Art Making for Non-verbal Students with Autism

A Case for Visual Literacy

by

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This dissertation is dedicated to Karim and Ernie.

You are my family and my world. Thank you for your constant support and encouragement.
I share this accomplishment with you both.

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Abstract

Art educators and their non-verbal students with autism interact and share ideas using a distinct language, the symbol-based language of semiotics. The visual arts have been integrated into school curriculum for individuals with disabilities but understanding how non-verbal students with autism express themselves is essential to fully supporting their creative endeavors. The non-verbal language community (Saussure, 2013) should encompass teaching and learning opportunities aimed at efficient dialogue for all communication partners (Beukelman & Mirenda, 2013). Through instructional strategies designed to support visual literacy a fully realized visual arts experience is possible.

The purpose of this case study was to explore instructional strategies designed to promote the development of a visual literacy for non-verbal students with autism who use augmentative and alternative communication technology (AAC). This study examined the supplemental language resources that provide additional communication opportunities during art making processes. The participants of the study were three adolescent students with non-verbal autism who use AAC technology to communicate. The students attend a public high school special education program and were engaged in 2-dimensional and 3-dimensional art projects over the course of four months. The data was examined using thematic analysis and collected through art classroom observations, video recordings of real-time interactions during art making, interviews with art educators and paraeducators instructing non-verbal students with autism through art projects, data collection journals for AAC technology use, and artwork artifacts illustrating student self-expression. The findings of this study suggest the key concepts that contribute to visual literacy development for non-verbal students with autism in a visual arts classroom are: (1) responsive paraeducator interactions, (2) differentiation of instruction through

multimodalities, (3) navigating art vocabulary on AAC, and (4) opportunities for creative expression through rich and varied art materials. Suggestions for practical instructional strategies to prepare future art educators for their students with autism emerged in this study. Further, ideas for art education researchers involving communication technology and its use during the art making process are provided. Additional instructional strategies are offered to promote collaboration between art educators and special educators and to promote creativity and self-expression for non-verbal students with autism.

Keywords: AAC, art education, autism, communication technology, differentiation, multimodal instruction, paraeducator, semiotics

Chapter I

Introduction

The Power of a Comprehensive Art Education

A comprehensive art education offered to students in schools today impresses 21st century ideals by developing critical thinking skills, and innovation through creativity. In an ever-increasing visual culture (Crow, 2016), art students are introduced to concepts of aesthetics as they have evolved throughout art history. Understanding the role of imagery provides cultural awareness and enables all students to engage in visual arts learning, decision making, problem solving, and collaboration. These skills are developed as students interact with materials and art processes. Planning appropriate materials to meet process requirements is essential. The foundational drive behind the most successful art education practitioner is their understanding of the importance of cultivating artistic expression and student creativity.

The ability to engage with materials in the visual arts allows for self-expression, self-awareness, and personal growth in how students relate to the world in which they live. The importance of an art education provides students opportunities for divergent thinking. The process of drawing, painting, or constructing is complex and provides students an outlet for their feelings and thoughts as well as how they see (Lowenfeld & Brittain, 1987). A student's use of color, or where they place objects within a collage, are choices the student has made on purpose. These choices are meant as expressions to those viewing the art. Purposeful creative moments require deep thought and produce visual information meant to be communicated across classrooms, cities, and the world. The visual arts create products that differ from other content areas, such as mathematics (Lowenfeld & Brittain, 1987). The representations that come from human figure drawings of young children are their passive understandings of that subject. While

they may have more knowledge about the human figure, their active representation of the figure is limited by their level of art education, and the stage of artistic development they are currently at. Proficiency in art is learned, not spontaneous (Hobbs & Rush, 1997), and despite skill, and despite levels of instruction, there is power in art, and power in art making at every level.

To see something beautiful, but more so, to create it yourself provides deep satisfaction (Furniss, 2008). The need to express oneself is powerful. Intrinsically, students who enjoy art, do so because they have a desire to meet a need (Lowenfeld & Brittain, 1987). Art education invites students to listen to their inner voice and align their inner-most thoughts and needs to materials that convey what they wish to share. The important learning taking place through these complex art processes necessitate design strategies (Alter-Muri, 2017) that support the student's self-expression and facilitate critical thinking. As certain colors express certain feelings when presented using paint or watercolor, other media such as sculpture can also express beliefs about life. For example, the material an artist may use to construct an abstract sculpture may have more meaning to her than the final form of the piece. The final product's shape is not the expression, but rather the material that were used to build it. The extrinsic benefits for students engaged in art processes might be their interest in using a new material or tool that offers a new design (Furniss, 2008). Perhaps a marker with a special tip creates a line element that allows a student to enhance their drawing in a unique way. This fresh new approach to their drawing supports their creative growth and can elicit original responses from students during conversations about their work. It is during these creative exchanges that a grasp of the language related to art is necessary.

The development of a visual arts language is tantamount to exploring the multitude of visual arts techniques taught in school art studios (Gorjian, et al., 2012). In this study, visual arts language refers to students' ability to communicate in and through the arts about visual arts

terms, media, and concepts. While the art process varies in style and even perhaps by intrinsic motivation, the understanding of how best to approach an art medium to achieve specific results is supplemented with the vocabulary and dialogue aligned to the whole art process. Vocabulary is a critical aid enabling students to associate what they create to their learning and the vocabulary itself ranges from elements and principles of design to art techniques, art processes, art history, and fundamental terms such as color and shape names. The ability for a student to convey a concept or idea in visual arts is done using the principles of design, thus, a students' creative expression indicates understanding of the visual arts language.

The breadth of a student's art vocabulary can provide greater understanding of art concepts and enable the student to build on projects as well as conversations more effectively. To accomplish the development of a thorough art vocabulary, art educators often draw upon the principles of Discipline Based Art Education (DBAE) (Dobbs, 1992). DBAE is an approach to instruction and learning in art that derives content from four foundational disciplines that contribute to the creation, understanding, and appreciation of art (Dobbs, 1992). Instructionally, it is implemented using various approaches because it is not a specific curriculum. The four disciplines as defined by Stephen Mark Dobbs are:

1. Art Production-Making art.

2. Art Criticism-Understanding the qualities of art and being able to discern the properties of visual forms.

3. Art History-Learning about artists, art styles and the contributions of the visual arts to culture and societies.

4. Aesthetics-Understanding the elements and principles of art and making judgements about art.

Out of these four disciplines spring many visual arts vocabulary words that enhance

understanding for students as they guide their creative vision across various media. The

vocabulary is a necessary component to learning in and through the visual arts.

Art Education for Students with Disabilities

Students with disabilities have not always had educational opportunities to develop their

artistic skill. Until the mid-1970s, individuals with intellectual impairment were typically placed

in institutions for similarly diagnosed children because educational programming was not

developed to support their learning needs. Laws such as the individuals with disabilities

education act (IDEA) mandate a free appropriate public education to eligible children with

disabilities throughout the nation and ensures special education and related services to those

children. The arts have also been integrated into school curriculum for individuals with

disabilities. Understanding how to support their creative endeavors has slowly gained momentum

since that time.

Art educators have had to tap into their own creativity as well as collaborate with special

education teachers to help students with disabilities accessing the arts and applying art skills

within their education (Loesl, 2012). Through modifications and integration of technology,

instruction can be differentiated to promote the growth of students with disabilities (Holyfield &

Caron, 2019). Some examples of technology include systems like the ELMO products that

provide a variety of learning options for students to participate in classroom activities. Learning

options are offered through technology such as touch boards, SMART Boards, interactive

whiteboards, interactive tablets, projectors, and cameras for students.

Across the country there are organizations functioning to support the artistic pursuits of

individuals with disabilities. The National Arts and Disability Center exists to promote the

inclusion of individuals and artists with disabilities into the larger arts community serving Los Angeles county and surrounding areas. Their aim is to advocate on behalf of these artists for opportunities within the mainstream arts community. The Kennedy Centers Very Special Arts (VSA), the international organization of arts and disability, is another example of current programming opportunity for arts and the art education of individuals with disabilities. At the heart of their creative mission are four guiding principles: a) Every young person with a disability deserves access to high quality arts learning experiences, b) All artists in schools and art educators should be prepared to include students with disabilities in their instruction, c) All children, youth, and adults with disabilities should have complete access to cultural facilities and activities, d) All individuals with disabilities who aspire to careers in the arts should have the opportunity to develop appropriate skills (VSA, 2020). These principles demonstrate societal views on the importance of understanding and respecting the creativity of individuals with disabilities (Furniss, 2008). Other notable organizations devoted to eliminating barriers for artists with disabilities include, but are not limited to, the Shield Agency (Pure Vision Arts) and Theater Development Fund. Tenets of organizations such as these elevate the importance of artistic outlets for individuals with disabilities including autism.

With these large-scale companies designing programs to integrate the special needs and autism population into mainstream society, integration at all levels is becoming the norm. For individuals with disabilities and the autism community to have full access to all the luxuries of modern life, all realms of society from corporations to public school classrooms, must consider the steps that will allow this access to take place. Universal design for Learning (UDL), with origins from the Center for Applied Special Technologies (CAST), is one framework allowing teachers to develop lesson plans and assessments based on three principles: (1) representation of

information in more than one format such as text, audio, video, and hands-on approaches to meet the learning styles of all students; (2) action and expression allows students to demonstrate their learning experience by taking a pencil and paper test or giving an oral presentation, and; (3) engagement encourages students to make choices in their learning that aligns to their interests and culture (Smith, et al., 2012). This approach enables students to immerse themselves in their learning in creative and non-traditional ways that may not always work for every student. While UDL provides more accessible learning for many students, and the work of these organizations provides acceptance and support for individuals with disabilities, specific research on how students with autism who are non-verbal learn and experience visual arts warrants empirical research regarding its comprehension, acquisition, and translation via the semiotic picture symbol system of their technology communication devices.

The Autistic Artist

Creative growth is an important component of art education and essential for students with disabilities. While broader investigations of this are warranted, art education for students with autism is the focus of the present study. Visual processing styles (Grandin, 2006) of individuals with autism present distinct types of perception and are indicative of visual processing abilities that differ from a typical student. For instance, the student with autism is a specialist thinker; good at one thing and bad at another (Grandin, 1995). Temple Grandin (2009) has categorized three types of visual processing in the minds of individuals with autism:

> (1) photo-realistic visual thinkers- all thoughts are in photo-realistic pictures. These students may be good at geometry but bad at algebra because there is no visual cue such as shapes to visualize;

(2) pattern thinkers-the music and math mind indicating a more abstract form of visual

thinking. Thoughts here come in patterns rather than photo-realistic pictures. These

individuals are typically weak in the areas of reading and writing;

(3) word and fact thinkers- with a memory for verbal facts and trivia about a multitude of

topics. These individuals are often poor at drawing and other visual thinking skills.

When it comes to processing nonvisual information, the easiest words for an individual with

autism to learn are nouns, because nouns directly relate to pictures (Grandin, 2006). Lower-

functioning children often learn better by association, with the aid of word labels attached to

objects in their environment. Text that is not associated with a visual image can be even more

elusive because the text has no concrete meaning for the student (Grandin, 2006). The language

benefits of symbols paired with words is essential for many students and should be considered

for any type of communication with a student who is non-verbal.

The strategies art educators can employ to maximize a student with autism's creative

potential include integrating concepts of multimodality, and both tactile and sensory awareness

since sensory experiences in art can lead to increased verbal or non-verbal communication

(Alter-Muri, 2017). By offering these experiences, art educators can encourage the

communicative trademark of the visual environment of the art classroom.

Guay (2006) has identified challenges along the way to effective integration of students

with autism into a visual arts classroom. As autism is displayed through a vast array of

behaviors, often, lessons are fragmented with numerous opportunities for students who need

frequent sensory breaks. Another challenge includes finding the multiple adaptive art tools that

can be used to support students with fine and gross motor limitations. These are not as readily

available as standard art tools, and often must be custom made by the art educator to suit specific

physical impairments. When it comes to students with autism who are non-verbal, additional challenges accompany them in the areas of communication (Gevarter et al, 2013). Art educators supplement missing language with visual symbols and imagery. While this might be easier to do within a visual arts classroom that already contains a rich supply of visual aids, there are still various accommodations that are needed. One support many non-verbal students with autism have is augmentative and alternative communication technology (AAC) (Geverter et al., 2013).

Students who are non-verbal and use AAC must learn basic symbol recognition to communicate, making their language development atypical. Selecting an appropriate AAC system to maximize support for individual students with developmental disability should be guided by research (Schlosser & Sigafoos, 2006). The symbol library (McCarthy, Schwarz & Ashworth, 2017) includes the various symbols students begin to recognize within their AAC system. Student understanding of basic art symbols enables them to engage with materials during a standard art lesson. Adding extended visual arts symbols to increase the student's art vocabulary, enabling deeper dialogue about art medium, styles, and processes, remains problematic for art teachers. Art vocabulary is broad and encompasses terms and common words and phrases about the visual arts such as color, abstract, sculpture, and expressionism, and how the elements and principles work together to compose aesthetically, a visual language that an artist uses to arrange a visual composition. Since symbols available on AAC are limited, non-verbal students cannot express themselves using art vocabulary such as contrast, monochromatic, expressionism, and tint or shade. These words simply do not exist on current AAC systems (Radici et al., 2016).

Non-verbal students with autism who use AAC will immerse themselves in the creative process despite whatever technology limitations they may be facing. Most students simply enjoy

working with materials. When AAC and picture symbols are not supporting a student's ability to communicate during these creative processes, the student will turn deeper into the materials to express their understanding of expectations or to demonstrate their independence. Either the materials that provide sensory exposure (i.e., glue, paint, clay) or the meditative process of a medium like collage becomes an avenue through which expression takes place.

The commercially available AAC language systems include Assistiveware's Proloquo2Go for iPhone and iPad, and LAMP Words for Life: Language Acquisition for Motor Planning, available for iPad. Understanding how core vocabulary, the small group of most frequently spoken words (i.e., yes, no, stop, go, more), fringe vocabulary, low- frequency vocabulary words that are specific to a particular person or activity (i.e., art, painting, collage, sculpture, drawing), and more specific visual arts vocabulary (i.e., expressionism, technique, relief, perspective) should be included and categorized when programming AAC devices and applications. This programming route is an important ingredient for using AAC with the most ease. The Proloquo2Go website organizes their vocabulary by category. Their website states, "A vocabulary organization is a way of organizing words in an AAC system so that people who use the system to communicate can find the words they need to express themselves" (Assistiveware, 2021). Vocabulary should be organized based on the needs of the individual user - language skills, physical and visual access needs, and what kind of navigation structure is most intuitive for the individual." When students need to communicate during the art making process, art educators who are facilitating these unique moments should be prepared to support all attempts and offer all possible means to supplement any limitation of communication. The semiotic language of AAC is designed and accessed through visual processing of picture symbols, therefore because most communication is verbal, conflicting interactions with the

communication process are common for students. Semiotics is the study of signs and symbols and considered elements of communicative behavior. The analysis of semiotic systems of communication as language is supported by the general theory of signs and symbols and usually divided into the branches of pragmatics, semantics, and syntactics (Morris, 1971) or the symbols ability to be interpreted by the person communicating, in this case, the non-verbal student. Students with autism who are non-verbal are learning the language of their device through the navigation of basic picture symbols. Rarely are they trying to put together full sentences but more so, associate a skill to a tool and communicate that using the corresponding symbol (Mirenda, 2013). This process represents semiotic behavior (International Association for Semiotic Studies, 2009).

An examination of how art educators can supplement the limited art vocabulary of most AAC systems is necessary and indicative of challenges facing essential communicative approaches used in the visual arts classroom. These concerns warrant further research since overcoming the communication challenge is critical to providing students who are non-verbal adequate opportunities to communicate about their art and essential to finding effective ways art educators can deliver rigorous arts instruction to their students with disabilities. Some art educators are supplementing symbol limitations on AAC devices by making their own version of symbols that correspond to visual arts content being taught. They are creating picture cards, using flashcards, and referring to the actual art tools and physical samples expressed within art images (Loesl, 2012). While new vocabulary can be added to AAC systems, words that will be repeated over time and more frequently are the most desired core vocabulary (yes, no, help, you, I, and me), instead of visual arts vocabulary. When adding an art-based word to an AAC system there must also be an image that corresponds with the word such as assemblage, mobile, or

woodcut. Such images are not available in the Proloquo2go and LAMP library. According to Speaker-Christensen (2010), AAC programs can become cluttered when too many new words are added. One consideration is to create an Art category where art-specific symbols are located. While this would provide a more efficient means of accessing those words, it would still necessitate adding new vocabulary and figuring out how to include appropriate imagery.

While students are engaged in the art making process, they will indicate what they need through body language, pointing, or the physical retrieval of their preferred tools and materials. Dependent on the lesson and the art educator's curriculum, the student can incorporate these favored materials into their work (Furniss, 2008). Doing so is a communicative presentation of their creative preference and a demonstration of self-expression.

Art educators can support students who are non-verbal by creating communication goals. These might resemble a specific visual arts vocabulary word related to a new art concept that can be programmed into a student's AAC device, or a flashcard-like picture symbol that the teacher presents to the student repeatedly during instruction and over several lessons. This strategy allows the student to make the connection between the vocabulary word and the art process. Further, it suggests practice using the specific art materials such as sculpture, build, or form while working with clay. Learning is reinforced through instructional rigor, and creativity can be bolstered. For the art educator who teaches students with limited communication and whose objective is to create communicative outlets using the best creative routes and the students most efficient technology, this is desirable.

Statement of the Problem

Purpose of this Study and Research Questions

The area of visual arts education for students with autism and use of AAC specifically during the art making process has not been extensively addressed in previous research. The translation seems easy at first: using picture symbols to indicate symbols within artworks. The visual arts have their own language to accomplish this, however, the semiotics involving the study of signs and symbols as elements of communicative behavior must be aimed at increasing any one individual's ability to effectively communicate (Crow, 2016). Semiotics, and their interpretation, further supports the effective use of AAC during the art making process. It therefore becomes necessary to describe the conditions under which semiotics and multimodal instruction, using AAC, support students' development of a visual arts language, and increased capacity for creative exploration and art making. The purpose of the present study is to gain insight into student use of AAC to understand what factors contribute to its effective implementation in the art classroom and the students' ability to develop a visual arts language. Therefore, the following research questions will be examined:

1. How do art educators create multimodal environments that promote creativity and exploration in the visual arts studio for non-verbal adolescent students with autism?

2. What strategies do art educators and non-verbal adolescent students with autism employ to supplement the functions of AAC devices during art making processes?

3. How does non-verbal symbol use support the visual arts language of non-verbal adolescent students with autism during art making processes in a visual arts class?

Significance and Need for the Study

This study is one of few bridging the gap that exists currently between art education and special education. Interaction between these two fields can be seen in schools from PreK to high school level art classes as education in the United States continues to focus on inclusive classrooms. Most current art education research involving students with disabilities details best practices for art teachers of students with special needs including use of adaptive technology and modified arts curriculum (Alter-Muri, 2017; Coleman & Cramer, 2015; Coleman, Cramer, Park, & Bell, 2015; Gorjian, Hayati, & Barazandeh, 2012; Guay, 2003; Guay, 2006; Loesl, 2012; Peterson, & Foley, 1992). Scholars like Guay (2006) and Loesl (2012) have contributed knowledge to the intersection of Art Education and Special Education providing approaches for art adaptations and guides for educators to be successful integrating new learners into their classroom. While these opportunities exist for teachers of all disciplines, there is a need for further research that addresses accommodations and adaptations necessary to increase independent, hands-on experiences for students with specific learning needs.

The benefits of AAC are certain, but the challenges faced by students and their art educators when navigating limited symbol systems during art making are as well. Finding supplemental communicative approaches are the aim in art classrooms and developing technology to meet the needs of non-verbal students is an immediate necessity.

Scope and Delimitations

This study is restricted to the limited opportunities for effective visual arts language development through use of AAC for non-verbal students with autism, specifically, device limitations and supplemental strategies employed by non-verbal students with autism to facilitate dialogue. The word "effective" used here represents Ferdinand De Saussure's semiotic concept

of sign, signifier, and signified and is intended to suggest the successful unification of thought, sound, and graphic equivalent for a visual arts concept translated between student and art teacher via communication technology or additional communication modalities (i.e., PECS systems) (Bondy & Frost, 1994).

Specific observations and interviews will be conducted to understand additional strategies being implemented by art teachers and paraprofessionals to explore approaches to the effective integration of non-verbal students into visual arts dialogues. Paraprofessionals (paras) are aides who assist students in both academic and personal tasks throughout the school day (Guay, 2003). Since the study is being conducted using a small sample size of three students, findings will be considered exploratory and current trends in AAC system development, art teacher preparation programs at the college level, or communication strategies being implemented within the larger special education sphere will not be discussed as those concerns are beyond the scope of this study.

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Definition of Terms

For the purpose of this study, the following definitions of visual arts vocabulary and terms used in the field of Special Education are used. Definitions come from various sources covering both visual arts resources and language that is specific to autism and non-verbal autism. Definitions taken from sources are cited. Detail is provided for terms that are broader in scope such as the elements and principles of art as well as art tools.

1. Aided language- For purposes of this study, the American Speech-Language Hearing Association (aided language. (n.d.). American Speech-Language Hearing Association. Retrieved from (http://www.asha.org) definition will be used. Aided language is a communication strategy that requires a communication partner to teach symbol meaning and model symbolic communication by pairing speech with graphic symbols or other forms of aided augmentative and alternative communication.

2. Augmentative and alternative communication- For the purposes of this study, the American Speech-Language hearing Association (augmentative and alternative communication. (n.d.). American Speech-Language Hearing Association. Retrieved from http://www.asha.org) definition will be used. Augmentative and alternative communication are communication methods used to supplement or replace speech or writing for individuals with impairments in the production of comprehension of spoken or written language. AAC is used by individuals with a wide range of speech and language impairments including those with intellectual impairment and autism. AAC can be a permanent addition to a person's communication or a temporary aid.

3. Autism Spectrum Disorder- A neurodevelopmental disorder characterized by persistent deficits in social communication and social interaction across multiple contexts, including deficits in social reciprocity nonverbal communicative behaviors used for social interaction, and skills in developing, maintaining, and understanding relationships. Additional presence of restricted, repetitive patterns of behavior, interests, or activities are required for diagnosis (DSM-V, 2013).

4. Communication partner- For the purpose of this study, a communication partner is an individual such as a parent, teacher, or therapist, that interacts and supports any form of

communication expressed by a student with autism. The support can be provided by presenting opportunities for communication or adapting the environment. Strategies to support student communication include prompting to use AAC, waiting for responses, and even ignoring vocalizations to have a student use their AAC device.

5. Elements of Art- Art elements include line, color, shape, form, texture, value, and space. The elements of art are the building blocks of all art. They are the ingredients needed for an artwork to make sense. The elements are combined within an artwork to make a 2-dimensional or 3-dimensional piece complete. The elements of art direct how we analyze an artwork and how visual messages are conveyed. They are the materials from which all designs are built (Graves, 1951).

6. Multimodality- A theory which looks at how people communicate and express themselves, and interact with each other, not just through writing (which is one mode) but also through speaking, gesture, gaze, and visual forms (which are many modes such as font choice, color, images, and video) (Kress, 2010). For the purpose of this paper, multimodality includes its application within visual arts classrooms and what that looks like during instruction.

7. Non-verbal- For the purpose of this study non-verbal refers to adolescent students with autism who cannot communicate using oral language. As an alternative these students use communication technology, sign language, and gesturing or body language.

8. Paraeducator (para)- A support staff member that assists students with autism in daily tasks both academically and personally. Para's as they are often called, perform assistive duties to teachers also including making copies, distributing paperwork, and maintaining classroom harmony. Throughout this study the paraeducator will be referred to as para.

9. Principles of Art- The principles of art have a more sophisticated role regarding how beauty or completeness is translated within a visual artwork. Principles of art and design are applied to the elements of art and how well they are applied determines how aesthetically pleasing a work of art may be. The principles of art include balance, contrast, emphasis, movement, pattern, rhythm, and unity.

10. Process- How an artwork is made. The techniques and design steps taken to produce a work of art. Art processes explored within a high school visual arts curriculum include collage, sculpture, relief, painting, printmaking, mixed media, etching, intaglio, mosaic, photography, and architecture or technical drawing.

11. Semiotics- The science of the life of signs in society. Semiotic modes can include visual, verbal, written, gestural and musical resources for communication. They also include various "multimodal" ensembles of any of these modes (Kress and van Leeuwen, 2001).

12. Style- The style of art involves the way the artwork looks and the way in which the artist expresses their vision. The different styles of art include contemporary, pop, cubism, impressionism, abstract, expressionism, surrealism, modernism, realism, and minimalism. Style refers to the artistic choices an artist has made to portray the subject matter of the work.

