the students were doing the movements along with me. For example, when the elephant was stomping her feet, they would stomp their feet along with me. The other three were just pointing and making facial expressions. Two of other students were trying

to get my teacher assistants to take them for a walk by pulling on their arm. The last student was covering his ears. When we listened to the story on the iPad, eight of the nine students were moving their bodies to the music. The last student was running around the room, climbing, and jumping off of furniture.

The students used pictures taken from the book to answer questions about what animal was making what movement. For example, “What animal was stomping their feet?” Student 1 answered, “An elephant.” Students 2, 4, 5, and 6 pointed to the correct picture and would say the animal. Students 3 and 8 pointed to the correct animal.

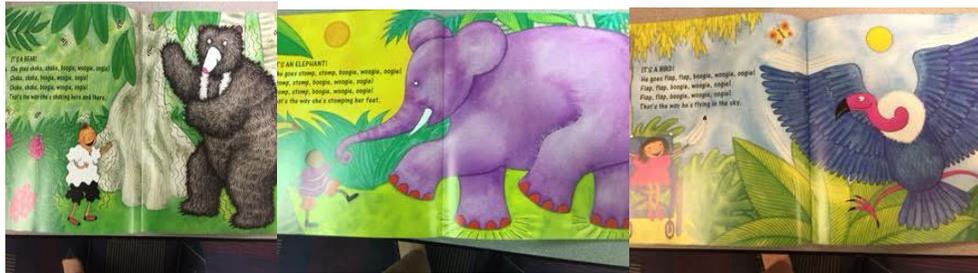


Figure 10. Pictures from *Animal Boogie* (Harter, 2011) that students used to answer questions

The last week of the study, week six, the iPad was used solely during a large group setting. During this week, nine out of nine participants were engaged and out of those nine, eight demonstrated listening comprehension by answering close-ended questions with PECS and sequencing with pictures from the story.

The book that we read this week was *Little Green Peas: a Big Book of Colors* (Baker, 2014). All of the students were sitting straight up and were focused on the book. The ones who have vocal ability would say the colors on the page. The comprehension task was a two-part task. The first part was to sequence using pictures from the book. The second task was to answer close-ended questions about what color certain objects in the

book are. For example, I asked, “What color were the mountains in the story and they were use the color PECS to answer the questions. The pictures below are ones that were used in the sequencing task.

The sequencing task was difficult for most of the students. This book does not have a typical story line where events take place. I wanted them to show me what order the colors in the book appeared. I wanted to push them a little bit to see who really understood first, next, and last. Student 1 was able to complete this task correctly. Students 3 and 4 attempted it by moving the pictures in the order they thought was correct, but struggled with the language of the question. The rest of the students did not attempt to answer the question. Student 8 pushed them off the table and student 6 threw them across the room.

However, when it came to the second task, eight out of the nine students were able to answer my questions about what color a certain object was. I asked them to tell me what color the school bus was. All eight students pointed to the correct color. Again, student 1, 3, 4, and 5 were able to vocalize what color it was. The same happened when I asked what color the mountains and the peas were.



Figure 11. Pictures from *Little Green Peas: a Big Book of Colors* (Baker, 2014) that students used to answer questions

This finding demonstrates that students are more engaged when it comes to reading via technology and in turn, their engagement level does have an impact on their listening comprehension level.

Finding 2: The Use of Visuals is Essential When Reading with Students with Nonverbal Autism

There were two adult participants that participated in my study. One participant is a speech therapist (Erin) and the other is a special education teacher (Jenn). Both participants work at the center where the study took place.

After analyzing their answers to my interview questions through a constant comparative method I found several similar keywords in their answers as well as a few different keywords. I compared the answers to each question to one another and colored coded them to come up with my findings or themes.

Participant	Similar Key Words	Different Key Words
Erin	Visuals, previewing the book, background knowledge, vocabulary	Sight lines, comfort, lighting, volume (environmental)
Jenn	Visuals, previewing the book, background knowledge, vocabulary	Technology, drawings, computer games, videos (multimodal)

Figure 11. Shows the keywords that were used by each adult participant

The first finding deals with the similar keywords in their answers and how they apply to students who are diagnosed with autism and are nonverbal. Question one was, “What is your process while reading a story to a student who has ASD and is nonverbal? What is the reason why you chose this process? When comparing their answers, three keywords/phrases emerged in their answers: visuals, preview the book/story, and

vocabulary. At first glance these keywords do not seem any different than what a teacher would do when reading a book a typical developing student and it is not.

