Restricted Interests as Motivators: Improving Academic Engagement and Outcomes of Children on the Autism Spectrum

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Abstract

One way improve engagement and ensure motivation for students with autism spectrum disorders (ASD) during academics is to use restricted interests in instruction and activities. Embedding these interests into the curriculum can motivate the student with ASD to attempt tasks that were previously less preferred or difficult. This article demonstrates how elementary, middle, and high school teachers improved academic engagement and outcomes for three students with ASD. Guidelines are provided along with numerous examples of creative ways for embedding restricted interests across subject areas and grade levels.

Keywords

autism, restricted interests, circumscribed interests, special interest areas

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Denise is a second grade student who is enthralled with Thomas the Train™. She has Thomas the Train™ sheets, wall paper, pajamas, and a train set. If it exists and has to do with Thomas the Train™, Denise eventually gets it. Zeb is a middle school student who, given the chance, would talk about hurricanes all day long. Jeffrey is in high school and he loves electronic gadgets. He spends all his free time deconstructing old electronic gadgets, then either reconstructing them or building new ones from the spare parts. All three of these students are identified as having an autism spectrum disorder (ASD). One of the defining characteristics of children with ASD is their engagement with restricted interests (Simpson & Myles, 2008). Restricted interests are topics or objects individuals with ASD pursue with intensity and focus. Sometimes they are called circumscribed interests, obsessions, compulsions, special interests, or narrow interests. These interests appear to increase in intensity over the individual's life span (South, Ozonoff, & McMahon, 2005) and may interfere with the development of peer relationships because the individual only cares to converse with others about his/her interest (Attwood, 1998). Restricted interests are postulated to lie at the higher end of the repetitive behavior continuum and are thought to be more prevalent in individuals with higher functioning autism (HFA) (Epstein, Taubman, & Lovaas, 1985; Turner, 1999). Attributes of restricted interests include: (a) accumulation of mass amounts of information or facts (Attwood, 1998; South et al., 2005), (b) difficulty redirecting individual from physically interacting with or conversing about the interest (Adams, 1998), (c) duration of fascination with the interest (South et al., 2005), and (d) intensity of focus (individual spends a great deal of free time engaging with the interest) (Adams, 1998).

A Positive Look at Restricted Interests

Despite seemingly negative attributes, restricted interests need not be viewed as deficits. Behavioral intervention studies have demonstrated that restricted interests may be used to improve functioning of children on the autism spectrum (Vismara & Lyons, 2007). In these studies, researchers controlled access to the restricted interests in two ways (Boyd, Conroy, Mancil, Nakao, & Alter, 2007). They either provided access contingent upon the occurrence of more appropriate behavior (consequence-based) or embedded them into structured tasks to motivate the child to engage in appropriate behavior during those tasks (antecedent-based). Embedding restricted interests into activities as motivators can help children with ASD stay engaged during academic activities, which is a problem often observed in children on the spectrum. This is not surprising considering nearly 75% of children with ASD also have behaviors typical of children diagnosed with ADHD (Heflin & Alaimo, 2006). Thus, one way to help improve engagement and ensure motivation during academics is to use restricted interests in the instruction and activities. Embedding these interests into the curriculum can make previously difficult and 'boring' tasks more interesting for the student with ASD. For example, Adams (1998) embedded the restricted interest of five preschool-aged children with ASD into preacademic tasks (three per child) and found that the children increased the number of task items correctly completed in a limited amount of time.

Embedding Restricted Interests in Lessons to Motivate Students

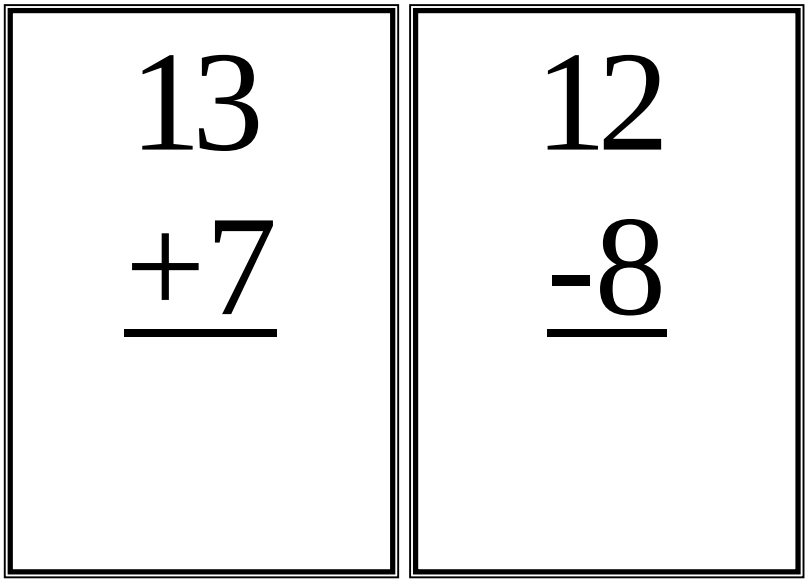
Restricted interests of students with ASD serve as motivators in various academic lessons and activities (Vismara & Lyons,