13. Tools- Visual arts equipment or machinery controlled by the artist and used to perform an art operation. Art tools used in high school studio arts classes can be essential tools or advanced tools. Essential tools found in most visual arts classes include brushes, canvas, easel, erasers, fabric, palette, papier-mache, pastels, pencils, pens, sketchbook, watercolor. Advanced tools include armature, brayer, cardboard, charcoal, clay, grout, mod podge, plaster, sandpaper, sponge, textile, wire, wirecutter, and wood.

14. <u>Visual Arts Dialogue</u>- Participants contribution to the discussion and language used to discuss art history, artists, and art processes.

15. <u>Visual Arts Discussion</u>- An activity that takes place in the visual arts classroom about art history, artists, how art affects us in life, art styles, and museums and cultural events.

16. <u>Visual Arts Elements</u>- Color, Form, Line, Shape, Space, Texture, Value.

17. <u>Visual Arts Language</u>- The umbrella over all communications involving the visual arts in the visual arts classroom including terms, media, and concepts. Communicating in whatever style one prefers using technology, or other semiotic resources. Creating a piece of art to communicate, and the conversation being reciprocal and not one sided.

18. <u>Visual Arts Principles</u>- Balance, Contrast, Emphasis, Harmony/Unity, Movement, Pattern, Rhythm, Variety.

19. <u>Visual Arts Vocabulary</u>- The words and terms associated with the elements and principles of design.

Chapter II

Literature Review

Working with the limitations of AAC in the visual arts classroom demands patience, and creativity from art educators. It warrants extra effort from the non-verbal student to make the connection between what is being taught, and the communication translation between the technology and their artwork. The technology is out there to increase the benefits of AAC in the visual arts, but the design needed for seamless communication is missing.

Theoretical Framework

This study is framed around the concepts of semiotics, multimodality, and technology. Together these themes provide a lens through which ideas aimed at improving the visual arts experiences of non-verbal students with autism might be generated. The themes are not singular, nor interchangeable, but complement one another when applied constructively within the visual arts classroom by conscientious, effective educators.

Semiotics

Understanding Signs and Symbols. Understanding signs and symbols involves how they are used and interpreted. It is essential teachers use signs students can associate with previous experiences and knowledge in order to provide a realistic opportunity to learn about something new (Cunningham & Smith-Shank, 1992). Smith-Shank (1995) states a student's previous experience is essential for what Charles Sanders Peirce (1834-1914), referred to as semiosis and attributes the recognized resources with confidence in their presence. The result is a more meaningful and significant connection in their learning.

Meaning is made through communication (Kress, 2010). Meaning tends to arise in social environments and social interactions, therefore, the classroom is a catalyst for interpretation

according to a students' propensity for communicating (Kress, 2010). Van Leeuwen (2005) defined semiotic resources based on their meaning potential. Meaning potential refers to a symbol or a sign's past usage, affordances based on possible uses, and how this is all translated by a student relative to their own experiences. Integrating semiotic resources into the visual arts classroom seems ideal because of the visual nature of the field and because the very nature of communication in art is visual. Semiotic pedagogy, as defined by Smith-Shank (1995), is about expanding the boundaries of education.

Van Leeuwen (2015) offers suggestions surrounding the importance for students to have multimodal "out-of-school" experiences that promote the development of a semiotic language. More time is spent in the "real world" where they are proximate to various signs, symbols, and images they become familiar to within their routines. In addition, images tend to be global, and it is the visual that communicates seamlessly across cultures, translating the values that go along with the images (Leeuwen). According to Leeuwen, this is not a new phenomenon. The peace sign, a symbol of love and freedom adopted by hippies during the 1960's, was originally designed by Gerald Holtom for the Campaign for Nuclear Disarmament in 1958 (Sinclair, 2014). The symbol represented despair during a time of volatile atomic weapons research in England. Symbols can be comprehended differently according to experience as well as exposure. Responses to various symbols will invoke various dialogue about how the symbol is understood. Teachers can use this dialogue to facilitate a strong understanding of the correlation between symbol and meaning.

Semiotics in the Visual Arts Classroom. Kress and Van Leeuwen (2002) use color as a communicational semiotic resource. Color as a mode, is multifunctional in its uses in the culturally located making of signs. Kress and Van Leeuwen connect Roman Jakobson's theory of

"distinctive features" of color, such as value, hue, modulation, purity, and saturation. The authors treat each one of these features of color through grammar rather than features of a color itself. The language is necessary to connect with the visual components of the resource. For non-verbal students making meaning of a color, it will be indicated through purposeful use of the color in their art aligned to art lesson expectations and requirements. Their ability to engage in dialogue about a specific color using their AAC device is another indicator of their meaning making ability with that color as the non-verbal student will not verbally express their understanding or artistic choices through words.

Additional semiotic resources within the context of the visual arts classroom include gestures produced by non-verbal students, visual displays presented on AAC devices, custom symbols designed by the art teacher to supplement lessons, and additional text to support visual imagery. These semiotic resources as defined by Kress and Van Leeuwen (2002) represent events and relations understood across visual arts classroom community members (Jewett, 2013). They are modes shaped by how the visual arts community members use them to make meaning as a distinct, cohesive language culture.

The linguistic theories presented by Ferdinand de Saussure (1857-1913) and Charles Sanders Peirce provide specific details emphasizing the intersection of semiotic communication and linguistics and provide foundational frames for the works of Kress and van Leeuwen. The language community (Saussure, 2013) of non-verbal students in the visual arts classroom operates as a system of signs. As the art educator can verbalize directions and ask questions, the tech-driven response of the non-verbal student will be conducted semiotically, or via the sign system of the AAC device. Language is the system of signs. It is "a storehouse filled by the members of a given community through their active use of speaking, a grammatical system that

has a potential existence in each brain, or, more specifically, in the brains of a group of individuals (Saussure 13-14 in Vidra-Mitra, 2017)

Instructional conversations taking place during a visual arts lesson when non-verbal students with autism are involved require specific and unique communication approaches from each individual communicating. Because the conversation can occur across multiple modes of language (i.e., pictures, gestures, text, technology), the concept being discussed must be able to translate equally through each mode while allowing for efficient meaning making for the student through each mode. This is necessary to enable a non-verbal student to be able to communicate using their most desired means and to be able to do it successfully. During art lessons, gestures are a supportive addition to verbal instruction. Assistive technologies and visual supports offer more than simply replacing speech. According to the Autism Speaks website, these approaches foster the development of speech. While verbalizing words is not the necessary result intended, they work alongside the primary communication modes to facilitate dialogue during visual arts instruction.

The seamless inclusivity of semiotics within art education promotes the visual culture of the field. As Smith-Shank (1995) suggests the use of various methods to achieve communication in art, be it, the communicative intent of the non-verbal student/artist, or the work itself, and the communicative attempts of the non-verbal student are aimed at expanding the boundaries of art education, and there should be no limitations to this process. Smith-Shank provides suggestions for teachers to use semiotic pedagogy to engage and empower students who might then refer to their own personal experiences to begin learning new information. Through this process, all forms of communication should be made available within the multimodal art classroom and the technology to support this endeavor must meet these demands.

Social conditions and routine affect the use of language (Crow, 2016). Regarding how

non-verbal students with autism communicate effectively, a consideration must also be given to

how this linguistic approach affects our students, emotionally. According to Crow, any type of

communication attempts should be accepted and legitimized within the culture of use for it to be

considered an official language. Students are capable of achieving when they ebb and flow

between making art and communicating with their devices about what they may need or wish to

express as well as any general interactions they may have with their peers. Chung, Carter and

Sisco (2012), found that students who use AAC are challenged when it comes to accessing

interactions that can facilitate relationships and even feel reluctant to use their devices when they

are the only student in an inclusive classroom using that communication style. These types of

relationships are often especially limited for students with disabilities or autism (Chung et al.,

2012).

Parallels between the challenges of AAC use and how it impacts the student is

highlighted further in the works of Coleman, Cramer, Park and Bell (2015), as they address the

difficulties students meet when AAC is inaccessible due to high costs of technology, or low-tech

designs that do not meet the demands of the student. Not only must cost, design, and

accessibility be considered, the impact of culture plays a part in how students perceive certain

symbols. Huer (2000) suggests AAC developers should consult with consumers and families,

specifically situations where practitioners provide support to students with differing cultural or

ethnic backgrounds. Huer also suggests that students who have varying language and life

experiences often understand certain graphic symbols differently. Age is a factor in the

comprehension of some symbols and the expectation that students represent meaning using the

preprogrammed symbol system offered by the leading commercial AAC companies should not

be held, nor should it be deemed efficient. The complexity of effective AAC use is evident in the multiple systems available and the challenges existing because of this variety, inconsistent implementation, and limited symbol selection.

Multimodality and Technology

AAC as a Modal Affordance. The term modal affordance, as defined by Kress (2010), is a concept defining the potentialities and constraints of various modes. According to Kress, the affordance of a mode is dependent upon how it has been socially contextualized, meaning its use defines its "affordance". Therefore, AAC is only potentially supportive of a visual arts language development as it has been programmed to be. Like a muscle, if it is not used, it becomes atrophied. An examination of what AAC technology can provide non-verbal students with autism is essential. Deeper exploration into the specific modal affordance (Kress, 1993) of varying AAC devices can present understanding of the current capabilities of such devices and enable a student with autism who is non-verbal to maximize their communicative capacity.

The meaning students make from experience is based on previous knowledge and present levels of language, as well as how the art educator presents materials to the students and integrates the technology. The ability for students to utilize both their expressive and receptive communication skills, dependent upon their language acquisition, is critical to effective implementation of an AAC device. Jewitt (2013) states the multimodal approach, in this case, the implementation of AAC which could offer a degree of prediction in what visual semiotic resources are available for communication in concrete situations. Jewitt also states that artists communicate through visual texts; therefore, we should consider the kinds of communicative functions images are able to fulfill when we begin to plan for language acquisition in the visual

arts classroom. In doing so, educators can create the multimodality needed in support of our non-verbal students.

When considering AAC technology for a student who is non-verbal, they must first be assessed to determine if they are symbolic. It must be clear if the student is able to understand line drawings versus photographs or if the student needs an actual object to use in order to be able to communicate. The student's iconicity level at the onset of assessment must be considered because if the student cannot distinguish between two different pictures then they will not be able to use certain devices that may be too complex. Next, the student's ability to physically access the device must be determined. A thorough assessment must indicate the student's ability to use a finger to touch the small keys on a device or if they need a whole hand touch indicating the need for a completely different type of system. In addition, the student must be able to physically push the buttons on the device or more high-tech systems must be made available. Those are the requirements at the forefront to finding a suitable system. If a student is not at a quantifiable functional level, it will be counter-productive to give them a device that is too high tech initially. Doing so will add confusion, frustration, and possibly aversion to a future device. The student should be exposed to picture symbols or explore various forms of technology first. In doing this, art educators and any special educator can narrow down the student's present levels of performance based on their device fluency and develop appropriate lesson plans. This approach will also enable the educator to use adequate scaffolding and differentiation.

AAC Technology in the Visual Arts Classroom. Multimodality has altered the location of emphasis in the classroom. What was once primarily a linguistic approach to learning, is now concerned with semiotics (Adami & Kress, 2014), and because of this, a shift has occurred in instruction, -and technology. While offering opportunity for students who are non-verbal to

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participate as fully as possible in their education, technology may still be limiting how much autonomy students can achieve. As visual arts classrooms often engage in critiques about art, the dialogue needed for effective engagement must be precise. Informed talk (Albers & Hearst, 2007) is defined as critical talk about art objects. A necessary ingredient to learning through the visual arts, and art history, art educators can lead an art critique, and together, these components enable a student to share their mark making and their intent within any given artwork in a meaningful way.

Beskow, Granstrom, and House (2007) indicate AAC users put excessive effort to succeed in interpreting and in producing messages, with the help of AAC systems. Their efforts communicating with the outside world, in a relatively fast and effective way, often end in distress and disappointment. The alternative communication tools they currently employ are not fast enough or are laborious to use. Additionally, there are considerations for the challenges that arise between picture symbol and text output on AAC systems. It is imperative to understand the variations in learning experiences that can occur for students using AAC.

There is a growing need to redefine literacy according to Albers and Harste (2007), and educators need to better understand the everyday literacies that learners bring into the classroom. In relation, Kress (2010) presses the need for the development of precise tools for understanding the interrelation of resources of representation and forms of knowledge; of the effects of both shaping environments and these in relation to the facilities, affordances, potentials, and limitations of contemporary technologies of representation, production, and communication. The learning environment established by and also designed for the non-verbal student with autism warrants not only the specific mode for communication that Kress suggests but demands reconsideration of the technologies running parallel to both the new developing technologies of

the day, and language development, as well as a literacy unique to the culture. Culture refers to non-verbal students with autism who use AAC communication technology, and more specifically, the use of this technology in the visual arts classroom.

As previously mentioned, multimodal affordances can be versatile and the option for a "text" output on AAC devices is commonplace yet presents a different set of social effects and future consequences (Adami & Kress, 2014). Adami and Kress discuss how we think about "text" in a multimodal semiotic world. They consider the semiotic landscape and present the notion of "text" and "talk", as well as the related developments, threats, and challenges of multimodality.

The non-verbal student who uses the keypad to type their communication efforts faces the additional challenge of learning new visual arts vocabulary while also learning how to spell the words. This time-consuming task is bittersweet, and the time constraints of having to type each word can be frustrating and discouraging as the class moves on to the next task while a student is still navigating through the system.

An individual may use multiple modalities or many systems of AAC in combination, allowing for change based on context, audience, and communicative intent. A well-designed AAC system is flexible and adaptable. It allows for changes to vocabulary and mode of access as the individual's language and physical needs change over time. A well-designed system also maximizes the individual's abilities to communicate effectively and efficiently across environments and with a variety of communication partners (Beukelman & Mirenda, 2013). Visual arts instruction, however, has many art-based symbols missing and provides just enough symbols to meet arts instruction at the preschool or elementary level. Question and answer assessments are limited to what the device offers, and visual representations of these concepts

are often absent. For a high school visual arts curriculum, advanced art terms are standard and compulsory. Albers and Jerome (2007) suggest that educators put in place a new set of social practices to support students being critically literate when it comes to their involvement with the arts, multimodality, and the new literacies. Instructionally, teachers must build upon the literacies which today's students bring with them to the classroom. This pertains to both building a visual arts language and enhancing the technology that is available for artistic exploration and creation.

We must consider how language supports understanding visual communication as well as the numerous modes through which communication takes place. Additionally, the modes of communication that are comprehended without language is unclear. (Leeuwen, 2015). Suggestions are also made regarding how multimodality is presented within education. Leeuwen states: a) we should turn our attention to the specific visual literacies of school subjects and domains of institutional practice and seek to ensure that these form part of teacher education at a high level; b) with multimodality in the school curriculum, we should now develop assessment criteria that will help students as well as educators to understand what level of multimodal literacy has been achieved.

Review of Related Literature

Current AAC research exists that is specific to the field of special education and speech therapy (Batorowicz, Stadskleiv, Renner, Sandberg, & Von Tetzchner, 2018; Baxter, Enderby, Evans, & Judge, 2012; Gevarter, O'Reilly, Rojeski, Sammarco, Lang, Lancioni, & Sigafoos, 2013; Holyfield, & Caron, 2019; Mcnaughton, & Light, 2013; Schlosser, & Sigafoos, 2006). Although AAC evolves as new technologies make their way into educational programming for students with disabilities, there is a paucity of research specifically addressing how the technology supports language development for non-verbal students with autism who are learning

visual arts concepts and processes. Coleman and Cramer (2015) posit that art educators are obligated to collaborate with special educators or speech language pathologists to develop plans for incorporating AAC into arts instruction. This is the first step, however, a more intensified recognition of how the technology can be synthesized among individual student skill levels is needed. Peterson and Foley (1992) indicated the use of AAC of various systems provide opportunities in the art classroom that otherwise were not possible before. They provide examples such as expanded keyboards, communication devices, pointing devices, or computerized drawing software. These technology enhancements are helpful however, they do not consider the more detailed challenges that arise from working closely with specific AAC systems. The limited vocabulary and symbol selections that can provide more opportunities for conversation and language are a concern. Further examination of these issues has potential to provide information to curriculum developers engaged with technology development. Information gained from this study can be used to advocate for better software on AACs to enhance the art education of students with autism. These are fundamental necessities for any communication system and directly affect AAC and education communities, however, the development of a visual arts language for non-verbal students will continue to be hindered until the requisite vocabulary is available. A focused narrative on AAC's support of visual arts language development for non-verbal students in the arts, together with art educators effectively providing essential art making opportunities using this approach, will advance understanding of this instructional process. An understanding of the strategies currently used by art educators to promote creativity and supplement AAC systems during art making processes as well as discovering the changes that are necessary to fully accommodate visual arts vocabulary expansion for non-verbal students with autism is what this study will address.

The non-verbal adolescent student with autism has a specific set of communication approaches that fluctuate between use of device, body language, and noise making. In the art classroom, it is not uncommon to exchange information with a student through all three approaches. When it comes to instruction and the introduction of new concepts the picture symbols most used on AAC devices are the suitable choice for development of new understandings. These understandings include visual arts vocabulary. In the instance a device does not support a new word or art concept, art educators must find the next best strategy to assist in translating new ideas. Art educators are tasked with supplementing visual arts vocabulary on AAC devices. To move toward more fluid communicative attempts for non-verbal students during art making processes, it is essential we consider the various ingredients that provide maximum communication support and integrate them accordingly. More picture symbols representing visual arts vocabulary and concepts are imperative and necessary additions to current AAC systems.

Visual Literacy

The ability to read, write, and create visual images is the fundamental premise of what we know to be visual literacy. Not only does the concept apply to design elements of art making, it represents an individual's ability to communicate using a distinct language. It is the ability to create visual messages, and to "read" messages contained in visual communications (Johnson, 2008).

Johnson (2008) suggests art experiences that include questioning and dialogue facilitated by educators of the visual arts can determine how well students express themselves with art media and language. For a student using AAC, these conversations look different from those conducted with a student who has full capacity of their verbal abilities. Five appropriate

questions about student art are suggested by Johnson and Johnson-Grafe (2005): a) Ideas: Tell

me more about your idea; b) Process: How did you make your artwork; c) Materials: What

materials or tools did you use; d) Knowledge (concepts, vocabulary, artists studied): What kinds

of shapes or colors did you use; e) Future: What will you make next, or next in your work

(aligned to the steps of the process as demonstrated for students in special education).For a

student with autism who is non-verbal and uses AAC, the chance they can answer any of these

questions in any real detail, using their device, is not probable. The third question has the most

likelihood of being answered effectively when projects using basic art materials or tools have

been employed in the process.

AAC

Autism covers a range of deficits in social communication and social interaction across

multiple contexts, and restricted, repetitive patterns of behavior, interests, or activities (DSM-V,

2013). The percentage of individuals with autism who are non-verbal is estimated at 40%

(Autism Speaks, 2021). When a student cannot communicate their needs and wants, challenging

behaviors often occur. These behaviors can range from tantrum-like fits to more serious self-

injurious or aggressive behaviors putting the student and others at risk (Ganz, 2014). Research in

the area of AAC for non-verbal students with autism has grown in recent years but little research

has been carried out in arts classrooms where students with autism engage in visual arts projects.

Many art educators are teaching students with disabilities and are unfamiliar with the supportive

technology students are arriving with to their art lessons (Guay, 2006). When this occurs,

precious instructional time is lost. Navigating the communication devices can be time consuming

and frustrating, as well as accounting for different programming between devices. Training may

not even be provided or available for many art teachers.

In a preliminary study, McCarthy, Schwarz, and Ashworth (2017) discovered the accessibility of basic concept words was limited. Words such as over, under, big, little, below, above, straight, bent, curved, twisted, or balance are essential to language development as well as useful when describing artworks. These words were examined across two AAC programs, and two iPad applications: Assistiveware's Proloquo2Go and LAMP Words for Life. The authors suggest educators who have students using these types of systems, must enhance the availability and accessibility of these words for their students who use AAC devices.

Selecting Appropriate Devices and Comparing Different Systems. Gevarter et al. (2013) compared communication systems for individuals with developmental disabilities and identified the importance of selecting devices based on individual assessments. They found across a range of communication systems, that students revealed differences in acquisition rate, preferences for specific technology, and effects on problem behaviors based on learner characteristics. Their findings indicate various outcomes, both positive and negative, in support for independent communication.

The use of picture symbols for non-verbal adolescent students with autism is the most effective method to use at this stage of development. It can be helpful to just explore various forms of technology with a student to see how they respond to certain devices or programs. Even if educators, speech therapists, and family members have carefully selected what they believe will be the best technological fit for a student, simply providing an iPhone or iPad does not guarantee it will be used efficiently to support effective communication (Mcnaughton & Light, 2013).

Limitations of AAC. According to Caron, Light, and Drager, (2016), vocabulary programming for many AAC devices is conducted offline. Because of this the vocabulary to be

used is outside the interactions for which it will be learned. Globally, there is only a considerably small team of active researchers, engineers, and technical developers that are conducting high-quality research and development in AAC technology (McNaughton et al., 2019). Additionally, Caron et al. (2016) indicate only minimal attention has been directed towards improvement of the design of AAC systems to better support language acquisition.

The visual scene displays used on many AAC devices present familiar social schemas for students enabling them to retain both the conceptual and visual relationships between concepts as they have been experienced in real life (Caron et al., 2016). This may be a supportive means for students to associate what they are learning to the images available to them on their device. Many students, however, will be functioning at levels both below and above the requisite rate for this AAC device fluency. Figure 1 shows a familiar school setting that is identifiable to a more independent learner. A student with emergent cognitive functioning may not be able to understand the symbols for *Read to me*, *Ok*, and *I forgot*, displayed at the bottom. Further, scenes such as the one in Figure 1 have not been developed to involve the art studio and art processes.

Wilkinson and McIlvane (2013) found that many individuals do not maximize the potential of their AAC systems based on the adequacy of the "fit" between the system and the functional skill of the user. The exemplars provided by the authors substantiate the claims of this proposal and include appropriate and motivating vocabulary, as well as adequate training for communication partners such as teachers, peers, and family.

Figure 1

Tobi Dynavox Visual Scene Display

Art Teachers Knowledge of AAC. The existing body of literature suggests there are a limited number of studies on how AAC is implemented specifically in visual arts classrooms, including a considerable lack of training for pre-service art educators who are underprepared for inclusive arts instruction. There are, however, many studies on individuals with this neurological, communicative disability (Coleman, Cramer, Park & Bell, 2015) and the effective supports they are receiving with the use of AAC. Baxter, Enderby, Evans, and Judge (2012) provide a review of the primary contributions of AAC and factors that influence effective implementation such as: a) ease of use of devices, b) reliability, c) availability of technical support, d) voice/language of the device, e) decision-making processes, f) time taken to generate a message, g) family

perceptions, and support, h) communication partner responses, i) service provision and knowledge and j) skills of staff.

Currently, the number of individuals who require AAC services is less than the number of service providers who have expertise in the technology (Light et. al., 2019). A single major factor affecting the visual arts classroom is the art teachers' limited knowledge of individual systems (Loesl, 2012). It is imperative art educators understand the symbols on different devices as well as the strategies that are the most effective in communicating with students. Supporting a student's abilities using the most suitable AAC device is paramount, and having knowledge involving implementations and ongoing use of available technology is essential (Baxter, Enderby, Evans & Judge, 2011). In contrast, Radici, Bonacina and De Leo (2016) indicate that regardless the availability of certain types of AAC technology, symbols must be readily accessible to what the authors refer to as communication partners, or, parents, speech pathologists, special educators, occupational therapists, psychologists, and art educators. Both communication partners and the students themselves must feel as though they always have an outlet for communication. If communication is not effective using AAC, then the use of Picture Exchange Communication Systems (PECS) (Bondy & Frost, 2001) or a similar offering may provide a supportive alternative.

Coleman and Cramer (2015) provide suggestions for art educators to implement AAC during instruction to fully accommodate students with disabilities into classroom visual arts discussions and increase their ability to explore materials and processes. Art teachers must have a better understanding of their non-verbal students and how they communicate. Since communication is multimodal (Kress, 2010), and characterized by different forms or occurrences, the learning environment must also allow for numerous ways for students to

interact. Students must be able to relate to their surroundings. The environmental factors are

numerous and take the form of visual aids, picture symbols, words, and directions such as

building signs and street signs. Ideally, a classroom is universally designed to support these

various multimodal instructional methods. Through the Principles of UDL (see Figure 2)

students who are non-verbal as well as other students with varying ability levels can enter the art

classroom and can participate in any project presented. Modified workspaces, adaptive

technology and the multiple communication options that should be available in all classrooms,

enable the creative exploration so important for all students. Specifically, students with

disabilities and students with autism who are non-verbal must be able to express themselves by

their preferred and most comfortable means. Kress (2010) suggests the various forms of

communication are always responses to prompts within the environment.