When introducing a book to a student, teachers need to activate the background knowledge of that student or group of students. Activating background knowledge includes, but not limited to, conducting a picture walk, pointing out keywords or phrases, and highlighting unknown vocabulary throughout the story.

The question however was to describe the process during a read aloud. Jenn's expansion on this question depicts the different ways a teacher can use this process with students with nonverbal ASD. Jenn said, "I use many visuals and gestures, do a preview of the book, and ask the students to attend to different parts of the book. For example, I might have them point to a character in the picture..." Erin stated that while reading the story she has "the student point to some of the pictures on the pages to show that he/she understands the basic vocabulary in the story after a page has been read." You can see in both responses that they use words like show, point, and gestures. These words are key when it comes to students with nonverbal ASD. If a student cannot talk or has limited verbal skills how would the teacher know if their students comprehend what is being read? Show, point, and gestures are three strategies that teachers can use with students with nonverbal ASD when gauging comprehension.

Another common word that was used in their answers was sequencing. This term was universal when it came to answering the third question. The question was, after the story is over, how do student retell the story? They had somewhat different answers, however they both mentioned sequencing. Both Erin and Jenn talked about how they use actual pictures from the story so that the student can put the events of the story in order.

Jenn said she “uses pictures from the book or games on an iPad to determine if students can remember the order of events.” Erin claimed that she uses sequencing to “allow the students to retell the story.” Sequencing is another strategy that students with nonverbal ASD can use to demonstrate comprehension.

This information is crucial to student success. I have found that it is essential to collaborate with colleagues about strategies that may or may not work for certain students. It is beneficial to teachers and students to look at a certain situation from a different lens.

Finding 3: There are Multiple Strategies that Students with Nonverbal Autism Can Use to Demonstrate Meaning Making

Based on the research that was conducted in this study, there were several strategies used in order for students with nonverbal autism to be able to demonstrate their meaning making skills. These strategies fall into two categories: environmental and multimodal (Figure 6). Environmental strategies deal with the environment of the room and multimodal strategies encompass the different modes of technology that can be used to enhance listening comprehension.

When answering question five, Are there any strategies that can be used to enhance student engagement while reading? Erin mentioned that “lighting, sight lines, volume, and comfort” are strategies that she uses to help her students become successful. She is a speech therapist and pulls her students out into a small room. Most of the time the only people in the room are Erin and her students even though she does share the clinic with other therapists. This makes it easier to control the volume of the clinic. She also creates good sight lines for her students because she works 1:1 or at most a group of three students. When I was conducting the read alouds in my classroom, I found that if

we sat at a table or in a semi-circle around the rug then the students were more engaged because they have a clear sight line to the book or iPad. I tried to make the room as comfortable and quiet as possible however, that was not always the case.

When answering the same question, Jenn said that she uses technology, drawings, computer games, and videos to enhance her students' engagement level. For example, she uses "programs that use videos of stories that seem to increase student engagement and motivation to read." She also uses "reading programs that gives kids stars once they have listened to a book." When I was conducting the read alouds, I took both types of strategies into consideration. I also used different modes of reading to determine my students' engagement levels: teacher read books and technology read books. Since students with autism are visual learners, these different modes help to enhance their listening comprehension by adding a picture to the words.

Summary of Findings

During this study, I found several themes. There are 1) student participants are more actively engaged in read alouds that are read by using technology, 2) visuals, PECS and technology are important components when reading with students with nonverbal autism, and 3) there are several strategies that can be used for students to make meaning.

According to Dixon, Vereninkina, Costly, and Pryor (2015), students with autism exhibit a strong preference for tablets and electronic devices. Since the students with ASD are more interested in technology, it is no surprise that they are more actively engaged when listening to a story on an iPad. Dixon et al. (2015) claim that the result from their current iPad trials have been encouraging even though they are in the early stages of their research study. This study dealt with how parents and teachers can work

together to implement the use of an iPad or other electronic devices with students with ASD. Students with ASD are visual learners. Visual based learning can enhance student ability to complete unfamiliar tasks (Ganz, Earles-Vollrath & Cook, 2011). These unfamiliar tasks include but are not limited to reading comprehension and the components that go along with comprehension. The students in my study were nonverbal or had limited verbal skills and through the use of teacher made visuals, PECS, and technology, the students were able to show that they have the ability to comprehend a story that was read to them.