While all these approaches are effective within specific applications, it can be argued that

the need for AAC is the most imperative. When it comes to the necessity of AAC the visual arts

language modeling conducted by art educators can go a long way in supporting a student's

connections to the matching symbols on their devices. When the visual arts language modeling

only meets the symbols already in a student's device exposure to new visual arts language as

well as symbols is limited (Ridici et al., 2016). Not only is this a concern for the student but also

the ability for an art educator to present the most rigorous lessons incorporating rich visual arts

vocabulary is restricted and minimized.

Figure 2

Principles of Universal Design for Learning

The Universal Design for Learning Guidelines

CAST | Until learning has no limits

Provide multiple means of **Engagement**	Provide multiple means of **Representation**	Provide multiple means of **Action & Expression**
Affective Networks The "WHY" of Learning	Recognition Networks The "WHAT" of Learning	Strategic Networks The "HOW" of Learning

Access

Provide options for **Recruiting Interest**	Provide options for **Perception**	Provide options for **Physical Action**
• Optimize individual choice and autonomy • Optimize relevance, value, and authenticity • Minimize threats and distractions	• Offer ways of customizing the display of information • Offer alternatives for auditory information • Offer alternatives for visual information	• Vary the methods for response and navigation • Optimize access to tools and assistive technologies

Build

Provide options for **Sustaining Effort & Persistence**	Provide options for **Language & Symbols**	Provide options for **Expression & Communication**
• Heighten salience of goals and objectives • Vary demands and resources to optimize challenge • Foster collaboration and community • Increase mastery-oriented feedback	• Clarify vocabulary and symbols • Clarify syntax and structure • Support decoding of text, mathematical notation, and symbols • Promote understanding across languages • Illustrate through multiple media	• Use multiple media for communication • Use multiple tools for construction and composition • Build fluencies with graduated levels of support for practice and performance

Internalize

Provide options for **Self Regulation**	Provide options for **Comprehension**	Provide options for **Executive Functions**
• Promote expectations and beliefs that optimize motivation • Facilitate personal coping skills and strategies • Develop self-assessment and reflection	• Activate or supply background knowledge • Highlight patterns, critical features, big ideas, and relationships • Guide information processing and visualization • Maximize transfer and generalization	• Guide appropriate goal-setting • Support planning and strategy development • Facilitate managing information and resources • Enhance capacity for monitoring progress

Goal

Expert learners who are...

Purposeful & Motivated	**Resourceful & Knowledgeable**	**Strategic & Goal-Directed**

udlguidelines.cast.org | © CAST, Inc. 2018 | Suggested Citation: CAST (2018). Universal design for learning guidelines version 2.2 [graphic organizer]. Wakefield, MA: Author.

Paraeducator Support

A critical element in ensuring students who are non-verbal receive support during art and with the use of their AAC devices are paraeducators or paras. These members of the classroom system provide students direction and assistance to the art teacher when necessary. They also instruct, manage behavior, and control the environment for students (Guay, 2003). Paras also face many challenges during art instruction periods. They are often unclear about how a student may feel or what difficulties a student may be having. They often must prompt students to use

their devices. In addition, they may have a lack of understanding of alternative communication methods such as American Sign Language that are often used by many students who are non-verbal.

Paras work in a one-to-one capacity throughout each school day, providing support in all areas of learning, self-care, and communication, therefore, the paras knowledge of the needs and functional skills of their student is considerable. For the paras to truly facilitate effective use of AAC during art making, they must be as efficiently trained and knowledgeable about the various AAC programs as the art teacher. Training outside the classroom for paras is minimal or nonexistent (Guay, 2003). They learn about their students on the job and traverse each day's challenges as best they can. While paras may lack the training, they tend to have greater contact time with the students and their associated devices. This leads to a naturally acquired knowledge of some of the device's capabilities and limitations. It becomes the para's responsibility in assisting the teacher with navigating the technology when they can do so.

While art educators are designing lessons for their students with disabilities, they must also be considering how they will instruct the paras in assisting the students in utilizing materials and tools appropriately. Dependent upon the details of the project, art educators must often teach the art technique to the para first for the para to then assist the student properly in creating their artwork. These considerations are necessary and appreciated yet often secondary to the actual implementation of AAC during the overall artistic process. Useful communication tactics using AAC, therefore, are not taking place until both student and para are fully engaged in the art making process.

Chapter III

Research Methodology

The purpose of this study was to gain insight into student use of AAC to understand what factors contribute to its effective implementation in the art classroom and the students' ability to develop a visual arts language. The following research questions were examined in this study:

1. How do art educators create multimodal environments that promote creativity and exploration in the visual arts studio for non-verbal adolescent students with autism?

2. What strategies do art educators and non-verbal adolescent students employ to supplement the functions of AAC devices during art making processes?

3. How does non-verbal symbol use support the visual arts language of non-verbal adolescent students with autism during art making processes in a visual arts class?

As outlined by Glesne (2011), a qualitative approach is appropriate when an exploration of in depth experiences of an individual or individuals, such as the art teacher implementing multimodal instruction in her visual arts class, and the non-verbal students experiences in art making, can be referred to as a case study. Researchers seek to understand participant experience related to a specific phenomenon. Because the purpose of the study was to examine how non-verbal students access AAC to communicate, and how art teachers and paras plan instruction to support this endeavor, a qualitative approach was adopted. This qualitative study was performed using case study methodology. A qualitative case study design supported classroom descriptions of art making processes, AAC use, student and para interactions during art making, and the overall communication activity occurring throughout the visual arts environment.

Case Study Design

The case study design was used to highlight the lived experiences (Creswell & Poth, 2018) of each participant and to understand the instructional strategies supporting visual literacy. A case study design with multiple units of analysis best suit this study because the entire study took place within a single visual arts classroom. The cases examined included the communication transactions between all participants, use of AAC, and supplemental language supports that provided each participant student opportunities for dialogue regarding visual arts concepts. The students, paras, and art teachers were the units of analysis within this case to provide varied perspectives about visual arts instructional strategies for non-verbal students with autism.

Setting and Participants

This research was situated in a public high school in one of the largest urban districts in the Northeast. The high school served approximately 60 students with special needs. The severity of students' needs varied from speech-language impairments, down syndrome, and hearing impairments to physical impairments and musculoskeletal disorders. The students being observed for this case study were adolescent students who had an autism diagnosis and who were non-verbal. Three students, enrolled in a visual arts class, were observed three times per week during each 45 minutes class, for four months. During those months, the visual arts curriculum offered two contrasting units. Students engaged in a two-dimensional collage project for two months, and a three-dimensional sculptural project for the remaining two months.

The visual arts units conducted during this study included two 2-dimensional collage projects and a 3-dimensional sculptural project. The 2-dimensional collage projects covered the works of Brazilian artist, Beatriz Milhaze's and a study of her use of line element, color, and

shape in her pieces. The objective of the project required the students to practice cutting, gluing, overlapping of cut shapes, and identification of color and shape. The second collage project involved the animals designed by children's book illustrator, Eric Carle. The objectives for this project included an understanding of animal body parts, texture, and color. Students were required to trace stencils of the animal parts and "collage" them together. The second unit involved an artist study of the sculptures of Frank Stella culminating in a 3-dimensional sculpture project using Styrofoam and acrylic paints. The learning objectives of the sculpture project focused on the concepts of building, organic shape design vs. geometric shape design, and a revisit of the element of line from the previous unit on collage.

The art classroom was set up like a professional art studio. A routine art class involved the students entering the class and taking their seat. The objective for each day's lesson was posted on the board and the art teacher introduced the project for the day. Students engaged in a visual arts discussion about the artist, art style, or technique presented each day. During this visual arts discussion students utilized their devices to ask questions and respond to questions posed. There was a full wall of windows that allowed for natural daylight to fill evenly across the classroom. In one corner, there were easels set up for students for when they practiced still life paintings. Large tabletops were available for students to work on around the room. Because class size was small, usually 6 or 8 students per class, instruction took place at the front of the room, at a single large table, and as a group. This design enabled the teacher to closely monitor student communication during the introduction of a new project. Along the wall behind the teacher were posters of the principles and elements of design. These posters provided examples visually as well as textually of art concepts covered in the class.

Friends in Art

The participants in this research study were adolescent high school students with an autism diagnosis who were non-verbal: Setsu, Brian, and Thomas. Pseudonym's were used to protect the privacy of the individual students. Table 1 provides the relevant descriptions of student participants including levels of autism severity as defined in the Diagnostic and statistical Manual of Mental Disorders (Fifth Edition) (DSM-V, 2013).

Setsu was a fifteen-year-old who effectively navigated and used her AAC device independently when in art. She used the LAMP application on an iPad. Setsu showed no signs of reluctancy to navigate her device when asked questions during art. She did however have minimal challenges finding certain symbols. With continued prompting to search within the program she could successfully find and express her responses. Setsu's speech recommendation as proposed by her school speech language pathologist was considered medically necessary. Her diagnosis included mixed receptive-expressive language disorder.

Brian used the LAMP words for life program on iPad. Brian was fifteen years old and like Setsu, had been using his program long enough to demonstrate total understanding of its communicative support. While Brian could independently navigate the program, both he and other communication partners (Beukelman & Mirenda, 2013) such as his teachers, and paras, often exhibited challenges finding specific symbols. Once Brian was engaged in art making, he still struggled to fluidly integrate the use of the device into his personal work pace. Brian demonstrated a lack of intrinsic desire to integrate his device into his communication practices. He demonstrated a lack of intrinsic motivation in general. Brian's speech recommendation as proposed by his school speech-language pathologist was considered medically necessary. His diagnosis included mixed receptive-expressive language disorder.

Thomas was fourteen. He used the Proloquo2Go application on an iPad. He was independent and often spelled his responses instead of finding the corresponding symbol. Thomas would often make verbalizations of words he had spelled or symbols he had selected as he responded with them. He exhibited echolalia vocalizations repeating words made by others. While all these attributes of Thomas's speech-language characteristics suggested the need for AAC to help support successful communication, he often needed prompting to begin using his device. Thomas's speech-language recommendation as referred by his school speech-language pathologist was considered medically necessary. His diagnosis included mixed receptive-expressive language disorder.

The participants' ability to properly maximize the communicative potential of their devices, situated them as appropriate participants for inclusion in this study. They engaged in a wide variety of visual arts projects throughout the year. Often, the students employed various other forms of communication such as body language, pointing and noise making. The communication conducted in the visual arts classroom included engaging in visual arts discussions about visual arts concepts, visual arts projects, materials, processes, visual arts vocabulary, and even art history. The use of the students' specific device coupled with their language acquisition and current functional language determined to what degree they could develop a visual arts vocabulary that enabled them to better engage in discussions about art. This consideration was in alignment with the third research question because it described how AAC and non-verbal symbol use supported the visual arts language of students with autism.

Table 1

Characteristics of Non-verbal Student Participants with Autism in High School Visual Arts

Classroom

Student	Gender	Age	Ethnicity	Grade	Time in Special Education	Time working with AAC	Autism Severity Levels (DSM-V)
Setsu	F	15	Asian	10th	10 Years	3 years	Level 2: "Requiring Substantial Support"
Brian	M	15	Hispanic	10th	10 Years	3 years	Level 3: "Requiring Very Substantial Support"
Thomas	M	14	American Indian or Alaskan Native	9th	9 Years	2 years	Level 1: "Requiring Support"

Mentors in Art

Additional participants included two other art educators who taught students with autism

who were non-verbal. These interviews were conducted to better understand the similar

experiences shaping the implementation of AAC across art classrooms. The two teachers were

good candidates for this study because they had a similar pedagogical approach supporting

student AAC use in their respective art classrooms. When AAC was inefficient, the educators

used PECS systems and custom designed symbols. They worked within a least restrictive, UDL-

based classroom and offered students multiple modes for learning opportunities. Selection

criteria included having an educational background in Special Education and/or Art Education,

and years of experience and specific training aimed at teaching the arts to students with disabilities. These training courses include Teaching Artists Training Institute (TATI) a residency program that integrated the arts within academic subjects according to learner skill, and Everyday Arts for Special Education (EASE), a curriculum-based series of workshops that provided arts integrated instructional strategies for special education teachers (see Table 2). Both educators worked for the same school district for over three years, and each have classroom environments closely mirroring the focal classroom. The visual arts curriculum used by each art educator was aligned to the same teacher evaluation tool used by the district. Within each art teachers individual classroom, they both provided the same materials and taught the same art techniques to their students throughout the course of a school year.

Table 2

Selection Criteria for Art Teacher Participants

Art Teacher	Gender	Educational Background	Years in Art Education	Years Teaching Art to Non-verbal Students with Autism	Additional Preparations for Teaching Special Education
Ann	F	BA-Education MA-Special Education	11	3	TATI EASE District PDs School Site Workshops
Eugenia	F	BFA-Visual Arts/Museum Management MA-Special Education 1-6	7	7	In-home caretaker for non-verbal teenage boy for 3 years

How paras and art teachers could ease the communicative efforts of students during art making to enhance the creative output for a student was considered; here the self-expression was significant, and communication should have effectively supported the students' artistic personal vision. Observations of para support were needed to highlight the specific interactions that students who use AAC had with their devices. Paras were the immediate observers to student use of AAC and had direct knowledge of how effective a program was for a student as well as how often a student would spontaneously use their device or how often they required prompting to use it (See Table 3). The paras worked with their students in a 1:1 capacity throughout each school day providing support in all areas of learning and self-care, therefore the paras knowledge of the needs and functional skills of the students was imperative. Observations aimed at better understanding the types of communication between para and student included prompt dependency, device navigation, and general flow during art making when AAC was a necessary component to inclusion in visual arts dialogue about materials and processes. Understanding the paras influence on AAC use was valuable in distinguishing any challenges and benefits of effective implementation.

Table 3

Selection Criteria for Para Participants

Para	Gender	Professional Training	Years as a Para
Fabienne	F	District-wide and School-based workshops	22
Tabitha	F	District-wide and School-based workshops	24

Device navigation was a considerable issue that warranted further inquiry. The literature suggested that timing during AAC implementation was critical. While this could pertain to the age of the student receiving an AAC device, here it pertained to the reduction of time between the need of a symbol and the availability of the symbol as necessary in maintaining student attention and interest (Radici et al., 2016).

The Researcher

All aspects of this study involved myself as the teacher/researcher. My various roles included a) an art educator in a special education high school for students with autism; b) a participant/observer of implementation and student use of AAC devices; and c) a data collector. The collaborative process that existed between classroom paras and the myself allowed a reflective approach to the researcher role for considering the strategies used across all learning environments (Cochran-Smith & Lytle, 2009). As the teacher and researcher, I functioned as an objective note taker and attempted to integrate seamlessly into the classroom as not to draw attention to the fact that observations were taking place. My instruction and data collection occurred concurrently.

Bias, values, and assumptions were recognized and acknowledged when an observer was used in context of the study (Sarniak, 2015). I have been an art educator for thirteen years. I have taught art at the elementary and secondary level in both general education and special education settings. I have experience working in a one-to-one capacity with children with autism teaching behavior modification using the principles of applied behavior analysis. Thus, I was well-suited to implement the study.

I came to this particular research through my experience with a single individual student in an afterschool program in a public school setting years prior to this study. As the head art

teacher of a group of twelve general education middle school students, I was perplexed when one afternoon a new student arrived in my class. Kallie as she will be called for this story, was female, non-verbal, and was moved around in a wheelchair by her aide because Kallie had a severe form of muscular dystrophy. As a young educator with no direct instructional experience teaching a student with these severe limitations, I approached the director of the afterschool program to inquire about the best strategies to support Kallie and include her in the class projects. The director of the program suggested that Kallie be put in the corner because she liked to watch the other children make art. This response was not only heart breaking to hear but also unacceptable to me. I decided if I was not going to receive any helpful assistance from the administration, I was going to experiment with Kallie to see what her abilities and interests were. What I discovered was that Kallie was capable of holding a pencil, and therefore capable of making marks with a marker or crayon, and even strokes with a paintbrush. Another discovery included the happiness Kallie exhibited as she worked with these art tools. Her understanding of her own creations was clear. She would smile and make joyous noises when working with the materials. She responded to color in an energized manner and was very attentive to her own expressive designs. Providing her opportunities to create was all it took to turn her experience into a positive one. It was a revelation. The experience I had with Kallie became a powerful guiding force that reminds me why the arts are a critical component of learning and of life for all individuals regardless of any perceived limitations. Everyone can be an artist, and everyone should have the opportunity.

The experience with Kallie provides perspective involving my aim at student-centered arts instruction based on the idea that all students can create. The design of this study also highlights the detailed investigation of the participant students and their experiences with visual

arts processes. The interpretation of the research findings may have been influenced by my belief that all students deserve an arts education.

There were challenges affecting my positionality within the work, specifically my limited experience implementing AAC with non-verbal students. The foundations of speech and language development are both the diagnostic and ethical tools used to assign an AAC device to a non-verbal student. Without the background knowledge of how language develops and is studied within the non-verbal autistic population, I initially assumed that the AAC programs would foster clear and direct dialogue between all communication partners. The inconsistent sharing of these practices between speech therapists, and myself influenced my stance regarding collaboration between all professionals working with the same population of students using AAC. My personal reflexivity (Holmes, 2020) began with my professional experience as an unknowing art educator. My teaching experiences prior to working at the study site involved the arts instruction of general education students. Therefore, before working with non-verbal students, I had no real consideration for the affordances and limitations of AAC, nor did I need to. My qualifications to investigate this particular topic were ample as I was a licensed practitioner working and communicating directly with non-verbal students using AAC. I should have had the same preparation as any other special educator working with these students. That was not the case. My desire to engage in the most effective communication with my students about our art projects directed my scholastic endeavors.

Data Sources for Multimodal Instruction, Non-verbal Symbol Use, and Creative Exploration

Artwork Artifacts

Student artwork was used as artifacts to indicate how they selected symbols and made creative choices. The color choices and inclusion of various objects and visual art elements provided information about what communicative attempts were made by students to fully express themselves. For example, when asking for cool colors to finish an artwork, a student who uses AAC should have blues and greens archived in their recent selection of symbols on their device history.

The artifacts collected for this study included student artwork, art products in development, and journals of symbol use from AAC device archives. Artifacts included both a 2-dimensional and a 3-dimensional art sample from each participant. Artifacts indicated the creative intent of the student measured against the project instructions and aligned to symbol selection recorded on individual student devices. This data was collected sequentially on the data capture journals by the paras. A rubric designed for each art project allowed for measurement of artifact completion. The AAC communication symbols collected on the data capture journal and the evidence of corresponding symbol selection based on the media and the subject matter included in the artwork artifact should have aligned to the project requirements listed in the rubric (see Figure 3).

Interviews

Interviews took a semi-structured approach to capture the personal perspectives and first-hand experiences of two additional art educators who taught the non-verbal, autistic population (Seidman, 2013). They served to determine common trends in AAC use, specifically in the art

classroom and the patterns of teacher planning and implementation that supported effective use of the devices and supplemented symbol limitations.

Figure 3

Visual Arts Rubric: 2-Dimensional Collage and Visual Literacy

	1	2	3
Creativity Creates a collage that demonstrates good craftsmanship and creativity	Art product lacks evidence of instructional expectations (use of correct colors of objects in collage, balance), work does not demonstrate good craftsmanship	Art product demonstrates some creative intent, but work is incomplete and only some instructional expectations are met (use of paper material, composition, balance)	Art product demonstrates attention to detail, demonstrates creativity, and uses good craftsmanship
Artistic Skill Uses art elements aligned to concepts being taught	Use of scissors and glue, and placement of paper material in art product do not correspond to collage elements and display	Some elements and principles of art have been incorporated into the work	Visual imagery in art product aligns to elements and principles taught during instruction Art product indicates intent to consider placement of paper materials in collage and selection of favored paper designs
Discussing Art/ **Visual Literacy Skills** Discusses elements in artwork artifacts using their AAC or PECS	Student does not attempt to participate in discussion about art project Art product shows little to no evidence of AAC/PECS symbol use during art making No cohesion to art product	Participates in a collaborative conversation and recognizes some design elements Some elements of work align to AAC/PECS symbol use, but some do not	Participates in a collaborative conversation about abstract collage Use of elements and principles of art in collage align to AAC/PECS symbols used on device

Note: Visual arts rubric for 2-dimensional abstract collage project demonstrating visual literacy skills

The format of the interviews was structured (See Appendix A) and they were also video recorded. A series of questions pertaining to arts instruction with non-verbal students with autism was conducted with two art educators working in special education. The structured format allowed for consistent responses from participants. Initial interviews were conducted and allowed for follow up interviews based on responses. The interviews were designed to discover patterns in art teacher instructional strategies, challenges of working with students with communication limitations, and supplemental communication practices. Filming the interviews

allowed for reviewing participant responses and offered nuanced and anecdotal evidence of teacher experience.

Observations

Observing the students using their devices during art indicated the communicative value of program symbols as discussions about art necessitated AAC implementation. The desire for a student to communicate during the art making process revealed various distinctions that could only be translated after direct observations pinpointed patterns and themes across participants. Observations allowed for anecdotal note taking. Data collection from observations were categorized on data capture journals (Figure 4) to indicate what symbols students were using, if they were using their devices independently or if they had to be prompted to use them, and the missing symbols that would have supported a more rigorous visual arts discussion about the art lesson taking place each day. The data capture journals recorded communication attempts made by students when engaged in art making processes. Either prompted or independent use of AAC was documented and allowed the researcher to determine how often AAC supported dialogue. Additional recording of symbols that were missing but needed to provide art-based language was taken. Collecting communication data in this manner emphasized areas of greatest concern and suggested areas that art teachers could design supplemental instruction around. Elements of the learning environment through semiotic resources beyond AAC that were observed could reinforce the student/teacher interaction strategies, support clarifying the research questions, and emphasize student visual literacy proficiency for each student.

Video Recordings

Video recordings enabled the researcher to capture real-time student use of AAC. This approach was not exclusive but was preferential to note taking as video enabled the researcher to review

recordings and return to individual student footage without having to rely on memory and the

fragmented quality of note taking. Further, the transcriptions of videos provided rich descriptions

of what was taking place in the classroom as students moved back and forth between their art

making and their devices. Video recordings were conducted using a Panasonic Lumix G digital

camera that was set up on a tripod. All footage was uploaded onto the researcher's personal

password protected laptop computer.

Figure 4

Data Capture Journal

<div align="center">DATA CAPTURE JOURNAL</div>

STUDENT: PROJECT:

COMMUNICATION ATTEMPTS: AAC/Proloquo2Go/ LAMP/Gesture/ASL

MATERIALS NEEDED:

DATE	AAC DEVICE/OTHER	P/I	SYMBOLS USED DURING ART MAKING

Note. P/I Indicates AAC use: prompted or independent selection of symbols; ASL = American Sign Language
Figure 4. Data capture form recording symbol selection and prompting on AAC technology.

Data Collection Procedures

During art making processes, students turned to their AAC devices independently or were

prompted to use their devices for communication. Data in the form of observations and artifact

analysis were collected demonstrating the supportive or limiting characteristics of specific AAC

devices. For this study, a broad description of the artistic expression of non-verbal students with

autism was presented. Additionally, the consideration of the part AAC plays, and art teacher question and interaction were included. The development of a visual arts language expressed by students using AAC, PECS pages, or body language, and closely aligned to art vocabulary presented within each art lesson, was documented through observations, and provided evidence to suggest the effectiveness of the AAC systems in the development of a visual arts language. This art vocabulary was often supplemental to the learning objective and necessary. Once the visual arts discussion concluded, the materials were presented and discussed. Afterward, the process the students were working on for the day was demonstrated and modeled. Finally, students received their materials and began their work. Primary data, in the forms of observations, interviews with art teachers, data collection journals, video footage, and collected artifacts in the form of completed art projects (Creswell & Poth, 2018), acted as evidence to clarify exactly how the devices were supporting the students. System limitations that may have been preventing students from engaging in deeper conversations about the art, as indicated through video recordings, data capture journals, and observations were considered. Data were collected during the Fall semester 2020. During the four months between September and December, data collection was briefly interrupted by the Covid-19 pandemic, however, data collection resumed after two weeks of remote instruction.

Information was recorded using field notes, as well as interviews and observational protocols, including the permission for students to be observed for the purposes of this study (Creswell & Poth, 2018). The comparative data enabled identification of patterns and themes that emerged. Through interview analysis, common trends in AAC implementation were described (See Table 4).

Data Analysis

The analysis process of a qualitative case study requires descriptive details of the setting, chronology of events and analysis of the multiple sources of data (Cresswell & Poth, 2018). Coding was the primary step in data analysis. The coding process used in thematic analysis enabled an organized categorization of codes to develop as patterns, and from that emergent themes could be established. Coding further enabled the researcher to reflect on interview and observation data as they generated perspectives of art teacher and para experiences. A continual assessment of data from previous coding episodes took place to ensure patterns could be authenticated.

Open Coding

During open coding, transcriptions from interviews, observations, artifacts, and video recordings were made before data were analyzed using cross-case analysis (Stake, 2006). To compare and identify codes, differences, and similarities between participants and their use of AAC constant comparative analysis (Saldana, 2016) was conducted. This approach provided corroborating evidence for validating findings (Creswell & Poth, 2018), and allowed for greater familiarity with developing patterns.

Pattern Coding

Recoding allowed the researcher to organize the data into complementary categories based on patterns representing the emergent themes. During data analysis, guidelines on coding and design of qualitative data (Creswell & Poth, 2018; Saldana, 2016) were utilized to prevent unbalanced significance placed on any individual data set. The pattern coding was conducted to identify similar phenomena across participants that appeared more than twice (Saldana, 2016). Patterns that emerged provided trustworthy evidence for the findings since patterns demonstrated

habits, salience, and importance in people's daily lives (Saldana, 2016). Participant's daily lives

were in many ways dependent on their need for AAC. Saldana also indicated the five "R's" as

evidence of pattern building: routines, rituals, rules, roles, and relationships, and all these

behaviors were coded as they provided evidence of student use of AAC during art making

processes.

Table 4

Data Sources and Forms of Analysis

Data Sources	Timeline for Data Collection	Links to Research Questions	Analysis
Observations of Focal Students	Ongoing during art class, 3 days per week for 4 months	• Research Question #1 • Multimodality, student use of art elements • Research Question #2 • Strategies that support AAC • Research Question #3 • AAC and Visual Arts Language Support	Memos Pattern Coding Emergent Themes
Video Recordings of Studio-based Arts Experiences	Ongoing during art class, 3 days per week for 4 months	• Research Question #1 • Multimodality, student use of art elements • Research Question #2 • Strategies that support AAC • Research Question #3 • AAC and Visual Arts Language Support	Transcription Pattern coding Emergent Themes
Artwork Artifacts	Once per month across 4 months. A mid-point and final assessment for each unit	• Research Question #3 • AAC and Visual Arts Language Support	Rubric

Table 4, cont.

Data Sources and Forms of Analysis

Data Sources	Timeline for Data Collection	Links to Research Questions	Analysis
Data Capture Journals	Ongoing during art class, 3 days per week for 4 months	• Research Question #1 • Multimodality, student use of art elements • Research Question #3 • AAC and Visual Arts Language Support	Rubric
Interviews with Art Teachers	Initial interview at onset of study, follow-up interviews as needed	• Research Question #1 • Multimodality, student use of art elements • Research Question #2 • Strategies that support AAC	Memos Pattern Coding Emergent Themes Categorization of Art Teacher Experiences

Emergent Themes

Emergent themes from coding followed the theoretical framework analysis (Saldana, 2016) for semiotics, multimodality, and use of technology and supported triangulated data along with interview and observation codes. Thorough description was achieved presenting interviewee participant voice and detailed description of each case and aligned to the three research questions guiding this study. Coding using thematic analysis allowed for a well-structured approach to handling data and generating unanticipated insights (Noell et al., 2017). Files were created to save documents and journal entries covering information gathered during interviews and observations. All data were password protected on the researcher's personal laptop.

Trustworthiness

        To reduce the possibility of bias it was important to focus on evidence that supported the research questions. Asking timely and relevant questions when immersed in the art making process (Sarniak, 2015) ensured honest, true perspectives from the art educator and para participants, and through additional observations, patterns of communication were distinguished that corroborated shared experiences. These approaches to data collection also supported research question three: *How does non-verbal symbol use support the visual arts language of non-verbal adolescent students with autism during artmaking processes in a visual arts class?* Additional approaches to data collection through multiple data sources of observations and video recordings, as well as interviews and data capture journals minimized the possibility of bias in the interpretations. Additionally, multiple sources of evidence strengthen good case studies by contributing to the authenticity and trustworthiness of the research work (Glesne, 2011).

        Transferability was established using Lincoln and Guba's (1985) evaluative criteria. This guideline was essential to bring more credibility to the field of art education when students with disabilities were the focus. Details were presented through thick description. The inquiry into student learning was interwoven with the researchers own intentions and interpretations (Cochran-Smith & Lytle, 2009) but were applicable to the larger community of art educators who teach students with disabilities. Triangulation using observations, interviews, and the artwork artifacts ensured the findings of the study were credible and further reduced bias. Along with improving the accuracy of collected data, triangulation balanced the findings and interpreted emerging themes.

        When it comes to coding non-verbal interactions and expressions, the data capture journal contributed to a solid catalogue of communication attempts. The data capture journal

collected each symbol selected on student AAC, as well as their use of PECS system symbols

when AAC did not support a desired word. Memoing allowed for coded data that sought patterns

and themes in student, para, and art teacher behavior observed through video recordings and

transcribed from interviews.

Follow-up reviews of findings with art teacher interviewees and paras supported

identification of any missed information about AAC use as well as identified gaps in the data. A

review of the findings by participants substantiated researcher interpretations as representative of

participant experience and beliefs. These follow-up sessions also provided affirmation of sound,

reasonable conclusions about the collected data.

Chapter Summary

This study was a qualitative case study using direct observations of non-verbal adolescent

students engaged in the art making process and the implementation of AAC during those

processes. Researcher proximity to the participants (Creswell & Poth, 2018) provided additional

observation details of interactions between students and paras using gesture and supplemental

language. Further, the characteristics defining this study as such were described through video

recordings and interviews aimed at understanding student use of AAC while also considering

their non-verbal limitations, how they compensated for their inability to talk, and their

knowledge of visual arts concepts evident in their art making products.

As practitioner-directed research, the exploratory nature of the study recognized the total

environmental structure and all influential factors including researcher, students, and para

interactions, and how behaviors were impacted by the multimodal environment of technology,

visual aids, and additional supports that were created to provide students opportunities for

maximizing their own creativity and exploration. These considerations addressed research

question one: *How do art educators create multimodal environments that promote creativity and exploration in the visual arts studio for non-verbal students with autism*? The visual aids, PECS systems, texture boards, and physical interactions between students and their teachers supported different communicative styles. These teachable moments were observed, analyzed, and highlighted. Additional considerations surrounding the practitioner-directed components of this study included strategies used by art educators and non-verbal students when communication devices were absent, not charged, or limited in supporting what was being taught. Inquiry into specific AAC device functions involving accessibility of visual arts vocabulary and symbol availability in support of the development of a visual arts language were also examined.

The semiotics of effective AAC use was explored to determine how visual symbols could be matched using color, shape, or imagery in student artwork. Specific visual arts vocabulary has basic symbols available on current AAC technology and the interpretation of the symbol was essential to understanding how a student connects their need to their art. Additionally, their comprehension of what was being taught, evidenced in their symbol selection during art making was dependent upon their interpretation. For instance, a student may need more glue during a collage making project. On many devices glue is represented using a bottle shape. When a student understands glue as a glue stick shape, the translation for understanding and learning what that symbol means must be understood by those supporting the student. Observations were conducted to better understand the strategies being implemented by teachers and non-verbal students to supplement missing symbols on AAC devices and to address research question two: *What are the strategies art educators and non-verbal students are using to supplement the functions of AAC devices during art making processes?*

Lastly, the study examined and analyzed the shared activities of three non-verbal students (Cresswell & Poth, 2018). Questionnaires with paras were conducted to explore how interactions with students alter or promote use of AAC. Interviews with special education art teachers contributed to our understanding of the common strategies used by other art teachers to supplement AAC limitations, examine the variations in AAC implementation between different visual arts classrooms, and probe for different methods of instruction that generate communicative competence for students using AAC or the alternative PECS system. The interview process aimed to understand the lived experiences (Seidman, 2013) of each of the teacher and para participants. Interviews with art educators and paras were video recorded on a Panasonic Lumix G camera. Presenting data using this method promoted valuable details of their involvement in the complex communicative transactions and art making processes that took place. Further, questionnaires designed to understand Speech Language Pathologist attitudes toward AAC were included as well as the responses of both teachers and speech therapist members of Assistiveware Community Group and LAMP Words for Life Users Group. These online groups provide support and troubleshooting perspectives for professionals who work with students who use Assistiveware and LAMP programs. Interviews and questionnaires contributed to triangulated data that also included artifacts in the form of student artwork.

For the purposes of this study, we considered the variations of spoken language, body language and gestures, expressive and receptive language, written or typed text, the multimodality of non-verbal communication styles such as the PECS symbols used by non-verbal students to communicate, and AAC systems including high tech, basic, and speech generating devices such as text to speech technology. Study findings pertaining to the methodology described in this chapter are presented in Chapter 4.

Chapter IV

Findings

The purpose of this research was to gain insight into student use of AAC to understand what factors contribute to its effective implementation in the art classroom and the students' ability to develop a visual arts language. Specifically, the following research questions were examined using a qualitative case study design:

1. How do art educators create multimodal environments that promote creativity and exploration in the visual arts studio for non-verbal adolescent students with autism?

2. What strategies do art educators and non-verbal adolescent students employ to supplement the functions of AAC devices during art making processes?

3. How does non-verbal symbol use support the visual arts language of non-verbal adolescent students with autism during art making processes in a visual arts class?

In this chapter, findings are presented consistent with data collected for case study methodology. Additionally, this chapter includes a presentation of codes and the resulting themes that emerged from the codes, description of analysis and narrative description of visual art room processes underpinned using the framework: technology, semiotics, and multimodal instruction.

Participants

This study examined three adolescent high school students with autism diagnosis who were non-verbal and their visual literacy development during artmaking processes in a visual arts classroom. Setsu (15 years old), Brian (also 15 years old), and Thomas (14 years old) received art as part of their regular curriculum.

During art instruction, AAC provided a voice for the participants. While there were some similarities of AAC use during the study, each participant's access and use of their system was unique to their communication style. The data capture journals highlighted the specific symbol selections made by students on their AAC during art making processes. Specifically, the data capture journals recorded when a student was prompted to use their device or when they spontaneously and independently communicated with it. Consistent collection of technology support data was taken by the paras during each art lesson. The relevant vocabulary unavailable on each AAC device, yet needed for rigorous dialogue about art concepts, was recorded and considerable (Appendix X). To better understand how the participants engaged with their AAC during art instruction, their communication with AAC was analyzed to determine how often they were prompted to use the device, when they used the device spontaneously or independently, and when the AAC was used, but symbols were not found (Table 5). Thomas was most efficient with his device with the highest occurrence of independent use. Brian had the lowest occurrence of independent use however he was independent more often than he was prompted. These data do not indicate exactly which symbols were selected therefore Brian's independence could be the result of simple yes or no responses he offers regularly. Finally, observation and video data both indicated that Setsu could effectively navigate her device more efficiently than Brian.

Setsu

Setsu used her LAMP Words for Life program a total of 148 times with communicative intent. She was prompted to use it 63 times. This indicates that for 42.57% of the times, Setsu was prompted by her art teacher or para to use her device to communicate effectively. 57.43% of the time, Setsu was independently communicating with her device however, 48 or 32.43% of the time, her device did not contain the relevant visual arts vocabulary symbols.

Table 5

Prompted, Independent Use, and Unavailable Symbols on AAC

Student and AAC System	Setsu LAMP on iPad	Brian LAMP on iPad	Thomas Proloquo2Go on iPad
Prompted	42.57%	46.42%	35.93%
Independent	57.43%	53.57%	64.06%
Unavailable Symbols	32.43%	28.57%	42.19%

These data were significant for Setsu because her Autism categorization as defined in DSM-V (2013), Requires Substantial Support, indicated opportunities for visual literacy development were dependent in part on assistance she received from her para or art teacher and her ability to access pertinent symbols for communication on her device necessitated supplemental vocabulary 32.43% of the time.

Brian

Brian used the LAMP program on iPad. He used his device a total of 56 times. Of those 56 communicative transactions, 26 times or 46.42% of his communication was prompted and 30 times or 53.57% was independent. A total of 16 communicative attempts, using symbols specifically related to the visual art project being conducted, were not available on Brian's program. This data indicates that 28.57% of the time, Brian and his art teacher and para had to refer to real objects or PECS cards to supplement the missing symbols. These data were significant for Brian because his Autism categorization as defined in DSM-V (2013), Requires Very Substantial Support, indicated opportunities for him to develop his visual literacy were directly dependent on the assistance he received from his para or art teacher, including his ability

to access vocabulary that would build his communicative repertoire. His access to appropriate symbols was limited on AAC and prompted 46.42% of the time he was engaged in a communication transaction.

Thomas

Thomas used the Proloquo2Go program on iPad. During data collection, Thomas used his device a total of 64 times. Of these 64 communications, 23 or 35.93% were prompted, and 41 or 64.06% were independently made. Twenty-seven symbols relevant to the art projects being conducted were not available on Thomas' program. These data indicate that 42.19% of art symbols were needed yet unavailable on the Proloquo2Go system. These data were significant for Thomas because his Autism categorization as defined in DSM-V (2013), Requires Support, indicated his ability to develop his visual literacy was not dependent on support from his para or art teacher. However, the limited symbol selection on his AAC required Thomas to access supplemental vocabulary in the form of picture images or vocabulary cards and this condition did require support from his para or art teacher.

Data and Analysis

The three participant students were observed across fourteen weeks of studio art instruction covering projects requiring 2-dimensional and 3-dimensional art making techniques. Two paras and two art educators were interviewed to offer perspectives on art making processes conducted with non-verbal students. Five data collection sources were used to conduct this study: 1) observations for note taking and memoing, 2) interviews to gain insight into art educator implementation of AAC with non-verbal students and to discover patterns across art teacher experience, 3) video recordings to acknowledge real-time interactions between student and para, and to catch artmaking nuances, 4) data capture journals to record symbol use on AAC and
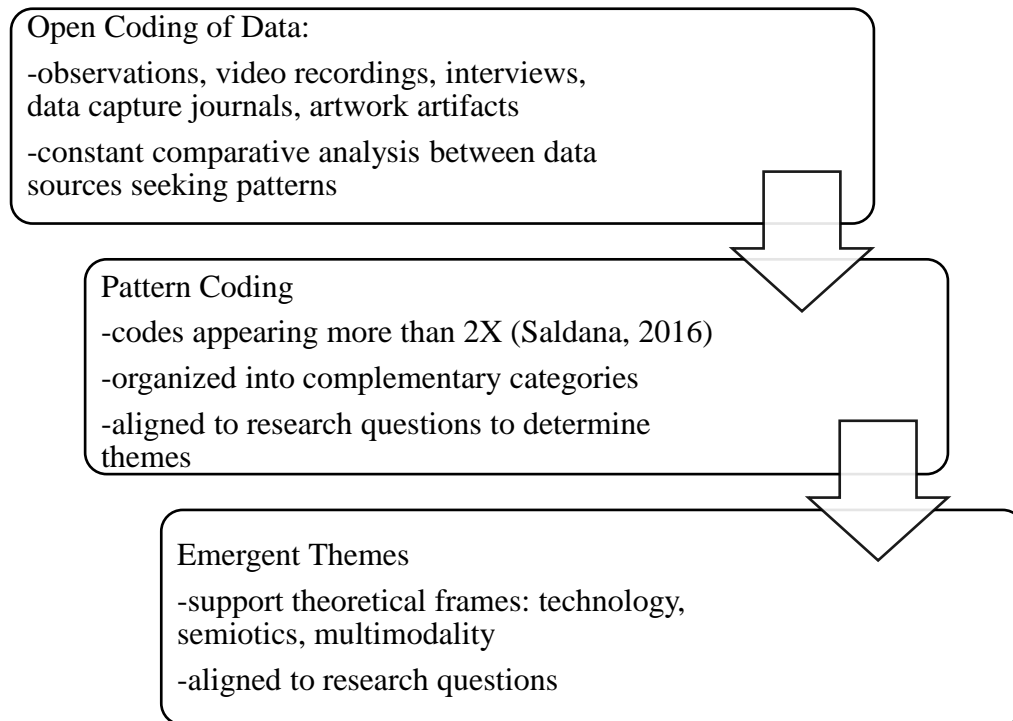
prompt vs independent use of AAC, and 5) artwork artifacts to recognize how visual literacy is present through student use of art materials and processes.

The findings presented in this chapter describe the multiple analyses that were conducted to examine individual student experience in the visual arts studio, to consider two different AAC programs as an affordance for efficient classroom discussions about visual arts concepts, and to describe art teacher experiences implementing AAC. Atlas.ti qualitative data analysis software was used to analyze, code, and form themes across data using an open coding process. The results of first cycle open coding yielded 56 codes however, pattern coding was conducted during second round coding and codes that were not replicated were removed, leaving 27 codes appearing two times or more, and with at least one instance of the code appearing across two data sources. From the coded data, categories were created to organize the codes into complimentary groups. After the categorizing process was complete, corresponding codes were compared against the research questions for thematic analysis. Finally, the emergent themes were combined from pattern coding that supported the theoretical frames of technology, multimodality, and semiotics across all five data sources. The codes appearing more than two times (Saldana, 2016) were graphed (see Figure 5).

Figure 5

Codes, Patterns, and Emergent Themes

> Open Coding of Data:
>
> -observations, video recordings, interviews, data capture journals, artwork artifacts
>
> -constant comparative analysis between data sources seeking patterns

> Pattern Coding
>
> -codes appearing more than 2X (Saldana, 2016)
>
> -organized into complementary categories
>
> -aligned to research questions to determine themes

> Emergent Themes
>
> -support theoretical frames: technology, semiotics, multimodality
>
> -aligned to research questions

Note. Data and Analysis Process

Figure 6 presents codes that occurred across data sources with most frequency during analysis and the resulting themes and subthemes that emerged as important pieces of communication phenomena taking place in the visual arts classroom. Codes were combined when they supported a larger theme. For example: Theme 2: Differentiation through Multimodalities was identified by codes that were similar or considered to have the same characteristics within the data. These codes included: AAC, Gesture, PEC, True Objects, sensory experience, and physical demonstrations. These codes support theme two because they were all concerned with communication behaviors and the many modes used to achieve communication.

Figure 6

Code Frequency
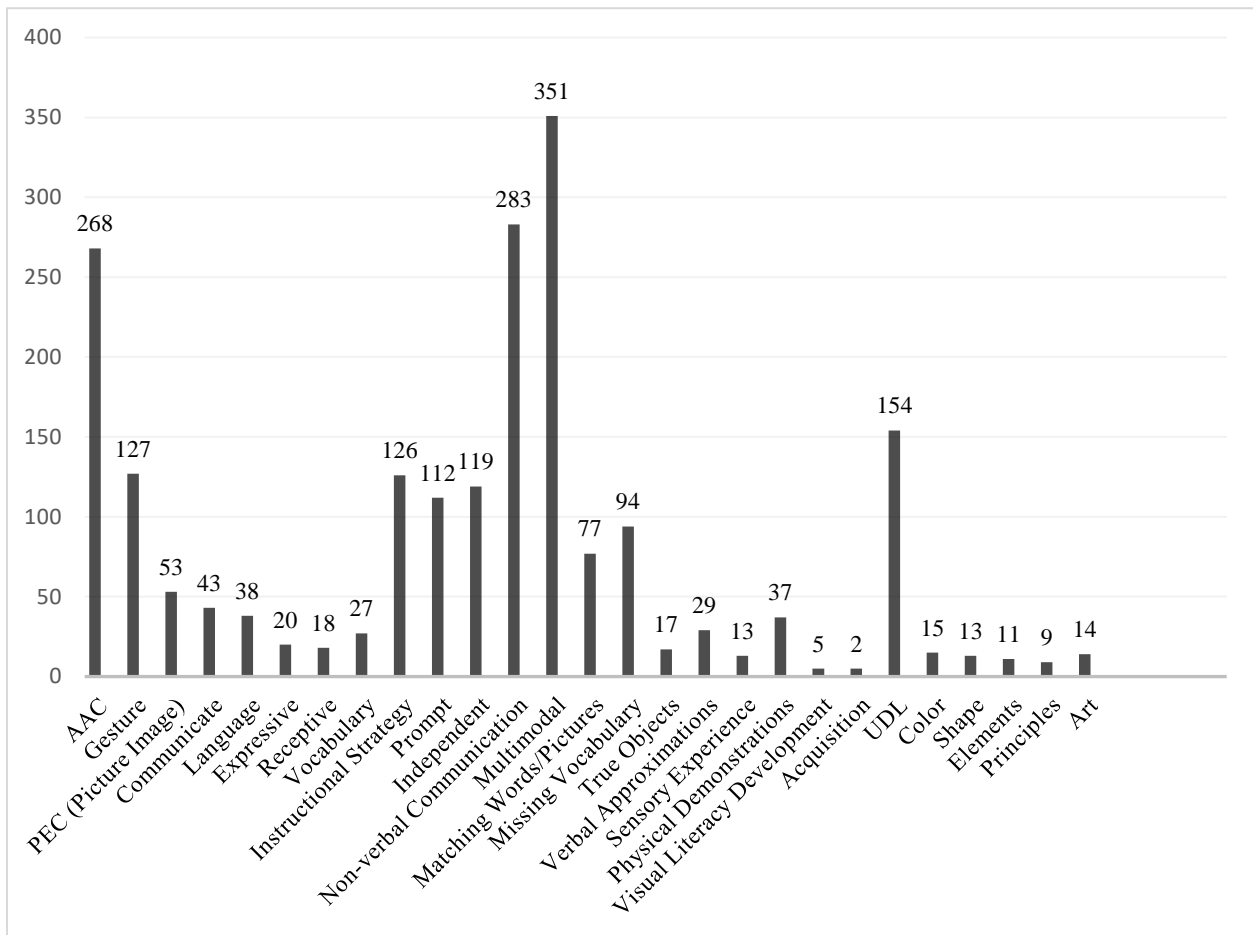
Note: Frequency indicates number of times a code was identified across observation, video, interview, journal, and artifact data.

The initial codes formed across all data sources included: prompt, independent, vocabulary, elements of art, principles of art, learning, instruction, language development, Proloquo2Go, LAMP, language acquisition, PECS, colors, shapes, 2-dimensional, 3-dimensional, sculpture, symbols, hand-over-hand, non-verbal symbol use, art, collage, build, paint, communicate, AAC, technology, strategies, support, communication attempts, gesture, device, language, visual arts language, literacy, multimodal, true object, verbalize, vocabulary card, body language, cues, sharing, asking, conversation, matching, UDL, photograph (image),

multimodal environment, expressive language, receptive language, semiotic behavior, confusion, navigating (AAC device), visual language, sensory experience, and supplemental. Each code associated qualities the researcher believed to be relevant to each research question.

Themes

It was found that four overarching themes (Table 6) emerged as the most common art studio strategies designed to support the development of visual literacy. Those themes were: (1) Responsive Paraeducator Interactions, (2) Differentiation through Multimodalities, (3) Art Symbols: Navigating AAC, and (4) Artwork Talks. The first theme, Responsive Paraeducator Interactions addressed the practice of gesture and prompting most often used by paras to facilitate art making and dialogue using the most appropriate means. An examination of para proximity to student revealed Vygotsky's Zone of Proximal Development as an area of learning that was supported by the interactions between para and student. Additionally, the course of action taken by paras to provide opportunities for students for visual literacy development placed the communication practices within the ZPD. The second theme, Differentiation through Multimodalities, emphasized instructional strategies designed using multimodal approaches (i.e. technology, sensory input, choice, and diverse presentations of visual arts content) to meet students' preferred modes of communicating their visual arts language. Art Symbols: Navigating AAC was the third theme that emerged from the data and this theme focused on the semiotic nature of symbols on AAC. The distinction between visual art-based symbols (language) on AAC, and the important ingredient of device familiarity needed by all communication partners was considered. The fourth and final theme emerging from the data was Artwork Talks. This theme dealt with the concept of student self-expression and the use of materials, elements of art, and principles of design. These art features, and how they were used, were indicators of meaning

making and communication. The artwork artifacts communicated through students' use of color, shape, and other design elements revealed all the instances creative choices were made and where visual literacy could develop.

Table 6

Codes, Resulting Themes, and Descriptions

Themes	Theme Descriptions	Codes
Theme 1: Responsive Paraeducator Interactions	The practice of gesture and prompting most often used by paras to facilitate art making and dialogue using the most appropriate means, para proximity using Vygotsky's ZPD	Prompting student, use of various gestures, true objects, physical demonstrations by para or art teacher, understands how to implement AAC technology
Theme 2: Differentiation through Multimodalities	Instructional strategies designed using multimodal approaches to meet student's preferred modes of communicating their visual arts language (technology, sensory input, choice, presentations of visual arts content)	Classroom awareness, ability to oversee, providing specific directions, prompting paras and students, use of various gestures, physical demonstrations, redirecting students, implementing AAC technology, use of PECs, true objects, providing sensory experiences through art making
Theme 3: Art Symbols: Navigating AAC	The semiotic nature of symbols on AAC and the distinction between visual art-based symbols (language) on AAC, and device familiarity	Understands the technology, semiotic knowledge (what the symbols mean,) acquisition, missing vocabulary
Theme 4: Artwork Talks	The concept of student self-expression and the use of materials, elements of art, and principles of design for meaning making and communication	Purposeful use of color, purposeful use of shape, elements of art, principles of design, sharing, how materials are used

Many aspects of the communication circumstances taking place during data collection overlapped between the various themes. In this chapter, therefore, findings were presented by theme. The occurrence of communication behavior overlap should be regarded as clear interpretations of visual literacy practices in the art classroom. The strategies were not isolated approaches but were regarded as one part of a larger visual literacy goal.