Again, students with ASD are visual learners. This was reiterated in my third finding. The study that was conducted with read alouds and the answers to the interview questions helped to support this. There were several strategies that became apparent after completing the study. These strategies can be categorized into two categories: environmental and multimodal. Mucchetti (2013) conducted a study to “investigate the effect of shared reading activities adapted with modified text, tactile objects, and visual supports on the story comprehension and activity engagement of minimally verbal students with autism and significant intellectual disability” (p.361). The result of the study was that all four student participants showed increased comprehension and engagement levels when visual supports were being used during read alouds.

Conclusions

Based on my findings, I came up with three conclusions to my study. The first conclusion is that students with ASD are more actively engaged when listening to a song or music rather than just a voice. For example, when I read the stories their peers in the

classroom distracted several student participants. When they listened to a story on an iPad or CD they were sitting up, moving with the music, pointing, and their body language changed in a positive manner. This conclusion specifically answers my first research question about how teachers can tell if students with nonverbal ASD are engaged in a read aloud.

The second conclusion is one that embodies the purpose for my study. My findings demonstrate that the more actively engaged students are in a story the higher their comprehension level (Figure 5). This conclusion is a result of the observations and field notes taken of the students' gestures, body language, and response to the books that were read aloud.

The third conclusion from this study is that students with nonverbal ASD are typically visual learners. This is apparent in the responses from the adult participants (Figure 6). The use of visuals was mentioned in just about every response to the interview questions. Types of visuals that were used in this study were PECS, sequencing cards, and an iPad for assistive technology purposes.

Implications

Give students with nonverbal ASD a voice. This to me is the most important implication that has come as a result of my study. Just because children are nonverbal does not mean that they cannot acquire the skills that are necessary for listening comprehension. They definitely have that ability. In my teaching, I will continue to implement the different strategies that have been used in this study, such as visuals, PECS, technology and continue to research new ones. This will also be carried on in my students' learning. As I continue to increase my resource list, I will use each resource

with my students to find the best fit for them. Each student is different and we need to teach to those differences. As for working with the families, I will keep in constant communication with them and give them the resources that I have found that work for their child. I will reach out to agencies in the community when there is something that I cannot personally help the families with. It is crucial for student success to be in contact with the families because they ultimately know their child the best.

Collaboration is key. This is another important implication that came out of my study. Talking with colleagues is a must when working with students. They are there to help give you a different lens when looking at a situation. I received valuable information from the two interviews that took place in my study. I will continue collaborate, as I do now, with my colleagues and administration. Many people have been teaching a lot longer than I have and they are more knowledgeable in certain situations and ideas. With that, I will take what I have learned from my colleagues and bring it into the classroom and try it with my students. My colleagues are another great resource for working with the families of my students. They can possibly help me look in the right direction when I am trying to gather resources for my families.

Limitations

There were a few limitations for this study. The limitations were 1) amount of time for study, 2) number of participants, and 3) behaviors in the classroom. I feel that there was not enough time to conduct the study. This type of study is complex and I was not able to get as much data as I would have like based on the time constraints. The number of student and adult participants were limited. I did not get the number of consent forms as I would have liked, therefore I did not have much data to compare. With more

participants, my study would be more reliable and valid. Lastly, one of my student participants has been exhibiting extreme behaviors in the classroom. The time allotted during the day for the study had to be cut short several times due to this student's behavior being unsafe to himself and his peers.

Recommendations for Further Research

I would like to continue this research and implement the different strategies from the adult participants further. I would incorporate more technology as far as students having the opportunity to retell the story. I would like to make a digital PECS board based on stories that are read aloud that will say the word that the student touches so that it gives them an actual voice.

Another recommendation for further research is to conduct the research out of the school setting or pull a small group of students out of the classroom to conduct the study. The reason for this is that it will limit the amount of distractions between the participants and nonparticipants. With limited distractions, the hope is that the students will be more focused.

My last recommendation for further research would be to have actual interviews with adult participants. I would have liked to have the opportunity to ask follow up questions and probe into their answers.

Closing

The student participants in this study may be nonverbal, however they are competent meaning makers. Educators need to be aware of the students' strengths and areas of need and teach to those strengths and needs. Students who have nonverbal autism or limited verbal abilities can still have a voice, whether it be by using teacher

created visuals, PECS, or even technology based programs that offer a text to speech function.

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