Responsive Paraeducator Interactions

Paraeducator assistance promoted visual literacy development primarily through the use of scaffolded prompts and gestures for student use of AAC, to maintain student attention, when responding to students in their preferred communication mode, and as guidance for students to stay on task with art making projects. Both paras in this study used gesture and verbal communication with their students during the majority of artmaking interactions. Proximity of para to student impacted the relationship of instruction to learning and influenced independence as well as direct teacher engagement.

Prompting Creativity with AAC. Para questionnaires revealed that supportive approaches to student communication were used by Fabienne, and Tabitha, and authenticated further in interview data with art educators, Ann, and Eugenia. The para, Fabienne worked closely with Setsu and Brian. Tabitha worked closely with Thomas. While paras are not required to find alternative methods to supplement language on AAC, both Fabienne and Tabitha used gesture and verbal communication with their students during the majority of artmaking interactions. Video data revealed that on 11/25/20 during instruction, Fabienne prompted Brian physically to select colors after I asked him: "what colors are you using?", Fabienne showed him a blue PEC piece of paper. He selected pink but was laughing which indicated he was being facetious. He was redirected to blue with prompting from Fabienne. Next, I shared a color

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diagram on the SMARTBoard. I asked what two colors make green as I also showed a blue, yellow, and green sample color card. Brian touched the green card. Brian pointed to the board laughing and vocalizing. Brian selected the orange symbol randomly, "what two colors are on your palette" I asked. He selected red and yellow as I demonstrated color mixing with yellow and blue. Fabienne physically and verbally prompted Brian to select yellow and blue color cards. I asked him what color I made and he independently and correctly selected green. Next, Fabienne physically prompted Brian to use his paintbrush for water paint and to make strokes with the brush as I demonstrated the physical motion to the class. Eventually, Brian engaged with the materials independently, but the moment was brief and Fabienne continued to prompt him verbally to stay on task. I asked Brian what he was doing and showed him a PEC that says "painting." Fabienne repeated the word to Brian and showed it to him again. He touched the PEC. Later in the process, he picked up the PEC and gave it to Fabienne. Brian got into a habit of simply wetting his page with water and not using paint unless Fabienne prompted him physically and verbally to work through the art making steps: water, paint, paper. In this example, Fabienne's support enabled Brian to work with the materials appropriately which reflected his individual creativity. The creative explorations afforded to students when paras were guiding the art making process were controlled yet strategically flexible. Allowing Brian to manipulate the art tools while receiving prompts supported his creative preferences and process.

During art making, device limitations necessitated supplemental instruction. Physically prompting students, and the subsequent creativity that followed indicated a propensity for independent use of AAC as Setsu and Thomas can and preferred to work independently. Both Fabienne and Tabitha indicated that prompting students to use their device helped them to use it more independently later on. Tabitha stated: "when you are working with the students and

integrating the device into the conversation, over time they begin to understand its purpose and how they can use it to request art materials". Her statement underscored the important aspect of prompting as well as modeling. When students observed paras using their devices to create a dialogue during conversations about art, they also wanted to access the language.

Para prompts were further evident as students progressed through their projects and needed more materials. Video data from revealed a typical supportive moment between Thomas and Tabitha and their interactions during the Frank Stella sculptural unit. Tabitha shared the geometric word card circle, to get Thomas to navigate to his shape section on his device. She asked him to review the Frank Stella artwork and to identify other shapes in his work. Thomas correctly selected circle. She said: "are there any other shapes you know," and Thomas selected square. Thomas was very well acquainted with the location of symbols on his device. Tabitha demonstrated tracing the geometric stencils onto Thomas' Styrofoam plates after I had modeled the task before the entire class. While she demonstrated the task, she reiterated the vocabulary to Thomas. Next, Tabitha presented a trapezoid-shaped card and Thomas correctly identified it using his AAC, however on the Proloquo2Go device, the shape selection was labeled "trapezium." Thomas did not make that distinction. He picked up the trapezoid stencil, placed it onto his Styrofoam plate, and traced it with a crayon. He cut the trapezoid shape out of the Styrofoam afterward as expected. It was noted that Thomas was directed by Tabitha to put his painted shapes on the drying rack across the classroom as he finished. He was painting with dark blue paint on this occasion, but that color was not on his device. Unprompted, Tabitha made a dark blue vocabulary card to support Thomas' understanding between dark blue and the standard lighter blue color symbol accessible on his AAC. She also held up both dark blue and light blue paint bottles and repeated the color names to him several times. Moments later, I asked Thomas

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what color he was painting with. He thought for a moment, looked at his AAC, then picked up

the dark blue vocabulary card. This demonstrated his ability to distinguish between the color

variation. Additionally, this exchange promoted Thomas' ability to choose colors based on his

creative intuition.

On occasion Thomas' speech therapist, Betsy would come and work with him in the art

room. Although her primary role was as speech therapist, there were times she functioned like a

para. In part, this was due to her having observed the paras in their role with Thomas during

visual arts instruction. The following conversation demonstrated Thomas' ability to engage in

dialogue about color after the instructional component of the lesson had taken place. Because he

was well acquainted with his device, the fluid characteristics of his AAC use are apparent:

Betsy: Thomas tell me the cool colors you are using today. What colors represent winter

and the ocean?

Thomas: (using his Proloquo2Go on iPad) selects green.

Betsy: that's right, green is a cool color. Tell me another cool color.

Thomas: (using device) selects blue.

Betsy: You are so smart! Nice. Are you going to paint with green or blue next?

Thomas: (using device) selects green and begins to paint his shape.

Betsy: Thomas, tell me what you are doing. (She hand-over-hand prompts him to select

"I" "am" "painting" on his device).

Thomas continued to paint until he finished the green shape. Afterward he placed the

shape in the drying rack and returned to his device and selected purple.

Betsy: You want to paint the next shape purple?

Thomas: (with Betsy's physical prompting) selects "I" "want" "purple".

Thomas painted the shape purple paying attention to the edges and painting them

thoroughly as well. The conversation concluded with Betsy prompting Thomas to say "I"

"want" "blue" instead of just having him select the symbol for blue.

(December 11, 2020)

The interaction between Thomas and Betsy presented a conversation that suggested the semiotic

nature of AAC was easily translated between communication partners when basic "one word"

(color) responses were needed, such as "what color are you using?", and "blue". However, the

desire for a phrase or sentence to be practiced required Betsy to prompt Thomas to find the "I",

the "am", and the "painting" symbols separately and then add them together to complete the full

sentence: "I am painting." While AAC supported the communication, the syntactic rules of

language were not as easily achieved.

During another para-student interaction, Setsu exhibited clear understanding of the

creative art making process between herself and Fabienne. Fabienne prompted her to navigate to

her shape symbols while also verbally directing her "go to your shapes." She did not have a

symbol for "organic" so Fabienne created a vocabulary card with the word and an organic shape

design (Appendix I). Fabienne demonstrated tracing and cutting the various organic shape

stencils onto Styrofoam while repeating the words for each step and the word "organic." Setsu

traced the stencils properly but was supported by Fabienne to cut some of the shapes as the

material presented some challenges. Although, Setsu demonstrated some frustration in the form

of whining during the hand-over-hand guidance to cut, she was content upon completion because

she was clear on clean-up processes and proceeded to clear her table appropriately. Video data

recorded on 12/10/20 presented another successful artmaking session for Setsu as she painted her

geometric shapes with warm colors. Fabienne minimized the field of choices on Setsu's LAMP

device using a window shield so Setsu could tell her she was painting with the color orange. Fabienne held up a triangle shape card and Setsu selected the triangle symbol properly. She painted her triangle; she was a thorough painter, painting both sides with attention and accuracy. Setsu even took time to paint the edges of her Styrofoam shapes. Fabienne reviewed the shape and colors with Setsu before she painted each piece. She independently chose each of the five warm colors: red, yellow, orange, pink, maroon on her device as she painted each of the five geometric shapes. The ability for Setsu to access each shape and color symbol on her AAC as she worked, and Fabienne's responding to her, provided feedback to Setsu that she was on task. Further, the important element of matching her shapes and colors to the AAC symbols demonstrated her mastery. For Setsu, the corresponding symbols simply confirmed her knowledge. The reinforcing quality of color and shape language could have been a redundant practice during art making, however the confidence building aspect of successful communication with her para encouraged more advanced communication aimed at visual literacy development.

Triangulated data from observations, interviews, and artifacts supported multimodal strategies, supplemental communication opportunities, and indicated the value of non-verbal symbol use for visual language. Interview data revealed both Eugenia and Ann utilized the support of paras for student success. Ann noted-

> If all my methods fail, I will look to classroom paras. They know the students
> very well and can assist the students when they need to communicate or can get a
> communication device or a visual board students will respond to (Ann, personal
> interview, 10/9/20).

Similarly, Eugenia stated:

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I use a board called "give me 20" made by the speech providers at my school, so

when students need the extra opportunities to communicate, I have the paras offer

the board during instruction. This way the student can participate with or without

their device and the paras can keep them on task. (Eugenia, personal interview,

10/10/20)

The additional language paras offered to the students enabled them to advance on what visual

arts language they already had, whether it was through AAC, vocabulary cards, or picture

images.

The data capture journals further supported how often a student made a communication

error and was corrected. One exemplar included a confusing moment for Setsu. On 10/22/20, I

observed and indicated a tendency for Setsu to defer to a color symbol when presented with

actual scissors. This error was common. She was selecting the color symbol to indicate the color

of the student-sized scissors that are made with plastic handles of varying colors. While her color

selection may have been correct, her confusion about the tool she was using to create her collage

necessitated the use of hand-over-hand prompting by the para. Fabienne prompted her to

correctly select the scissor symbol on her device. These data revealed opportunities for teachable

moments where she could distinguish between what she was doing (the action "cutting") and

what she needed to communicate. The non-verbal symbol use signified opportunities for visual

language development.

The directions provided by paras during classroom discussions about visual arts concepts

or the project under way enabled students to access language from their device, supplemental

vocabulary cards, or images in a timely manner and develop visual literacy skills. Using a

combination of verbal, physical, or gestural prompts, paras responded to the needs of the non-

verbal students with autism and enabled them to stay on task during arts instruction and directed

or re-directed their communication using AAC symbols or picture systems.

Para Proximity to Student Art Making. Beyond assisting with the navigation of the

AAC device, another way paras demonstrated responsive support was through proximity during

student art making. The level of para support fluctuated between helpful guidance and hands on

direct physical prompting to complete a task. It was observed that the discrepancies between

students' levels of independence were important to note when considering the level of support

required to optimize "teachable moments" where visual literacy development could take place

for each student. Specifically, the level of support required for each student seemed to align with

the severity levels of autism as defined in the DSM-V (Diagnostic and Statistical Manual of

Mental Disorders-V, 2012.) (See Appendix B). Thus, each student's level of support informed

how the paras worked within the students' Zone of Proximal Development.

Proximal refers to skills the student is close to mastering but needs more guidance and

practice in order to perform them independently. In these situations, the important technique of

prompt fading was used by the paras. Prompt fading required that prompts be "faded" or

removed quickly enough that students did not become dependent on the prompt. Across the two

art units documented in this study, the paras were in tune with the students and able to slowly

fade physical prompts to ensure students were still successful in their conversations and art

making applications. The use of delayed time allowed students the critical time frame to think

and apply their learning when responding with AAC, and finally, para proximity ensured

students could practice their independence but remain confident the para would provide support.

Multimodal strategies were implemented to support art techniques that demanded more

sophisticated physical maneuvers than what the participant students could independently

perform. Hand-over-hand prompting was another supportive interaction used by both paras to facilitate many different techniques of the art making. These physical prompts (the para's hand over top of the students hand) assisted the motions of art making such as painting strokes back and forth, cutting with adaptive squeeze scissors to help a student "stay on the lines," or supporting fine motor limitations.

Interactions between Brian and Fabienne were more frequently conducted because of the level of support required by Brian. For Fabienne to maximize her support during his art making and communicating, strategies for working within the ZPD of a level three: requiring very substantial support (DSM-V, 2012) are presented below and illustrate the additional reinforcements necessary to meet Brian's learning capabilities.

Brian had weak dexterity and often needed the hand-over-hand support from Fabienne. Video data revealed Fabienne hand-over-hand prompted Brian to trace, cut, and glue his collage (10/22/20). During this moment, Brian complied and allowed Fabienne to support him. This moment was critical in building upon performance levels for Brian and exemplified his ability to know what was coming in the way of support. He had the ability to anticipate this guiding moment and he did not resist. Additionally, while supporting Brian during his art making, Fabienne worked within Brian's ZPD to assist him in reaching a level of independence with his art making. Fabienne's guidance provided Brian support to engage in more demanding art tasks such as cutting Styrofoam. A thicker material than paper, Brian used his adaptive squeeze scissors with Fabienne's hand-over-hand support and manipulated a new material. Because Brian required substantial support, Fabienne very rarely faded any of her physical prompts.

The interaction below revealed the typical conversation between Brian and Fabienne based on her proximity to him during art making processes. The excerpt involved conversation about texture during the Eric Carle 2-D animal collage project.

Brian: (pointed to texture board and vocalized)

Fabienne: Tell me which texture represents soft.

Brian: (independently touched the various textures on the texture board but did not select soft to be the correct response)

Fabienne: (hand-over-hand prompting) This is soft. See, soft feathers.

(October 22, 2020)

The conversation above demonstrated Brian's experience with the texture board. While he may have received some sensory input by touching the various textures, Fabienne's prompt for him to touch soft, and her verbalizing the word "soft" at the same time, provided corresponding stimuli in the form of tactile and auditory perception.

The 2-dimensional collage artifacts designed by Brian both indicated he had lots of assistance from Fabienne his para, and that he was prompted to contribute to his work more often than not (see Figure 7). Data from the data capture journal and video footage supported how paras provided multimodal language prompts such as vocabulary cards or picture images. Brian's Beatriz Milhazes collage was sparse, lacking the same quantity of paper pieces as Setsu or Thomas' pieces. This detail explained the pace at which Brian worked as compared to Setsu and Thomas. This detail further indicated Brian's limited desire to even complete the projects. He showed no sense of urgency. These factors were noted through observation data:

Every step in the art making task is prompted. She uses both verbal and physical

prompts. While tracing a stencil physical prompts to cut were used. He is not

attending to his task of cutting. He is looking around the room, not at his art. Physically twisting glue stick caps off are too difficult. We move to a bottle. Squeezing requires too much muscle also. He can use glue sticks appropriately. He touched the glue stick top to signify "finished". He only added a couple pieces to his collage. He responds quicker to verbal prompts from his para. During collage she is always hand-over-hand prompting. She shows glue and asks: "show me the glue". He lightly touches glue stick. He will attend to tasks more closely when one on one assistance is given.

(Observation data: October 30, 2020)

Brian's art making process always demanded acute attention from his para, Fabienne. In this way she was able to scaffold her approach to prompting his contributions to his work. Providing materials to him in the sequential order he would need them allowed Fabienne to develop an organized art making process for Brian as described in the following video data:

Fabienne presented the art tools to Brian in the order he would need them: Paper, pencil, stencil. Using vocabulary cards for each material, Fabienne said "trace the stencil with the pencil". Brian was prompted to pick up the pencil and hand-over-hand prompted to trace the stencil on the patterned paper. Next Fabienne cleared the materials and presented materials for the next phase of the project. She presented paper, scissors, and glue. Fabienne matched the vocabulary to each material then told Brian he will cut and glue. Fabienne prompted Brian to pick up the scissors. She hand-over-hand prompted him to cut with the squeeze scissors the shape he had traced. The next step was to glue the shape onto his collage.

She repeated trace, cut, glue periodically throughout the process.

(Observation data: October 22, 2020)

With minimal internal motivation to explore art materials, Brian exhibited a strong desire to observe others throughout the classroom instead of attending to his work. During these occasions Fabienne prompted him to return his attention to the materials in front of him. To complete an art project her physical prompting was always necessary and ultimately overrode any work that could be considered completed by him. On 10/20/20 Brian and his para, Fabienne engaged in a lot of hand-over-hand prompting to support his work. She assisted him in coloring, cutting, and gluing, and faded her prompts as often as possible. As Brian worked with Fabienne, she stated each art action to him: "cut with scissors", "cut on the line", "nice cutting." Brian followed along appropriately. His work should be considered a collaboration with Fabienne rather than an individual production. Brian engaged in coloring independently, but he had to be redirected often. He was capable of completing basic art tasks. Prompting him using shapes and colors on his device would elicit a response one time. Since Brian did not comprehend the differences between "my work" and "our work," the process of creating with his para gives him the one-on-one attention that brings him joy.

Additional interactions had to be verbally or physically prompted. Fabienne and Brian engaged in a conversation about cutting his animal out for his collage:

Fabienne: (hand-over-hand prompting Brian) Let's count your giraffe's legs: one, two, three, four. Good Brian, four!

Brian: independently picked up his texturized paper to trace on

Fabienne: (hand-over-hand prompting) Let's trace your giraffe's legs now. Tell me how many we need to make. (Fabienne hand-over-hand prompts Brian to select 4 on his device.)

(November 13, 2020)

Figure 7

Brian's Eric Carle-inspired Giraffe

The artwork artifacts indicating para support was apparent for students like Setsu and Brian. While Thomas's work was completed almost entirely independently and organized, Setsu and Brian required additional guidance. This guidance took the form of physical and gestural prompting to use AAC or supplemental vocabulary and images, it met multimodal needs for art making, and it provided not only creative support but offered some freedom for the students to explore each art process. Setsu's artifact offers a glimpse into her spontaneous approach to artmaking and joy of using glue and paper materials. This is evidenced in the video footage of

her working and the lively quality of her collage application. Any communication taking place during this art making session was facilitated by the para to promote visual literacy.

Para support in maximizing opportunities for visual literacy development was evident across data capture journals for all three participants and stated as a common classroom strategy in both art educator interviews. These findings indicated that the ability for non-verbal students with autism to develop visual literacy was often dependent upon para support during multimodal instruction, device capabilities, and supplemental language prompted by paras during art making processes. Although initially described here, responsive para support is evident in the remaining themes as well.

Beyond the Technology: Differentiation through Multimodalities

Visual arts instructional strategies implementing the multimodal use of AAC, PECS, true objects, sensory experiences, and text presentation of information supported visual literacy development for students with autism. Continual attention paid to the art language provided on AAC and supplemental materials during visual arts lessons bolstered dialogue between all participants. The consistency and repetition of art-based language presented in the various modes of imagery and print paved the way for visual literacy to materialize in these moments. However, it was important to distinguish where AAC or supplemental language such as vocabulary card or picture images was going to achieve the desired language transaction. Having access to both modes during art making was the ideal scenario for the participants of this study and extended the applicable communication opportunities for the students.

Consistent with UDL (CAST, 2018), being able to provide students multiple modes of instruction, beyond the AAC, required strategic planning, communication, and organization from the art educator and the paras. The observations in the structured learning environment and

conversations with the paras and art educators were used to identify patterns and themes and compare the "lived experiences" of each individual working within the special education visual arts environment. The presence of multimodalities was organized by subthemes to represent more specific details about differentiation during instruction and art making processes. The subthemes included Universal Design, Gesture: prosodic and iconic, Visual Graphics, Text and Words, and Tactile and Sensory Perception. Each subtheme was a multimodal instructional strategy and/or communication behavior that elevated learning opportunities for the students.

Universal Design. Art content offered to students through the various modes of imagery, printed subject matter, tactile materials and music offered flexible learning transactions that fostered visual literacy in the art classroom. The principles of universal design were present in observation and video data and took the form of various representations of language, communication, and support from paras. This support was designed to accommodate each participant's ability. Most often, visual images were used and presented on the SMARTBoard or printed out and provided to each student individually. Lists were used to offer students text input and a guide to follow for each step in the art project. During the Frank Stella 3-d sculpture project, video data from 11/6/20 indicated vocabulary cards for "modernism," "abstract", and "geometric" were used. These terms were not on AAC and provided the students additional links to their learning component. Physical shape cards were also implemented; a triangle shaped card with the word triangle on it maximized learning opportunities for Brian. These instructional strategies are backed with those found in the interview data of Ann and Eugenia and supported the teaching methods of both art educators. This supplemental shape and vocabulary approach dominated their visual arts classroom and provided numerous communication opportunities for students beyond what their AAC systems offer. During the interview with Ann, she indicated

that information and knowledge student's acquire beyond verbal instruction was presented by visual, auditory, and physical or gestural means.

> If students arrive without their primary use of language, I may try multiple strategies such as offering pictures. Pictures are great to use because students can pick and choose what they need to say, and well, pointing to the picture indicates they want the item in the picture. I also use written directions of the task; this provides students with a guide on how to complete the assignment. I think students like this method a lot because it gives them a satisfaction that they are completing their work and successful each time they get to check off the list. When I make these types of directions they can be modified by words or steps for each student's ability, or for the expectations I have for a particular student. If all my methods fail, I look to the paras to assist the students.
>
> (Ann, personal interview, October 9, 2020).

Universal Design was not a novel component in multimodal instruction for students with autism. The blending of the various strategies enabled all participants to negotiate their understanding of art content across a landscape of learning challenges. A conversation with Brian demonstrated the various modalities offered to him to provide language and discussion about an art topic. Not only were supplemental language options incorporated into the conversation, gesture was also a part of the communication:

> Fabienne: What colors do you see in the painting (Frank Stella artwork presented on the SMARTBoard)? (she silently points to his device)
>
> Brian: (looking at his device) selects orange
>
> Fabienne: Nice job Brian.

Maude: (presenting a triangle shape card) what shapes do you see in the artwork Brian?

Brian: selects circle.

Maude: (hand-over-hand prompting) let's try again, (triangle card is presented again, matched to the triangle in the artwork on the board) what shape is in the artwork?

Brian: (with hand-over-hand prompting) selects triangle.

The field of choices was minimized using a window shield

Maude: try again. What shape do you recognize in the artwork Brian?

Brian: (independently) selects triangle.

Both repetition and reiteration of correct response were useful strategies to reinforce Brian's learning. His ability to make the connections between shape design and color began at the onset of instruction and was continually presented to him through modes and verbal praise that offered cognitive reinforcement (Skinner, 1969).

Gesture. The use of a diverse range of gesture was used to communicate to students the various steps in each art making process. While gesture was used by all participants, its effectiveness was evidenced in video data and occurred as often as use of AAC. This outcome indicated the contrasting convenience of AAC to finding communicative means more naturally. Gesture was a more immediate form of communication and most often limited to basic translations such as nodding for yes or pointing. The use of more sophisticated gesture to engage students was also used. There are a range of gestural behaviors, including non-verbal gestures used to communicate across all conveyances of language. From the data collected for this study,

two such gestural styles were recorded as natural and essential means to communicate in the visual arts classroom. Following are descriptions for prosodic and iconic gesture.

Prosodic Gesture in the Visual Arts Studio. A technique used often to emphasize size, shape or form in art, sound or prosodic gesture was often used to gain a student's attention or to demonstrate an art technique using a specific intonation. An example was drawing a dotted line. To emphasize the spaces between each mark, video data indicated the art teacher would make a "boop, boop, boop" sound as the dots were drawn on the board. This technique highlighted the design component for the students and demonstrated the important mechanics of lifting the drawing tool or brush between dots to make them separate from each other. To reinforce this technique, physical hand-over-hand prompting to make the dotted lines was needed for Setsu and Brian. While Setsu was able to eventually complete the task independently, Brian always needed the physical prompting to make a dotted line. Finally, the use of intonation occurred by the art teacher and paras when praising students on correct responses or successful art making moments.

Iconic Gesture in the Visual Arts Studio. During instruction, iconic gesture was also used. An example included the hand gesture to indicate cutting with scissors. Using forefinger and middle finger the art teacher and paras gestured cutting in this way. This gesture was used to prompt Setsu and Brian when cutting was the next step in an art making process. Typically, the gesture preceded the question: "what do you need to do next?" When the reply was not easily achieved, the gesture was used to promote a correct response. These multimodal strategies to communication demonstrated the alternative approaches to instruction and questioning sequences used by paras and the art teacher.

In comparison, gestural language presented communicative opportunities

in the classroom of art educator Eugenia. Like Ann, Eugenia's classroom

environment was designed to offer visual aids alongside textual aids.

The variety of instructional aids suit different students under different

circumstances. I find that my students communicate beyond their AAC device in

multiple ways. So, for instance, if they want a different color or material, they can

simply point to what they want or physically get up and go get it, but sometimes a

student will walk toward the cabinet in the classroom or the area where they know

what they want to use is stored. When socializing to share their projects, they use

"friendly touch" to get a peer or their para or myself to look closely at their

creation. The art room is a fantastic place to communicate through the process of

making art, which is what makes art so necessary to students with special needs.

(Eugenia, personal interview, 10/10/20).

In Eugenia's experience, pointing and other physical gestures were important in the overall

communication that occurs during the art making process. Gesture functioned as a common

understanding between all communication partners in the art studio.

Gesture became the second most used multimodal instructional strategy after AAC. This

was exhibited across video and interview data and confirmed in the data capture journals and

observation data. Use of both prosodic and iconic gesture demonstrated strategies used by paras

and art educators to promote creativity during art making.

Visual Graphics. The visual component of multimodal instruction provided students

images of famous artworks and art examples and was recorded in observation and video data. Art

was already a visual endeavor through which students expressed themselves with color and

additional principles of design. Their attention to imagery whether displayed on the SMARTBoard or provided in PECS, photo images, or printed images demonstrated opportunities for learning through visual presentations of art content and opportunities for visual literacy development.

The SMARTBoard allowed for large pictures of real-life visual arts content and art historical imagery that aligned to the art lessons being taught. A Frank Stella 3-dimensional sculpture, when presented on the SMARTBoard, offered students an art reference to match vocabulary and elements/principles of art during instruction. Students were provided the vocabulary that matched imagery on the board. Having the diverse applications enabled students to follow the lessons using the most appropriate mode for their communicative style and their ability to engage in dialogue about the art. One example of matching mode with communication style was shared by Eugenia:

> When creating art, I might show one student the color red and then have them touch the symbol, then have them touch the red bottle of paint. While I am doing this, I am also verbalizing "red", or "red paint." For another student I might show them two different color bottles of paint, then have them use their communication symbols or their AAC device to tell me which one they prefer to use. For other students I might just ask them outright, "what color would you like to use, without a visual, and they can use their device to answer my question.
>
> (Eugenia, personal interview, 10/10/20)

Eugenia's planning and using of visual graphics was influenced by student use of AAC.

The visual input Eugenia's students were receiving was reinforced by her use of real objects in the form of the paint bottles. Their association to the color and the paint was reciprocated by the available color symbol on the device.

By implementing a mix of multimodal teaching approaches and UDL principles such as offering students a variety of visual representations of art-based information, students experienced a thorough art lesson, rich with visual arts language and stimuli. The multimodal and supplemental blueprint designed for instruction promoted creativity and visual language during art making processes. Students benefitted from the incorporation of the essential visual arts skills presented to them through art appreciation exercises and demonstrations of art making techniques. The strategies used to provide students opportunities to engage with visual arts materials and processes was realized through careful instruction designed by the art teacher and paras. Implementation of AAC supported immediate communication for the students as they worked.

Text and Words. Beyond the technology, print-rich vocabulary cards and other visual aids offered language opportunities for students. To reinforce learning, pertinent vocabulary was always reiterated. Steps to the art process were demonstrated and listed on the SMARTBoard as the class went through each. Art tools and processes were clearly stated and named during instruction. Support was always provided to the students. For instance, it was observed on 9/23/20 that Brian worked best with continued prompting, both verbal and physical. When his device was not charged, he responded best to PECS images. The hand-over-hand support offered by Fabienne to complete tasks enabled him to get more work completed. She assisted him in tracing stencil shapes during which he would demonstrate minimal following along with his eyes and have to be continually redirected to attend to the work. He required hand-over-hand

prompting to cut with the adaptive squeeze scissors. He would squeeze lightly but needed real support in following through with cutting. Brian would not choose scissors on his device and "cut" was not a simple option or text option that would work unless he was prompted to express that art action.

Physical demonstrations of art techniques given by the art teacher and reinforced by paras through verbal or physical prompting supplied students with examples of art making expectations. Presenting the written steps of each art process allowed students who read the additional knowledge to be successful and follow in a step-by-step process to complete tasks. Each multimodal instructional procedure increased the probability of students learning and knowing through visual arts processes. The dialogue occurring during these art making moments was often promoted by teacher and para, but spontaneous communication using any of the modes available indicated a student was deliberate in their effort to make meaning of their creations.

Printed content presented to students during instruction and art making included vocabulary terms that corresponded to images and symbols used to engage in dialogue about the visual arts concepts each day. The opportunity to match a word with an idea, image or symbol provided additional learning opportunities. For example, the art teacher would present a detail of an artwork such as the eyes of Leonard da Vinci's *Mona Lisa* (1503-1506), present a vocabulary card that said eyes, and students then had the opportunity to find the symbol for eyes on their device. The multimodal strategy of picture images to represent concepts allowed students to identify and match, which allowed them to communicate their understanding of detail within a historical artwork or their own art creation.

Tactile and Sensory Perception. During a discussion about animals and texture, Thomas demonstrated positive identifications of several animals including alligator for which he

spontaneously described its texture as rough. I noted that this response was recalled from the previous days lesson. This texture symbol was not on Thomas Proloquo2Go system and was selected using the texture board (see Figure 8). The class also discussed that an alligator texture could be described using the words or symbols for bumpy and rigid which were present on the texture board but not on either AAC device. Additional textures discussed included soft and fuzzy for the brown bear. Setsu required hand-over-hand prompting to find the bear symbol on her AAC.

The programming of each AAC device was a deciding factor in how students could engage in art conversations. As the AAC programs can have symbols added or removed, Setsu's animal category supplied her with interesting options:

Fabienne: (sharing an image of rhinoceros skin texture (rough))

Setsu: selects "velociraptor"!

Fabienne: wow, Setsu! What a unique guess. So close. Let's look closer and try again. What animal could this be?

Setsu: (with hand-over-hand prompting from Fabienne) selects rhino but then selects bumpy.

Fabienne: oh, okay. Is it a bumpy feeling?

Setsu: selects the yes symbol.

Fabienne: (presenting texture board) show me bumpy.

Setsu: (with hand-over-hand prompting from Fabienne) touches the bumpy texture on the texture board.

It is important to note here that the skin texture of a rhino and a velociraptor may have been similar in appearance. Setsu was not necessarily wrong when choosing velociraptor for "rough". It does beg the question, how is Setsu familiar with a velociraptor? She may have been making an association with previous learning not related to this art lesson. Additionally, when Thomas was asked about the texture, he selected both "snake" and "ridged" for his answer. All of these answers were similar and "on the right track".

Figure 8

Supplemental Texture Board
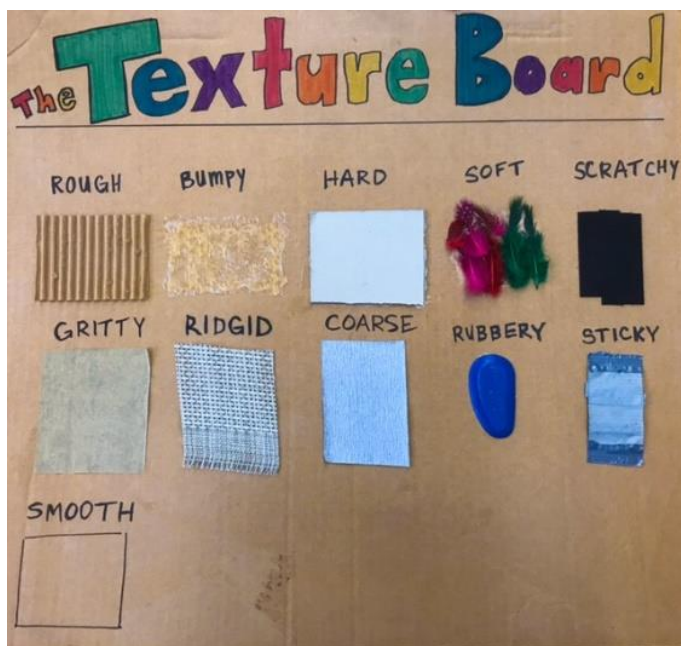
Multimodal instructional strategies aimed at reaching the students through their various receptive channels promoted learning connections for each. Some of the additional studio designs included labels of all materials so students could become aware of their spelling. Providing students materials as needed reinforced the important concept of process. Visual aids and the artwork being studied were always visible during the entire session so they could be referred to and discussed as needed. AAC and additional supplemental materials were always

available and within reach of each student. Communication with the technology was intermittent dependent on the conversation taking place. Thus, the language challenges occurring during these times bring us to the third theme, the importance of navigating the AAC.

Art Symbols: Navigating AAC

The AAC system was one aspect of multimodal opportunities for language used in the classroom and described above. AAC was an important component of differentiation through its affordances in allowing students to respond to questions during instruction. Further, the AAC is often used in conjunction with the responsive support of paras. Through analysis of observations and video recordings, insights were gained regarding the semiotic nature of AAC use by non-verbal students with autism and the communicative attributes of the two observed systems (i.e. LAMP and Proloquo2Go). Screen displays and symbol output vary between systems as seen in figure 9. An observable pattern that emerged was that AAC comprehension, or knowledge of the device and its features, determined the efficacy of the language program. Student use of AAC aligned to symbol selection on the devices, the details of which provided key information about what vocabulary and "conversations" students were having during art making. It was also noted that when AAC symbols were not available, supplemental language resources were helpful when they were made accessible. Thus, while the AAC is an affordance, there were times it did not always meet communicative demands of classroom dialogue. Information supporting the art process and the creative intent of the student was determined by comparing artistic choices evidenced in artwork artifacts to data capture journal recordings of symbol use. Technology and semiotics were the underpinning frames for this theme.

Knowledge of AAC Art Symbols. Student, para, and art teacher knowledge of art-based symbols on AAC devices determined to what degree visual literacy could develop using that

technology. The students' understanding of how their device worked was paramount to integrating it into classroom use. When the para and art teacher are unfamiliar with the program, it took minutes away from instructional time to navigate to needed symbols to support an art dialogue. Thus, para and art teacher familiarity of the technology facilitated seamless discussions about art content. The ability for any communication partner to navigate the device was at the forefront of efficient art dialogue.

Setsu's artifacts provided details aligned to what symbols were selected to assist communication during her artmaking process. During the 2-dimensional, Eric Carle-collage animal project she navigated through her LAMP program and continuously and independently selected the animal symbol for echidna. An echidna is a medium-sized hedgehog-like mammal with spines similar to a porcupine. The animal has large claws and a long beak. They are brown in color. The animal symbol was available on Setsu's device (Figure 10 echidna on AAC.) Her artwork artifact (Figure 10 her echidna collage) noticeably aligned to the physical characteristics of the animal. I had noted in the data journal the vocabulary available to Setsu in her visual screen display; her symbol choices were brown, purple, green, white, and crayon. These symbol choices were present in her work. Further video data supported Setsu's accurate identification of purple, blue, and brown crayons using her device when it was presented to her by her para, Fabienne. Fabienne's knowledge of art-based symbols enabled her to assess what Setsu's communicative intentions were. Her understanding of the device, and rapport with Setsu was principle in maintaining reasonable language transactions. This included "AAC coaching" and supplementing when necessary. Setsu's ability to respond with the AAC supported the notion that visual language development occurred when AAC was effectively implemented in the visual arts class.

Similarly, in her 2-dimensional collage, Setsu demonstrated consistent selection of both color and shape choices, and when vocabulary was absent from her LAMP program there was supplemental texture vocabulary presented in the form of a texture board. On 10/16/20 Setsu accurately identified the purple crayon using her device. She continued to color her textures within her Eric Carle work. She selected a new color by touching her device but then laid her head down momentarily. She resumed playing with a green crayon while vocalizing. After identifying a green crayon in her crayon bowl, she looked around the room briefly as if to confirm her work process was still on task, and then Setsu began tapping the crayon on her desk several times. Setsu decided to select a new color but before choosing a different crayon, she grabbed a handful of crayons. Upon doing this it seemed Setsu enjoyed the feel of all the crayons in her palm. Her para, Fabienne instructed her to return to her coloring process. Next, Setsu selected the red crayon and properly identified the color on her device. She hesitated but her para physically prompted her to stay on task and continue working on her picture. As I visited Setsu's desk later on in the process, I noted the "ING" symbol had been selected on her AAC. When I asked Setsu to tell me what she meant, she showed me her crayon and then selected the "ING" symbol again to state she is "crayon-ING" or coloring. This confirmed her understanding of the artmaking process in which she was engaged.

In another of Setsu's artmaking sessions (10/22/20), she used her device to correctly answer what color is the hippo? She selected blue. After viewing an image of a leopard on the SMARTBoard, however, Setsu needed assistance in navigating her device to find the leopard symbol. During this moment, she exhibited some mild self-stimulatory behavior in the form of clapping and hand waving. Setsu was re-directed back to finding the appropriate animal symbol. It should be noted that both the Proloquo2Go and LAMP devices included a symbol for a

leopard. Color symbols were high frequency art vocabulary. Her knowledge of them and their location within the program enabled her to fluidly respond to what color the hippo was. However, her inability to properly locate the leopard symbol, and her need for Fabienne's assistance to do so, presented latency in her response time and thus self-stimulatory behavior was the result. Fabienne's knowledge of the AAC system served as a guiding light in times when Setsu was lost looking for the correct symbol for communication.

Although various methods such as system programming and supplemental vocabulary cards were implemented to supply language for students, the speech generating feature on AAC devices was especially effective in giving voice to students' visual arts language. The speech generating feature provided sound and auditory responses of a student's symbol selections. This important aspect of the technology not only provided a voice for the student it offered audible reinforcement that appropriate and effective communication had taken place. Observation data emphasized the positive behavioral responses of Setsu and Thomas when using AAC and gaining the communicative results expected. An example was the hand clapping and noise making Setsu exhibited when a total communication transaction had occurred, and she received praise from Fabienne and was then able to move to the next step in her art making process (12/10/20).

During comparison of the Proloquo2Go and LAMP programs, symbol selection on each device offered differing screen displays (see Figure 9) However, the Proloquo2Go program provided both a symbol and the textual spelling of the word where the LAMP program offered only the text. The symbols were accompanied by the text in the general display of the LAMP program but the response generating area of the display contained only the words and no visual symbol. It was important for the art teacher and paras to be knowledgeable of the two differing

AAC systems to best support visual literacy and to be prepared with the symbol systems related to art content.

The semiotics were presupposed as far as understanding of symbol meaning by students, paras, and the art teacher. As all participants had worked with the devices previous to the study, they were familiar with what symbols represented the most frequently used words during art making processes. This was in contrast with knowing where seldom used symbols were located in the AAC programs.

While symbol meaning was not a concern during this study, it should be noted that the fundamental concepts surrounding semiotics and semiotic language involved universal understanding of what signs and symbols *meant* (Kress & van Leeuwen, 1996). In this case the classroom culture of artists with autism making art, and the visual arts classroom was based on students using specific art-based symbols required for specific conversations about art, art making processes, tools, and materials. Therefore, the semiotics of this study provided the foundation for AAC art language and conversations.

Figure 9

LAMP vs. Proloquo2Go Output

Each students knowledge of their individual AAC systems was revealed through unique displays of communication. For instance, Setsu demonstrated use of familiar symbols she was

comfortable using such as colors. In contrast, Thomas demonstrated a willingness to navigate

through his system more often to find new symbols for communication. Instead of settling on the

paintbrush symbol, he would select, "I" "want" "paintbrush" "please," a request his speech

therapist helped to cultivate. This operation was typically supported by para or art teacher

guidance, but the task enabled him the ability to engage in more detailed conversations about art

as described below:

> Tabitha: (showing Thomas paper to cut) Pick up your next piece of paper. What
>
> do you need to do?
>
> Thomas: (picking up paper) selects scissors (on AAC)
>
> Tabitha: That's right you need to cut. What else do you need?
>
> Thomas: (on AAC) selects glue.
>
> Tabitha: good job, okay keep going. It looks great so far.
>
> Tabitha showed Thomas the collage vocabulary card and stated: "you are making
>
> a collage."
>
> She then hand-over-hand prompted him to spell the word on his device
>
> Thomas: selected collage and then the glue symbol.
>
> (October 30, 2020)

The interaction above illustrated a scenario where the art technique in use, collage, was

spelled out with Thomas because a symbol representing collage did not exist on his Proloquo2Go

AAC system. Thomas was a student who demonstrated a solid understanding of the art symbols

on his device, and thus, the symbol system was easier for him to navigate. Nonetheless, spelling

the vocabulary was a natural alternative because that skill was one of his individual strengths.

Brian used his device minimally and were it not for prompting, he would rarely refer to it for language. These findings illustrated the individual strategies used by non-verbal students to produce language. Brian's interactions with his AAC (mostly prompted, rarely used spontaneously or independently), and Thomas' interaction with his AAC (efficient and independent) demonstrate the range of behaviors and communicative competency of each student. While the words were all generated by technology, their implementation was unique to the user.

Para knowledge of AAC was the catalyst for consistent use by the students. The important aspect of Tabitha and Fabienne's prompts were that they functioned to provoke and maintain conversations during art making. Additionally, art teacher knowledge of AAC oversaw the effective implementation of the devices. Often, the art teachers initial reminder to paras and students to use their device to communicate set the communicative tone for each art lesson. This action supported understanding of art expectations and increased opportunities for visual literacy.

Communication Limitations of AAC. While AAC is an affordance for communicating visual arts language, a number of limitations exist requiring alternate strategies. Each AAC device offered its own vocabulary search function. The Proloquo2Go program used a magnifying glass symbol for its "search" function. The LAMP programs search feature was called "word finder". A user simply had to spell the word they seek, and the program highlights the order of symbols one must navigate to get to the sought-after symbol. If a student cannot spell a word, they cannot search its location within the program. Students and paras or the art teacher must know what vocabulary is missing from the device in order to prepare supplemental vocabulary or picture images. A list of missing vocabulary from the systems used in this study was compiled and included in Appendix H. Awareness of included or missing symbols is dependent on the

planning and preparation of the specific art lesson and language to be used during instruction. For example, Thomas and Brian's devices were programmed according to their language needs and while Thomas had access to the shapes circle, square, triangle, rectangle, semi-circle, trapezium, and oval on his Proloquo2Go system, Brian only had circle, square, and triangle on his LAMP system. If discussion was taking place regarding the shapes oval or semi-circle, Thomas was able to use his device where vocabulary or picture symbols were needed to support Brian's conversation. This discrepancy is noteworthy and supports the multimodal strategies in place to promote visual literacy. The important aspect of device familiarity was emphasized during moments where if students could not find a desired symbol, paras or the art teacher needed to know where it was, or what supplemental language could be accessed for communication in a timely manner.

Supplemental communication options in the form of vocabulary cards, PECS picture images, and true shape or color cards provided essential language for students when AAC did not meet communicative demands. Without the availability of "backup" vocabulary and art symbols related to the art content being taught students, paras, nor the art teacher would have the necessary means to develop conversations about art when AAC language fell short. This supports multimodal strategies used by the art teacher and supplemental strategies used by all participants to provide opportunities through classroom conversations for visual literacy development. The supplemental language of vocabulary cards and picture images differed from differentiation in that it provided the same semiotic language (picture cards) as the AAC devices. It could be understood as merely an extension of what communication affordance the AAC provided when used as such. This distinction was flexible however, because dependent on how the supplemental language was implemented, it could also fall under the differentiation category.

It could be defined as differentiation when grouped alongside the variety of other communication strategies in use during art making processes, and when it was tailored to meet language useful to the project being carried out.

On occasion devices had to be charged, or the needed symbols simply were not on the program. During these times art educators, and the student's themselves supplemented the language needed to communicate about the art project with vocabulary cards or picture symbols, important companions to the AAC technology. During the art class on 10/16/20, Thomas' device was not charged. Thomas was capable of completing work without the use of his AAC because he knew to supplement any needed language with the PECS pages. He selected the appropriate paper and coloring materials to continue his artwork, and properly demonstrated his knowledge of the art process when his para, Tabitha asked him about each step being taken.

Like Thomas, Setsu accessed art vocabulary when it existed in her AAC. When art vocabulary was not present, alternate communication strategies were used. During discussion about texture, Thomas selected "fish" on his Proloquo2Go system to represent an images of "scales", while Setsu selected "fishbowl" on her LAMP system. Further, Thomas often spelled out a word rather than search for the corresponding symbol in his program. When vocabulary were presumed missing from devices based on the researcher's prior experience with the technology supplemental vocabulary and picture symbol cards were made in advance of each project presented to students. This approach to instruction and learning supported the strategies that supplemented the functions of AAC devices during art making processes. It was noted during observations that Thomas' Proloquo2Go program did offer the art element word zigzag for types of lines and the word had an accompanying zigzag symbol. The word sculpture could be programmed into the system but was unavailable on this particular day. The communicative

affordances of AAC are certain, however when it comes to supporting conversations regarding visual arts concepts there is still a lot of missing visual arts language. Vocabulary (AAC symbols) that would have fully supported the projects conducted are included in Appendix H.

During the conversations about the element of line, Setsu and Fabienne discussed the use of each design for her work using picture images of each type of line and a worksheet with line designs. Setsu's AAC device did not contain most of the line symbols discussed. Supplemental line designs were provided to students on the SMARTBoard, in drawings, and on a worksheet they could each refer to at their table. The following discussion about lines took place between Fabienne and Setsu while working on the Frank Stella 3-d sculpture project:

> Setsu: selecting random colors on her device
>
> Fabienne: you need to begin your line designs. What line design do you want to make first?
>
> Fabienne shows her the previously discussed lines horizontal line, loop-d-loo, spiral, curved, and zig zag on the worksheet.
>
> Setsu: selects curved
>
> Fabienne: (using hand-over-hand prompting) let's make curved lines. Good job Setsu, you made great curved lines!
>
> (December 14, 2020)

Like Setsu, Brian communicates with the LAMP Words for Life program on iPad. Brian's creative choices were not selected as independently as Setsu's and his artwork required a lot of prompting by his para, Fabienne. Brian routinely needed physical and verbal prompting to do his work and he often became silly and would laugh at himself and his paras. The data capture journal indicated he was initially prompted to use the symbols for cutting, tracing, and gluing,

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however he independently used the symbols for cutting and gluing later in an art process. Video data taken on 10/19/20 indicated Brian was minimally engaged in his work. He also selected orange when he was presented with a red crayon. Choosing the wrong color symbol was a behavior Brian often displayed when he wanted to act silly or when he found something to be funny. To confirm that he was really unclear on his color identification, I presented a red, orange, and yellow color card for Brian to identify. He independently selected the actual orange card and not the symbol on his device. I responded by stating he likes orange and wants to use that color in his work. Moments later he selected the orange symbol on his device. I asked him "what colors are on your palette" and, he selected red, and yellow with prompting. Next, I began to demonstrate the color mixing of red and yellow paint to get orange paint. I asked, "what colors are you using" and Brian independently and correctly used his device to say red, orange, and yellow. His para helped him express sentences aligned to his art process using vocabulary cards. With these cards Brian could share that he was creating a modernism artwork, and that his work was also abstract art. A continued discussion about shapes took place when I presented a triangular shaped card to Brian and asked, "what shape?" I hand-over-hand prompted him to find the correct symbol on his device. The number of shapes on one display made it difficult for Brian to choose, therefore I minimized the field of choices using a window shield and he was successful when he only had to choose between one symbol rather than three. A window shield is a large piece of laminated white paper that covers the entire device. A two-inch-by-two-inch window is cut out in the middle allowing only correct responses, or the correct response and another option to be available. The use of a window shield was a multimodal strategy aimed at supporting the students' creative growth. An additional note taken during observations included Brian being presented a glue stick versus a glue bottle during his artmaking. He was working

with a glue stick. In this moment Brian needed physical and verbal prompting to select the correct glue symbol on his device, however, when reiterated several minutes later, Brian selected correctly.

Without the use of supplemental language in the art classroom, conversations were limited to the art-based symbol selection on AAC devices. The selection of art-based symbols were sparse on both programs. The development of an effective visual literacy for non-verbal students is complex and would only work when all participants were tasked with increasing opportunities for dialogue. The addition of the vocabulary cards, or picture images expanded language and opportunities for students to communicate and became a routine and expected part of each art lesson. Effective communication manifested through materials and the art elements and principles of design applied within student artworks. In the final theme, the language of artwork artifacts and their communicative characteristics are described.

Artwork Talks

Student self-expression and a student's creative ideas were communicated through their use of materials, elements of art, and principles of design as they were applied within their art product. In this way, students' artwork "talked" or communicated their knowledge of visual arts vocabulary and processes. During the art making process non-verbal students made expressive gestures with color. They made creative choices that demonstrated their understanding of the art styles and techniques they were being taught. They were designers. They were communicators. They were artists.

The Language of the Artist. The artmaking process was like a superhighway with information going back and forth between each student, the AAC technology, the para, and the artwork artifacts. Information being transferred from materials to the students revealed itself in

final products. The energy of the moment created a sort of "buzz" in the air. The influence of

each instructional strategy: AAC, differentiation, and para support, all allowed the unique

language of each student to be revealed. This was evidenced in observation, video, interview and

artifact data sources. Thomas' artwork told stories about his understanding of himself. When

designing a head shape for his Eric Carle collage, he navigated to "body parts" on his device,

touched his own head, then with some support from his para, Tabitha, found the "head" symbol.

Additionally, Thomas spelled the word head using his AAC. He also verbalized "head." Not only

would Thomas clarify his understanding of each small step in the creation process, but his

overall approach to art making was in earnest. Obtaining his materials and beginning the work

was done with confidence. This personal quality is perceptible in the bold placement of his bear

design, and the thorough rendering of the art product he created; indicators of a deeper

understanding of visual arts principles such as balance and emphasis that were discussed during

instruction.

Throughout the unit on collage, Setsu exhibited focus and determination during her art

making and allowed her chosen materials and her application of the materials to demonstrate her

self-expression. There was an adventurous quality to Setsu's Eric Carle-inspired animal

evidenced in the playful application of tissue paper and placement of the echidna animals body

parts (see Figure 10.) Application of the visual arts rubric for the 2-d collage project placed her

piece at a level 2 out of 3 for *Discussing Art/Visual Literacy Skills*. A score of 2 indicated a

student participates in a collaborative conversation and recognizes some design elements, and

some elements of work align to AAC/PECS symbol use, but some do not. Setsu's use of tissue

paper emphasized her awareness of the difference between where the echidna is and what the

echidna is. She used the different paper materials provided to express each detail of her work in

different ways. Setsu was aware the echidna required coloring while the tissue paper fulfilled its own purpose. The rubric score for Setsu's *Artistic Skill (uses art elements aligned to concepts being taught)* was a 3: Visual imagery in art product aligns to elements and principles taught during instruction and art product indicates intent to consider placement of paper materials in collage and selection of favored paper designs.

At a later point in the lesson, Eric Carle animal samples with accompanying vocabulary were displayed on the SMARTBoard for Setsu to refer to when considering animal body parts in her own artwork. Observation data indicated she was able to identify animal body parts and match them to symbols or PECS images, and then replicate her ideas for those body parts in her work. Setsu selected "animal" on her device indicating her understanding of the classroom discussion about an Eric Carle hippo. The tracing of the animals head was modeled using a pre-cut stencil and Setsu touched her own head as well as selected the symbol "head" on her device. Next Setsu identified "body" and "leg" to indicate her understanding of the hippos body parts. Setsu's para supported her in tracing her stencil body parts for her echidna. On occasion Setsu would make verbal approximations for each body part. In these instances, she was praised by the art teacher and para. The second step of cutting was modeled for the students. She was then asked what tool was needed next, showing her scissors, she was hand-over-hand prompted to select the scissors symbol on her device. Hand-over-hand support was offered to Setsu here because she often showed confusion over her scissor symbol. A conversation between Setsu and Fabienne elucidates Setsu's confusion she sometimes demonstrated during art making:

> Fabienne: Let us trace your echidna body parts Setsu. We will trace with stencils. What do you need to trace your stencil shape?
>
> Setsu: (with pointing gesture from Fabienne) picks up her pencil.

(Using hand-over-hand prompting they trace the shape together.)

Fabienne: (making hand gesture for scissors with forefinger and middle finger)

What tool do you need next so you can cut out your shape?

Setsu: (with prompting) selects scissors.

(October 22, 2020)

Figure 10

Setsu's Eric Carle-inspired echidna and echidna Symbol on LAMP AAC

There were noticeable similarities between Setsu's echidna collage and the image of the echidna on her LAMP AAC program. The soft round quality of the animal's shape was made by Setsu. She cut her paper into a round oval. Additionally, her scribble coloring technique is reminiscent of the sketch quality of the markings on the echidna symbol. She also used brown crayon aligned to the symbol's colors. For a viewer to be able to match these expressive designs to the characteristics of the echidna symbol would indicate that Setsu's artwork "talked". She matched the animals characteristics and was able to demonstrate her understanding through her use of materials and art elements.

There were many strategies used in art by the students and paras demonstrating effective communication and creative explorations. The overall function of the art classroom supported each students ability to express themselves with the materials and they were met at their comfortable functional level. The materials and process offered challenges to support their growth and visual literacy development. There was no process that was off limits for the students to engage in under the right support and guidance of the art teacher and their paras. The deeper connection to creativity through visual arts processes was present in the artwork artifacts made by the students. This connection was illustrated more predominantly through the works of Setsu and Thomas and their engagement with the materials. They were eager artists, and their unabashed application of materials demonstrated their enthusiasm for artmaking.

The Joy of Art Making. The creation of geometric and organic shapes cut out of Styrofoam, painted, and designed with line element, and then constructed into 3-dimensional sculptures was a multifaceted, multi-step process for the students to undertake. The challenges of language and process were observed across all students and met with creative aplomb by the paras. Not only were they eager to support the needs of the students, they allowed the difficulties that came with designing the work to be used as moments for dialogue about each complex process. The Eric Carle-inspired collage, and the Frank Stella-inspired sculpture created by Thomas indicated he was clear on project expectations. His collage animal was constructed correctly, and he used mixed-media technique to complete the work. Crayon, tissue paper, and watercolor paint all appear in his piece. These various materials support multimodal strategies because they were all offering Thomas' design a different texture, material, and process. The various media provided variety to his work. There is an overall balance to his composition. The combination of these elements and principles allow a viewer to understand the image he intended

to make: a bear with wings (see Figure 11). Additionally, his Frank Stella-inspired sculpture

project was designed using geometric and organic shapes and was painted using warm and cool

colors as assigned. When Thomas' AAC did not support the vocabulary for the geometric and

organic shapes he was creating, vocabulary and picture cards were used to supplement the

vocabulary. The use of supplemental vocabulary and imagery supported instructional strategies

aimed at complementing AAC. Thomas was able to use line element effectively, indicating his

understanding of that design requirement for the work. His sculpture, when constructed,

expressed his understanding of the concept "build." He was able to indicate this by selecting the

build symbol on his device. Thomas' artwork was always completed using good craftsmanship.

He had a keen attention to detail and worked to ensure all steps were included in the art making

process. As he glued individual pieces of paper to his Beatriz Milhazes collage, I asked him, "tell

me what you're doing" and pointed to his device. Thomas touched the glue symbol indicating he

was using glue to adhere paper materials to his work. During a discussion of Frank Stella's

sculptural artwork sample, Thomas was able to identify the geometric shapes found in the

artwork using his device or supplemental shape cards (data capture journal, 12/14/20) Thomas'

process of identification of the shapes used in his work supported strategies incorporating

supplemental language into conversations and opportunities to develop visual literacy.

Figure 11

Thomas' Eric Carle-inspired Bear with Wings

Students used the elements of art and principles of design in their artwork products to explore materials, use color, create patterns, experience texture, and to express themselves. Art-based symbol selection on AAC corresponded to content applied in art products and can be seen in data capture journals. In the video data, Setsu and Thomas were observed matching the geometric shapes and organic shapes of their design to those in the Frank Stella samples discussed. These identification activities were executed using AAC and supplemental shape cards when AAC lacked specific shapes being used and demonstrated students' visual arts language. While the process of design was complex at times, using multiple steps to create 3-dimensional sculpture products, the students demonstrated joy in the expressive properties of art making. As communication was necessary to get from one step to the next, the challenges in finding appropriate language were contradicted by the ease with which the students managed their art tools and materials. The joy of art making was evident for all students.

Visual Voices. Artwork products demonstrated visual literacy development through the purposeful use of materials during art processes. Each art lesson had an instructional component to prepare student's and paras for project requirements and expectations. A brief review of the

previous days learnings was typically performed just before materials were passed out to reiterate for students' the materials and tools needed for each project and the process of applying the materials . During these reviews, short question and answer sequences allowed students to access their art-based symbols on AAC and prepare for the communication presets most likely to be needed. While the work spoke for itself as a creative expression, the students engaged in dialogue about their work and about the artistic choices being made. Sometimes they were prompted to engage in dialogue, and sometimes they engaged independently. Video data indicated students shared their creations to elicit responses from paras and the art teacher. Thomas was inclined to seek approval by holding up his work. AAC use was encouraged but not always accommodating, therefore strategic implementation of picture images and art vocabulary facilitated the art making process and fostered student use of materials and techniques. These supplemental strategies support how art educators create multimodal environments promoting creativity and exploration in the visual arts studio. Setsu and Thomas' artwork best represented the alignment of symbol use recorded in their data capture journals to the elements of art in their artwork artifacts. This evidence highlighted their engagement in dialogue about the project and demonstrated both creative correlation and perception. Further, it supported how non-verbal symbol use supports the visual language of non-verbal adolescent students with autism during art making processes in a visual arts class. Because both 2-D and 3-D projects were used, student's had the opportunity to explore each technique and develop their visual literacy involving the vocabulary representing each. While Brian did not demonstrate increased confidence during art making processes, Thomas and Setsu's behavior indicated an excitement and spontaneous interaction with the materials being used for each project. They both would often drift into a meditative phase when creating. This was particularly common with Setsu. Her ability to

concentrate on her work provided her a creative efficiency that made her projects substantial in their detail and quality. Setsu's "work ethic" was consistent. She demonstrated a desire to complete each component of her project. Whether it was achieved using crayons or paint did not matter. The last to want to turn in her accomplishments for the day, Setsu could be seen huddled over her work, meticulously completing an art task.

The elements of art used in Setsu's Frank Stella sculpture indicated her understanding of the various line element (See Figure 12). With each painted shape, Setsu selected a different line design from a line chart on the SMARTBoard, however, she was prompted by Fabienne to choose a line element for each shape. In a conversation about her line designs, Setsu and Fabienne discussed the process of incorporating the element into her work. This conversation demonstrated effective use of supplemental picture images. No AAC was used, and universal design supported the multimodal art making process:

> Fabienne: What line do you want to draw first?
>
> Setsu: Points to curved line in the chart.
>
> Fabienne: Okay which shape do you want to draw curved lines on?
>
> Setsu: Picks up her yellow circle.
>
> Fabienne physically supported Setsu in drawing her curved lines.
>
> Fabienne: Good job drawing curvy lines! What line design do you want to draw on your next shape?
>
> Setsu: Points to zig zag line on the chart.
>
> Fabienne: Which shape do you want to use for zig-zag?
>
> Setsu: Touches her pink square and begins to draw.

Setsu drew the zig-zag lines independently on each side of her pink

square.

(December 14, 2020)

Figure 12

Setsu's Frank Stella-inspired 3-D Sculpture showing line elements: horizontal, zig-zag, spiral,

wavy, dots, curved

The quality of individual student artwork represented a combination of individual

motivation and direction provided from paras or the art teacher. Each student's expressive

process was determined by their use of crayon, paper, and watercolor or paint materials. More

specifically, the evidence of visual literacy was demonstrated across artwork artifacts through

each students use of the 2-d and 3-d materials as they were first modeled during instruction. This

looked like the independent and spontaneous application of materials and defined by symbol use

or other communication modes. Further, a student's ability to access AAC technology or

supplemental vocabulary cards and picture images, and match those within samples of their

artwork provided opportunities for increased development of visual literacy.

Summary of Findings

It is necessary to compare the four themes with one another as there were several

correlating characteristics across the data set. The first theme, responsive paraeducator

interactions can be understood best as the umbrella theme. It described the behaviors of paras in

providing supplemental language for students and the facilitation of communication with the

students during art making Without the support of paras the differentiated instructional strategies

(theme two) could not be effectively implemented. As AAC was the primary means of

communication for the students, a link existed between what the paras did to implement the

technology and what the third theme: art symbols: navigating AAC represented. The AAC was

necessary to communicate, and the paras maintained the effective use of the AAC for student

communication efforts. The cross-over between theme three and theme two in this case was

inevitable as AAC itself was a mode of communication aligned to the multimodal concept. The

fourth and final them artwork talks also aligned under theme two (differentiation through

multimodalities). Key characteristics identified in the art itself represented varying levels of para

support (theme one) and materials providing sensory input, color choice, and communication

(theme two). The themes were interchangeable and the importance of distinguishing between

them demonstrates the specific strengths they all brought toward supporting students in

developing a visual literacy. Finally, detailing their strengths allows us to appreciate their

corresponding objectives.

Chapter V

Discussion

Purpose of the Study

The visual arts education for students with autism and use of AAC specifically during the art making process has not been extensively addressed in previous research. Additional research was necessary to describe the extent to which semiotics, multimodal instruction, and use of AAC support students' development of a visual arts language and increased capacity for creative exploration and art making. Accordingly, the purpose of this qualitative case study was to gain insight into student use of AAC to understand what factors contributed to its effective implementation in the art classroom and the students' ability to develop a visual arts language. The significance of this study lies in details that bridge the technological gap between art education and special education.

This chapter includes discussion and interpretation of findings to help answer the research questions:

1. How do art educators create multimodal environments that promote creativity and exploration in the visual arts studio for non-verbal adolescent students with autism?

2. What strategies do art educators and non-verbal adolescent students with autism employ to supplement the functions of AAC devices during art making processes?

3. How does non-verbal symbol use support the visual language of non-verbal adolescent students with autism during art making processes in a visual arts class?

In this chapter, the findings to these research questions are examined and interpreted in relation to previous research on students with autism in art, communication technology seen in art education classrooms today, and art educator and paraeducator experience implementing

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multimodal instruction during art making processes. Implications for visual arts instruction, art teacher and special education teacher collaboration, and art teacher preparation programs at the college level are suggested. Recommendations for future research and limitations of the study are also discussed.

Methodology

This study was a qualitative case study using direct observations of non-verbal adolescent students engaged in the art making process and the implementation of AAC during these processes. The three focal participants of this study all shared communication behaviors that emphasized individual understanding of visual arts processes. Setsu (age 15), Brian (age 15), and Thomas (age 14) received art as a regular part of their curriculum. They were observed three times per week during each 45 minutes class, for four months. During those months, the visual arts curriculum offered two contrasting units. Students engaged in a two-dimensional collage project for two months, and a three-dimensional sculptural project for the remaining two months. Both 2-dimensional and 3-dimensional art samples created by each student contributed to our understanding of the art processes undertaken by Setsu, Brian and Thomas to produce Beatrize Milhazes, Eric Carle, and Frank Stella-inspired artworks. The information gathered through observations, video recordings, interviews, data capture journals, and artwork artifacts illustrated multimodal communication transactions were used by all participants and designed to encourage the communication habits essential to creative exploration and art making.

The data sources used to conduct this study (i.e. observations, video recordings, interviews, data capture journals, and artwork artifacts) were useful for obtaining information regarding non-verbal student behavior and communication during art making processes.

Observations allowed for delineation of communication strategies implemented by the art teacher and paras. Use of AAC during art making was an observable behavior that enabled patterns of communication to be understood more extensively. The real time evidence of video recordings illustrated behavioral details of communication transactions between and among the students and paras and art teacher. The catalogue of communication attempts illustrated in the data capture journals emphasized the symbol selection made by students.

Art educator experience and personal perspectives across multiple teaching environments for art classrooms containing the autism population (Seidman, 2013) were gathered through interviews. Comparison of art teacher instructional strategies and use of paras confirmed communication practices that support visual literacy development.

Finally, artwork artifacts provided data regarding student symbol selection and additional creative choices regarding color, the elements of art, and related communication attempts. The application of an art rubric to assess the students' creations, further documented the design principles the students learn and were able to communicate during instructional components of each project.

Thematic analysis of each data source was collected cross-case (Stake, 2006) and categorized to examine individual student experience in the visual arts studio, to consider two different AAC programs as an affordance for efficient classroom discussions about visual arts concepts, and to describe art teacher experiences implementing AAC. The cross-case (Stake, 2006) method revealed similarities in communicative behaviors for each participant student, including differences in language acquisition through AAC technology use or supplemental vocabulary, and overall visual literacy development opportunities during artmaking processes. Atlas.ti qualitative data analysis software was used to analyze, code, and form themes across data

using an open coding process (Creswell & Poth, 2018). It was found that four overarching themes emerged as the most common art studio strategies designed to support the development of visual literacy. Those themes were: (1) Responsive Paraeducator Interactions, (2) Differentiation through Multimodalities, (3) Art Symbols: Navigating AAC, and (4) Artwork Talks.

Findings

In this study suggested there were a number of alternative instructional strategies art educators, paraeducators and non-verbal students with autism use to supplement the functions of the LAMP and Proloquo2Go AAC programs during art making processes. Findings were aligned with research supporting the need for art educators to understand instructional strategies aimed at supporting the unique needs of their students with disabilities (Loesl, 2012). While the communication preferences of the three participant students were different, the themes were generalized across the art making processes and experiences of each. The themes represented strategies occurring naturally (gesture,) and those occurring more deliberately (navigating AAC.) Each theme is summarized below.

Responsive Paraeducator Interactions

The support offered to non-verbal students by their paras is essential during art making processes and can cover a range of levels of interaction. They offer instruction, manage behaviors, and control the learning environment (Guay, 2003) during visual arts lessons however, they also alter the role for the teacher (French, 1999) as delegation of responsibilities and classroom management are modified during instruction for students with disabilities. The use of paraeducators specifically in the visual arts classroom has little literature to clarify the circumstances surrounding what the support looks like. Guay (2003) has focused on this

collaboration and has led the charge in offering evidence to emphasize art teacher and para experiences working together to support students with disabilities through creative exploration and self-expression. Students can maximize their art making experience with materials and processes because of the guidance from paras however, the use of paras is dependent upon the needs of the classroom and the population being served (Cipriano, et. al., 2016). In this study, the role of the para was further illustrated in the visual arts classroom serving non-verbal students with autism. Paras must possess insight of each student, and for Setsu, Brian, and Thomas, this included an understanding of their language community (Saussure, 2013) and individual communication style. Through the lens of Vygotsky's ZPD, the paras Fabienne, and Tabitha provide accessible and differentiated instruction to the students when they engage in visual arts processes. The creative attributes inherent to undertake 2-d and 3-d art projects with students with autism required paras to find familiar and comfortable communication approaches with the students utilizing their AAC and supplemental language options. A consideration of the element of time is necessary. Both paras have been working with the students for several years. For Setsu and Brian that means they have been progressing through their school days aware of Tabitha and Fabienne's expectations. The paras know the students so well, that much of the support provided is intuitive. However, for new art educators coming into classrooms with new students and new paras, and building relationships with each, collaborative conversations about daily experiences, multimodal instructional ideas, and art making strategies using differentiation to meet individual student needs can be helpful in effectively promoting student creativity. These instructional strategies are components of the second theme.

Beyond the Technology: Differentiation through Multimodalities

The multimodal learning environment of a visual arts classroom, designed using principles of UDL, can provide multiple communicative outlets (Kress, 2010) for students with autism who access curriculum and content in individual ways. The diverse modes of communication comprehended without verbal language (van Leeuwen, 2015) include written, visual, and tactile properties. An example includes the visual codes such as color and font shapes (Jewitt, 2013) that offer language analysis as determined by how students interact with those multiple forms of information. Differentiated planning by the art teacher when considering non-verbal communication and when implemented by paras during art making processes should integrate all of these adaptive and alternative strategies including supplemental language practices using vocabulary cards and picture images to make up for AAC limitations. This approach to art education provides customized instruction aimed at supporting learning, art making, and visual literacy. Each student's development of these skills is dependent on specialized art teaching procedures.

Art Symbols: Navigating AAC

Through the implementation of communication technology, non-verbal students with autism can forge a conversation with their paras or art educator during visual arts class. A singular caveat to efficient communication is the student's, para's, or art teacher's ability to navigate an AAC program effectively. Issues such as time management arise when the path to a specific symbol in the program is not direct. Navigating through various categories can be time consuming and interrupt instruction or a dialogue already in progress. Thus, familiarity with the device and its symbol system provided an efficiency to communicating for each individual.

Interpreting visual symbols for meaning making (Kress & van Leeuwen, 2002) seems to be the fundamental step to understanding and accessing AAC. Students' or paras' knowledge of what symbols mean allows them to communicate most productively. The meaning potential of symbols is dependent upon the students experience with a symbol (Van Leeuwen, 2005) and history of its use specifically during visual arts instruction. When the technology meets the communicative demands (Kress, 2010) of each non-verbal student, conversations about visual arts concepts and processes can flow freely. However, AAC modal affordance support is reliant on programming (Kress, 2010). The programming must align to visual arts content and lesson plans designed by the art teacher and the art teacher, para, and student must be effective navigators of the device.

Artwork Talks

Analysis of artifact data considered previous student experience with the materials in use for 2-dimensional and 3-dimensional artworks. The artwork of an individual with autism should only be critiqued considering the original context of the design (Furniss, 2008). The student's knowledge of materials was present in the video data and there was an obvious comfort between Setsu, Brian, and Thomas when using the various collage and sculpture materials. They were not novel artists and their joy in creating was evident, particularly for Setsu and Thomas. If too many materials were presented to them, however, sometimes they could become overwhelmed with choice and confused, not knowing how to take each art making step, one at a time. Choice provided opportunities for self-expression and individual creativity. Having only one option for color, shape, or material, sometimes allowed a student like Thomas the cognitive latitude needed for effective one-step communications to fulfill an art process.

Upon first viewing the artwork of each student it helped to have some knowledge of the instructional component of the lesson. The visual art content discussed beforehand set the parameters for subject matter and materials and their representation within the artifacts. It must be noted that the meaning potential of the visual communication presented within an artwork was metaphorical (van Leeuwen, 2005). For instance, Thomas used blue tissue paper in his collage to represent his clouds. The meaning potential of the colors Thomas selected for his Bear with Wings could be on the basis of association (Kress & Van Leeuwen, 2002) but could also be as simple as that he liked the color. Setsu's echidna may have appeared abstract to an unknowing viewer, however, closer analysis of the communication transactions before and during the art making process offered clarity on what her artistic approach and creative goals were. When it came to distinguishing how communication for non-verbal students engaged in art making processes was present in the final product, the symbol selection, supplemental vocabulary or picture cards aligned to the materials used and principles of design were evident in the final product.

Discussion

Technologically Proficient: A History with Semiotics

A prior history of specific symbol use is helpful in creating meaningful communication using AAC symbol systems. Determining beforehand if individual symbols are understood equally between all communication partners will enable fluid conversations. Additionally, symbol meaning and representation within a practical visual arts frame must be compatible and coherent to the project in progress (Kress, 2010). Representation is not simply a matter of available symbols or supplemental language options; it is reliant on the language, culture and each individuals ability to access the meaning behind the communication transaction.

In terms of guidelines for effective communication, various suggestions emerged from the data: alternatives to technology limitations and students' communicative level must be considered using when using the instructional and communicative design of supplemental language. This language can also be semiotic and symbol-based. For example, vocabulary cards with art terms can provide additional learning opportunities for students to match their understanding of text and image, or art teacher or para-made art-based symbols such as a brayer can enable a student to demonstrate their desire to work with printmaking tools. It is a matter of creating the additional symbols unavailable on AAC. The integration of supplemental vocabulary demonstrates the importance of communicating during art making processes and therefore, practitioners and all communication partners can achieve desired outcomes for both art making and non-verbal language practices.

The nature of the relationships between all communication partners in the visual arts classroom within a non-verbal learning environment demands not simply the recognition of such a unique language community but the nurturing approach to foster effective dialogue. Not only are language connections needed between students and paras, there are language connections needed between students and technology and students and materials. Between students and paras, the social and emotional associations of communication allow for a richer understanding for each, thus promoting clearer communication. The cognitive associations through technology awareness enables students to communicate with confidence, and as they explore a wider assortment of art materials their ability to discuss how each can contribute to their visual artworks is essential. With practical applications of para support, and implementation of AAC or supplemental vocabulary and picture images, it is possible to create an atmosphere that

encourages visual literacy development through semiotics and meaning making through art processes.

Knowing the Artist with Autism: Communication is Key

As art educators spend more time interacting and communicating with students of varying abilities, they become better equipped to support their learning. Guay (1994) investigated preservice art educators regarding their perceptions of the preparation and effectiveness to teach their students with disabilities. Guay found that many (44% of respondents) art teachers did not feel adequately prepared to teach visual arts content when they entered their first classroom. This finding is relevant because it was clear there were still challenges that often arose within the focal classroom of this study. Despite the years of experience, the art teacher and the paras had with this population of students, communication and technology difficulties were observed between all communication partners at times. Video data provided evidence of the additional instructional materials needed to fully support the cognitive needs of non-verbal students. Interview data indicated students could display challenging behaviors when they were unable to effectively communicate. All of these examples of the extra lengths art educators must go to, to prepare to teach the visual arts to their students with disabilities confirm Guay's (1994) findings.

It is also incumbent upon the art educator to be aware of students' capabilities so that they can differentiate instruction with the appropriate multimodal tools. Multimodal approaches to instruction are interrupted when one mode of language (AAC systems) is not adequate for a visual arts conversation unless a new mode (supplemental vocabulary or additional pictures) is available and presented promptly. It is up to the art educator to recognize which mode is most appropriate and be prepared for differentiating instruction to accommodate these changes. This

includes prior preparation of instruction and materials with paras who will implement some of these changes. Multimodality is aligned to the social context of the art room language community (Jewitt, 2013) and necessary to support students as they prepare to make meaning of their creative adventure. The various modes of symbols, text, picture, and tactile materials are the building blocks to visual literacy development. It is not only the physical artifact created and the expressive process to create it, it is the total cognitive and sensory experience realized for each individual student that will encourage continued communication.

The technological constructs of AAC used by non-verbal students imply a critical need for system knowledge by art educators. They are at a communicative disadvantage when they are unfamiliar with the technology and planning differentiated instruction for their students with disabilities. Collaborations with other special educators can provide suggestions on best practices for instruction and technology implementation. The framework for UDL can guide art teachers to improve accessibility to visual arts materials and tools and generate learning opportunities through traditional and novel art processes. Further, implementation of UDL practices can be a shared strategy between teachers providing clear and consistent learning benchmarks for students when they visit the UDL art classroom. With these approaches to teaching practice in mind, art educators must develop habits of delegation and communication to ensure the visual arts studio runs consistently and effectively.

Limitations

The findings of this study offer insight into instructional strategies for visual arts educators who teach non-verbal students with autism. The important aspect of art educators developing knowledge of the types of communication technology non-verbal students communicate with is paramount to creating a supportive art making environment and providing

effective arts education. There are limitations within the study that warrant caution in interpreting the findings of this study and suggest more extended research in the area of arts education for students with disabilities.

An unexpected challenge that occurred during this research was the global pandemic (COVID-19). The 2020 school year began with in-person instruction five days a week, which was a typical academic schedule for these students. However, a brief interruption in data collection occurred when a spike of COVID-19 caused school to close for approximately two weeks. Upon returning to school, a review of the current project and learning components was conducted, students continued working on their projects where they had left off, and data collection resumed. The direct impact of COVID-19 on this research seemed minor as there was minimal effect in carrying out the purposes of the study. However, the full impact of the disrupted daily routine, the time away from visual arts materials, and the time away from daily discussions about the visual arts content using AAC on the participants is unknown and may have indirectly influenced the findings.

Another limitation of the study included the small sample size of three participant students with autism who are non-verbal, use AAC to communicate, and have art daily as part of their regular school programming. They were selected as a convenience sample and because all were familiar with their AAC technology. A larger pool of participant students, using additional AAC programs not discussed in this study, would generate more knowledge regarding the neurodiversity of those with an autism diagnosis and the additional communication or instructional practices designed to meet the cognitive, affective, and perceptual differences (McGee, 2012) that represent individuals on the autism spectrum. Because the participant students in this study have an autism diagnosis with speech-language impairment (non-verbal)

the expectation is that they all use AAC to communicate with no specification of what that may look like for each student individually. The fact of the matter is that neurodiversity is exactly that: all autistic students with a non-verbal disability who use AAC access it in various ways through various systems to communicate in their own distinct style. The communication is dependent upon the type of program they are using but their ability to comprehend what the technology offers manifests in different ways. For instance, Setsu accesses her LAMP program through singular symbols to give one word responses whereas Thomas is capable of forming phrases with his Proloquo2go program. Their cognitive processing is developing in different ways, at different rates. A larger pool of students would provide more data regarding AAC use and neurodiversity and would further provide data regarding various AAC programs being used, including additional trends in how visual literacy develops during art making processes. Further research is needed to address the many variations of AAC use to better understand the affordances each provides to non-verbal students and to prepare supplemental language supports for visual literacy.

A related limitation is insufficient knowledge on current trends in AAC system development. The two programs included in this study are the Assistiveware's Proloquo2Go for iPad used by Thomas, and LAMP Words for life on iPad used by Setsu and Brian. The programs had been selected for the students by the speech therapist a few years prior to the study but updates on technology and vocabulary programming were not addressed in this study. Understanding the latest symbol availability, how to include new symbols in the different systems, and what symbols are planned for incorporation in the future can offer perspectives on how extensive art-based language will become including the supplemental language strategies art teachers will need to continue to develop.

The lack of prior research specifically aimed at visual literacy for non-verbal students with autism achieved during art making is also a limitation to this study. Art education research specifically aimed at how non-verbal students with autism engage in visual arts processes is insufficient, especially when it comes to incorporating the AAC technology they use to communicate. Because most art educators are unfamiliar with this technology there is a need for further research to provide data on how to develop art teacher preparation programs so beginning art educators, when tasked with designing instruction for students with disabilities, have some knowledge about where to begin their planning.

An understanding of any potential researcher bias should be identified and reviewed to avoid any prejudice and understand to what degree errors, if any, were made during data collection, analysis, or during interpretation of findings. The art teacher/researcher was the sole investigator of this study and while attempts to minimize researcher influence were taken, forms of bias cannot be dismissed.

Implications

Implications for Art Educators

This study maintains that visual arts education is essential for all students and that art educators must be knowledgeable about the adaptive and alternative supports designed to increase opportunities for creativity and self-expression for students with autism in art. Providing visual arts experiences for students with disabilities is effective when art teachers differentiate their instruction to meet each student at their skill level. To focus more precisely on students with autism, art educators must be up-to-date on current special education practices including student IEPs and instructional mandates. To narrow the focus even further on students with autism who are non-verbal, art educators must be informed in how this population of students

communicate. The various forms of technology in use by the non-verbal community of students is wide, thus there are many programs to learn. There is a critical intersection of awareness directing art educators to both their non-verbal students and the type of technology they use to effectively support that student through visual arts processes. Art educators must know to offer opportunities for visual literacy development by planning for the implementation of supplemental language. A perceptive art educator will modify art materials and tools for students. Additionally, planning with paras is essential to making the art classroom run smoothly when art projects are underway. This task is accomplished through meetings with paras clarifying lesson expectations and periodic "check ins" to determine modifications to instruction when/if needed. Professional development aimed at supporting the arts instruction of students with disabilities can be an effective means for art teachers to learn new strategies and access the latest resources available within their school districts. Art teachers can join arts and education professional associations to stay abreast of current trends in the field. The National Art Education Association provides annual conferences supporting effective visual arts instruction to arts educators across the country. Art educators can seek out community resources such as galleries to develop partnerships for exhibiting student work. These suggestions aim to support the arts in public schools, support art teacher best practices, and bring awareness to the creative explorations of the neurodiverse population. The communicative approaches found in this study include AAC knowledge. A thorough understanding of how AAC functions, its affordances and limitations will help art teachers better support the communication of their non-verbal students. Further, the necessity of supplemental language is as critical as the students AAC device in providing language opportunities and should be regarded as such. The implementation of these

communication strategies is recommended best practice for art educators and should therefore be included in professional development of art educators.

Art educators are the advocates within their own school and possibly their own district when it comes to acquiring appropriate art tools and materials for their students with disabilities. The addition of modified equipment is often necessary. Discussing the specific needs of individual students is a necessary conversation to have with the special education teacher and the speech therapist who works with the students. In collaboration, they can determine a students' communication needs, tools to support that communication, and then work together to maximize students' potential.

Implications for Art Education Researchers

Art education teacher preparation curriculum in colleges is the starting point to bring art education forward to meet the needs of all students who engage in visual arts practices. All students, including those with special needs, deserve well-prepared art teachers who understand the challenges of supporting visual arts making and visual arts literacy. Students with learning differences should not be denied a comprehensive art curriculum. Beginning with student teaching opportunities, educator preparation programs need to consider their training policies. It may be important to restructure art teacher field placement programs into general and special education tracks so art educators can train specifically for the population of students they hope to teach. Higher education art teacher preparation programs also must include rigorous curriculum for beginning art teachers to effectively prepare them for the cognitive and behavioral differences of students with disabilities. The approach to instruction for students with special needs, and particularly non-verbal students with autism is different from what is understood about teaching the visual arts to typically developing students in general education settings. The

volume of art projects completed with a non-verbal student with autism within a school year differs from the number of projects capable of being completed in a general education visual arts classroom. The time commitment and requisite strategies to see a student with autism through an art project can be substantial. Unless an art educator is prepared for the additional challenges of teaching a student with disabilities, they may feel frustration and defeat, and not know how to proceed. This would be a disservice to the students and the art teacher and cause potential premature art teacher fatigue.

Art education research is informed by art teaching practices as many arts educators are challenged to perform skills they can only learn as they go through their day instructing their students with disabilities. Art educators may be the catalyst for research conducted in their own classrooms to better understand their own experiences. In addition, practitioner contributions to art education research may also suggest that although there are inclusive or integrated classrooms, changes to instruction more precisely designed for the non-verbal student with autism is unique and deserves particular attention.

Implications for Art Educator and Special Educator Collaboration

Collaboration between special education teachers, other support professionals (i.e., speech therapists, occupational therapists, etc.) and art teachers is a critical component of effective planning and can help provide consistent instruction across classrooms. In addition to consistent instruction, communication allows for consistency of routines, communication of expectations, and knowledge of strategies to implement when students may need flexibility (i.e., what to do when the AAC isn't charged, or vocabulary is missing). Corresponding support for visual literacy development is essential to the students' growth. The use of a functional

vocabulary across classrooms suggests a strengthened language can be developed and AAC can be a consistent communication system to foster prosocial behaviors.

Additional forms of collaboration such as professional development designed for art and special educators are necessary. In public school settings, special educators, occupational therapists, speech therapists, and art educators can plan for student IEP goal setting through simple art tasks and communication tasks that develop student skill. Through consistent implementation of instructional strategies across all professionals working with a non-verbal student with autism or other disabilities, growth in the areas of communication, fine motor development, and gross motor development can take place. Moreover, special educators and other professionals may be aware of outside services provided to students with developmental disabilities.

Recommendations

Future Research

Future research should investigate other AAC programs to consider the programming design of each AAC system presented here, and to examine the most efficient process of providing a broader collection of visual arts vocabulary to students when in visual arts classes. The LAMP and Proloquo2Go sites provide a table of contents with all of the symbols currently offered but programming the systems requires time and familiarity with the devices. An example includes categorizing symbols to avoid distraction from other irrelevant symbols (Gevarter, 2015). Students who are somewhat familiar with their technology are fortunate to be able to engage in dialogue when needed. A student who is just receiving a device will face challenges learning to use it consistently. Specifically, an adolescent student who has just received a device for the first time has established gestural and vocalization-related forms of communication that

may have formed in early childhood and will demonstrate undesirable behaviors when transitioning away from those communication habits to a new AAC device. This process can take time and weigh on the student emotionally. Supporting this transition is essential and can be done effectively when alternative language is available and rewarding the student's progress is prioritized. Therefore, further research should focus on strategies for supporting non-verbal students as they initially begin working with an AAC system in the art studio to ease the communication transition and facilitate their use of visual arts language.

Additional professional development for art educators to provide support for their neurodiverse students should be offered to teachers often and in conjunction with special education professional development if possible. Further investigation of the findings of this study can be accomplished through art teacher surveys similar to Guay's (1994) study, and opportunities for art educators to share experiences through blogs, social media groups, and other professional organizations can provide community and feelings of unity for art teachers who may be struggling with the challenges of instruction. As art education researchers continue to provide research-based strategies, in time it will be possible for implementation of visual arts instructional strategies for the non-verbal autistic population to be customary and routine across the art education discipline.

For students with autism. preference can dictate how art projects are generated and should be investigated further to determine to what degree. Preference influences how all people make decisions. While some students will enjoy the challenge of learning how to use a new tool, others may be comfortable continuing to use a tool with which they are confident. For example, one of my students loves to paint because he enjoys the freedom of watching the colors come to life on the white sheet of paper. Whereas, working with scissors is restrictive because of the need

for control and precision, which are difficult for him. Thus, research into preferences for art

making may yield useful insight into ways art teachers can enhance visual arts experiences for

these students with autism.

Art and Special Education Collaboration with Technology Developers

AAC affordances versus AAC challenges have necessitated an alliance between art

educators and special educators in seeking the most effective approach to communication during

all types of instruction for non-verbal students with autism. A closer look at the technology

companies designing AAC might provide educators a look at the latest innovations. Art

educators and special educators can also collaborate with AAC program designers to emphasize

the language needed to support visual arts development at an advanced level. This research study

provides evidence that advanced visual arts language is needed on AAC. While these companies

may consult with a variety of education professionals, it is important for art educators to be a part

of the conversation so that a broader spectrum of visual arts language is represented in the varied

AAC systems.

Art Teacher, Art Researcher

Other scholar practitioners reviewing this work may determine that the planning

component of art teacher practice is at the core of effective communication between art teachers,

paras and non-verbal students with autism when they are participating in visual arts-based

instruction. The presentation of visual arts content will only support creativity when it is

communicated effectively across all partners. Before attempting to conduct similar research,

other scholar/practitioners should note that conducting research while teaching art requires

extensive planning and preparation to maintain organized materials and to multitask through art

processes. Clear and concise expectations of the research process should be expressed to paras

before and during instruction, and as a daily update. Delegation of tasks may be altered when research is being conducted in an art classroom and the community should be prepared for any changes. In such an environment as the visual arts classroom, an art teacher/researcher may need to ask themselves if the research would be better collected by someone else familiar with the study but not involved in direct instruction of the students.

Conclusion

The student with autism who is also non-verbal has a lot to say. The visual arts can be the foundation for their self-expression. Through color or form the design of an idea can speak volumes for that student by communicating understanding, preference, and emotion. Through the power of self-expression an individual can find their place in the world and define themselves not by perceived limitations but by their innate creativity. Equitable art making opportunities are critical components in public schools and community organizations for the neurodiverse population but visual arts programs in special educational settings must be met with appropriate accommodations for students with disabilities.

The field of art education could be positioned to fully support the creative skill of non-verbal students with autism, yet many obstacles remain. Art educators are called upon to advocate for their teaching practice and their students. New curriculum in art teacher preparation programs to better prepare art teachers to support their students with disabilities is essential and learning to effectively supplement AAC technology a necessity. Supporting visual literacy in the art classroom requires customized lesson planning to accomplish this. Multimodal learning in the arts can be achieved through effective collaboration with special educators, paraeducators and other creative professionals but it is through true caring and understanding of their students that

art educators can enable their non-verbal students to develop a functional visual literacy and

make deeper meaning of their experience.

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Appendix A

ART EDUCATOR INTERVIEW: TEACHING EXPERIENCES WITH NON-VERBAL
STUDENTS WITH AUTISM

Directions:

Please provide honest answers you have thought carefully about. The information you
provide will contribute to our understanding of the common strategies used by other art
teachers to supplement AAC limitations, examine the variations in AAC implementation
between different visual arts classrooms, and probe for different methods of instruction that
generate communicative competence for students using AAC or the alternative PECS system.
Answers to these questions are confidential and will only be used to inform this study. You
may decline to answer any item.

1. What do you notice about non-verbal students and their ability to communicate?

2. What strategies do you employ to supplement AAC in your art classroom when students
   arrive without their devices, or when they are not charged?

3. How do you broaden communicative opportunities for your non-verbal students beyond
   what their AAC device allows?

4. What alternative expressive communication do you observe from students when they do
   not have or are not able to communicate with their devices?

5. In what way does student use of AAC influence your planning of the questioning and
   discussion components of your lessons?

6. What additional classroom circumstances influence implementation of AAC for your
   non-verbal students?

7. Describe your experience working with non-verbal students who use AAC.
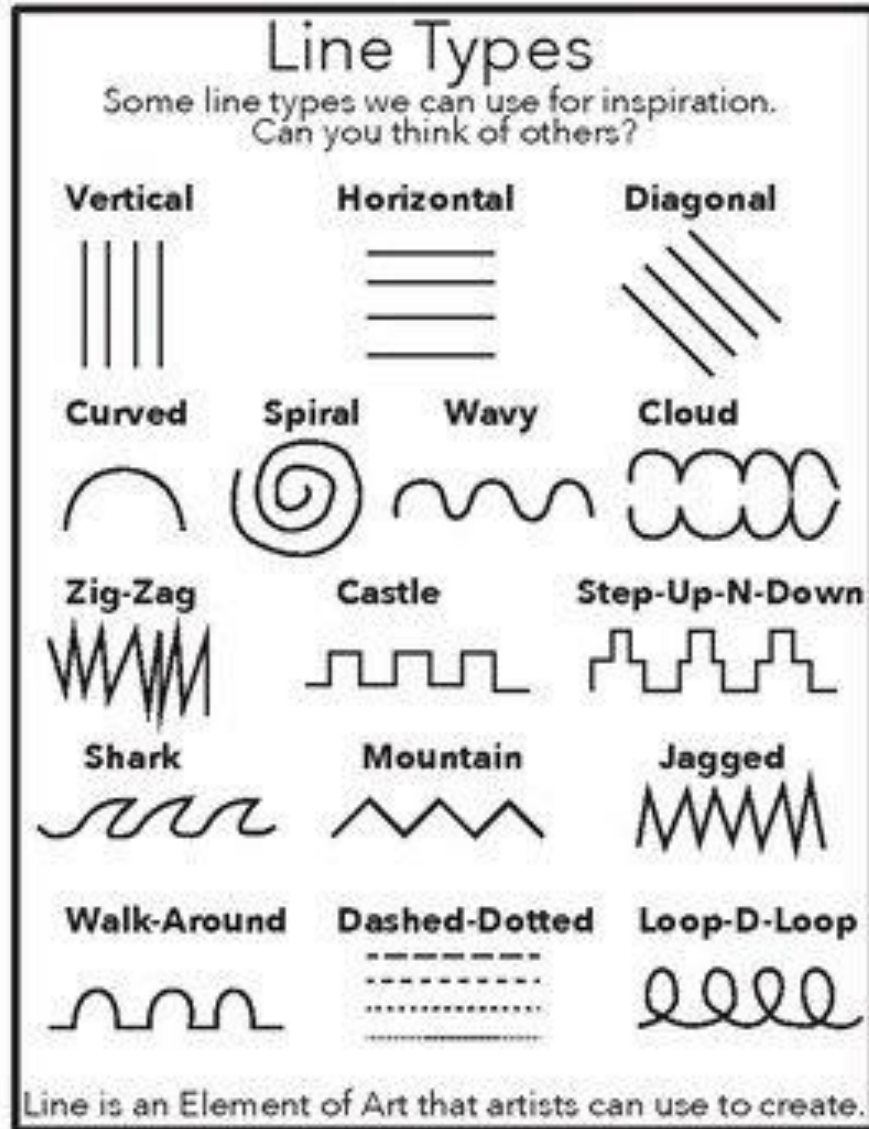
Appendix B

Severity levels for autism spectrum disorder defined in DSM-V

Severity level	Social communication	Restricted, repetitive behaviors
Level 3 "Requiring very substantial support"	Severe deficits in verbal and nonverbal social communication skills cause severe impairments in functioning, very limited initiation of social interactions, and minimal response to social overtures from others. For example, a person with few words of intelligible speech who rarely initiates interaction and, when he or she does, makes unusual approaches to meet needs only and responds to only very direct social approaches	Inflexibility of behavior, extreme difficulty coping with change, or other restricted/repetitive behaviors markedly interfere with functioning in all spheres. Great distress/difficulty changing focus or action.
Level 2 "Requiring substantial support"	Marked deficits in verbal and nonverbal social communication skills; social impairments apparent even with supports in place; limited initiation of social interactions; and reduced or abnormal responses to social overtures from others. For example, a person who speaks simple sentences, whose interaction is limited to narrow special interests, and how has markedly odd nonverbal communication.	Inflexibility of behavior, difficulty coping with change, or other restricted/repetitive behaviors appear frequently enough to be obvious to the casual observer and interfere with functioning in a variety of contexts. Distress and/or difficulty changing focus or action.
Level 1 "Requiring support"	Without supports in place, deficits in social communication cause noticeable impairments. Difficulty initiating social interactions, and clear examples of atypical or unsuccessful response to social overtures of others. May appear to have decreased interest in social interactions. For example, a person who is able to speak in full sentences and engages in communication but whose to-and-fro conversation with others fails, and whose attempts to make friends are odd and typically unsuccessful.	Inflexibility of behavior causes significant interference with functioning in one or more contexts. Difficulty switching between activities. Problems of organization and planning hamper independence

Examples of Line element for identification and used in student artworks

Line Types
Some line types we can use for inspiration.
Can you think of others?

Vertical

Horizontal

Diagonal

Curved   **Spiral**   **Wavy**   **Cloud**

Zig-Zag   **Castle**   **Step-Up-N-Down**

Shark   **Mountain**   **Jagged**

Walk-Around   **Dashed-Dotted**   **Loop-D-Loop**

Line is an Element of Art that artists can use to create.

Appendix D

Beatriz Milhazes, *Po de arroz*, 2017-2018, Acrylic on Canvas, Sample artwork used for discussion about 2-dimensional artworks, abstract art, collage, overlapping, pattern, color, shape, and line.

Appendix E

Eric Carle Blue Hippopotamus, Sample artwork used for discussion about animal construction,

color, painting, and texture

Appendix F

Frank Stella, Sample artwork used for discussion about 3-dimensional structures, abstract art, organic shapes, geometric shapes, color, line element, sculpture, and construction

Frank Stella, *Harran ii*, 1967 Sample artwork used for discussion about 2-dimensional paintings, abstract art, geometric shapes, and color
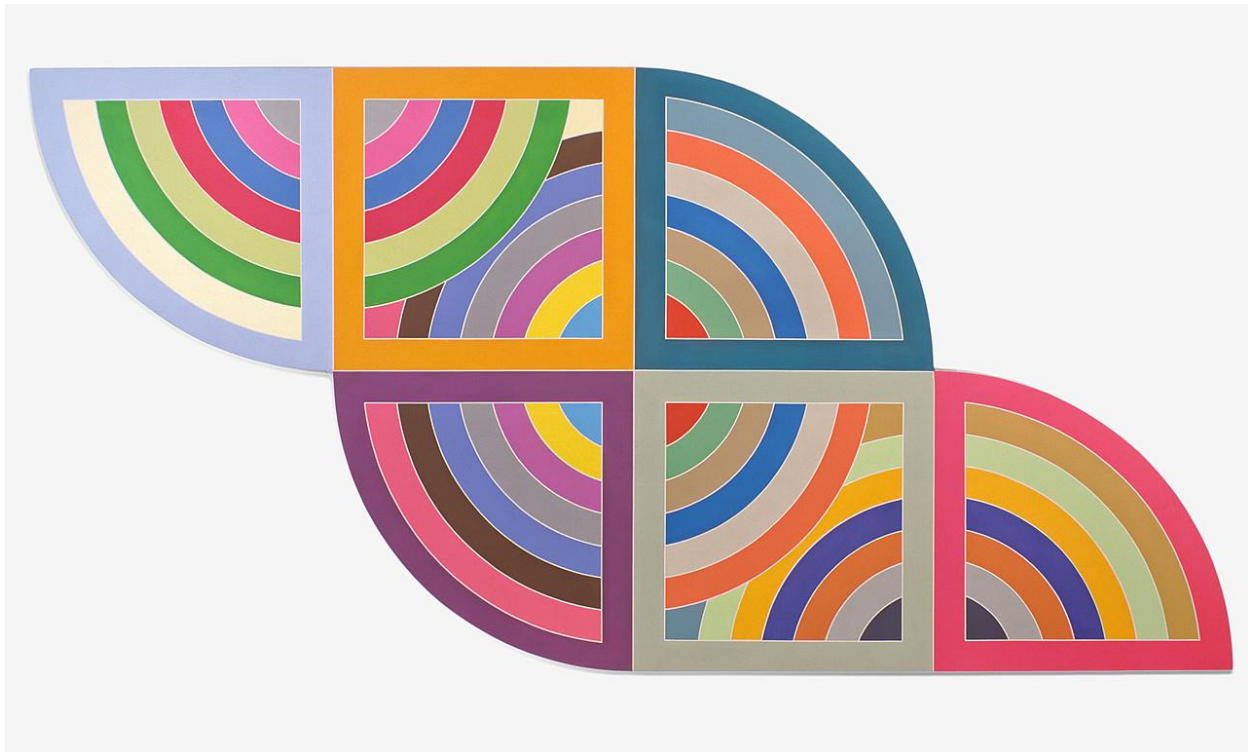
Vocabulary absent from one or both of the AAC devices and needed to support learning and

communication during the sculptural project:

AAC Device	LAMP on iPad	Proloquo2Go on iPad
Missing Vocabulary from 3-D project	3-dimensional, abstract, cardboard, construction, curved, design, expressionism, foundation	3-dimensional, abstract, cardboard, construction, curved, design, expressionism, foundation, sculpture
Missing Vocabulary from 2-D project	geometric, horizontal, loop-d-loop, modernism, spiral, vertical, wavy	geometric, horizontal, loop-d-loop,
Missing Vocabulary from other observations	organic	modernism, sculpture, spiral, vertical, wavy

Note. LAMP and Proloquo2Go websites offer a catalogue of all available symbols. They must be programmed into the system.

Appendix I

Supplemental vocabulary card for "organic shape" missing from AAC