2007). Embedding these interests into math, science, history, and other applicable lessons help increase academic engagement and improve outcomes (Boyd et al., 2007). In the following sections, examples selected from elementary, middle, and high school classes will be provided, with observations of general education teachers embedding restricted interests in the various academic lessons and activities across grade levels. In addition, examples will be provided of ways to use restricted interests as reinforcers to motivate students to accomplish tasks that do not lend themselves to embedding of restricted interests.

Elementary School

Embedding Denise's restricted interest in Thomas the Train™ into the curriculum increased her academic engagement time. Her teacher, Mrs. Johnson, found a number of ways to motivate Denise by capitalizing on her fascination with Thomas. After several weeks of using these strategies, Mrs. Johnson noted marked improvements in math, science, and reading.

Figure 1: Classic flash cards.

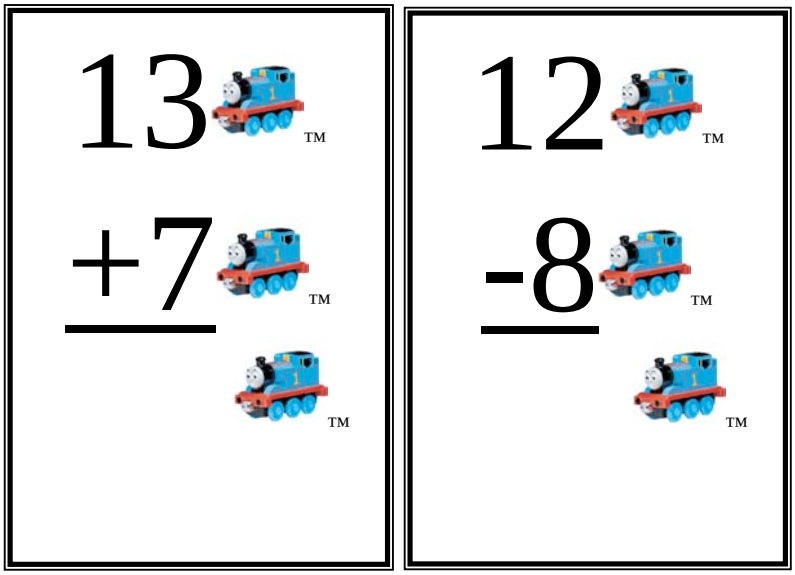


Math. The first few weeks of school, Mrs. Johnson focused on addition and subtraction facts. From the beginning, she observed that Denise did not pay attention during these lessons and engaged in escape behavior for the majority of independent work time involving addition and subtractions facts. Denise would cry, put her head down on the desk, and crumple her paper up when she was asked to complete math work. For example, one day Denise cried and said, "I can't, I can't" repeatedly as tears streamed down her face. Mrs. Johnson had tried to shorten assignments, but this did not work. She had also tried reinforcing Denise with star stickers, but to no avail.

After several unsuccessful attempts to motivate Denise with the star stickers, Mrs. Johnson went home and explored the Internet where she stumbled upon an article about the restricted interests of children with ASD and how these interests can help improve various

behaviors. Mrs. Johnson stayed up late that night and developed a new plan for Denise. She knew that Denise was obsessed with Thomas the Train™. In the past, she had thought it was best to ignore or redirect Denise away from this obsession, but after reading the article, she decided to embed the restricted interest into the math activity. Instead of adding mere numbers together, Mrs. Johnson incorporated Thomas the Train™ into basic facts flash cards. The old flash cards and math worksheets were plain with black, bold numbers (see figure 1 for example flash card). Mrs. Johnson added Thomas the Train™ to the flash cards and math sheets (see figure 2 for example flash card).

Figure 2: Thomas the Train™ flash cards



When the new cards and sheets were presented to Denise during math time, her interest was immediately sparked. She grabbed the cards, looked them over closely, and said, "Mrs. Johnson, they have Thomas the Train™ on the cards." Mrs. Johnson was thrilled when Denise sat down and started to do her math work.

With the new flash cards and work sheets, over several days, Mrs. Johnson noticed an improvement in Denise's challenging behaviors. She no longer crumpled up her paper or cried during math assignments. Although she stilled complained at times, her attention was maintained and she completed her assignments, possibly because she enjoyed seeing pictures of Thomas the Train™. She commented to Mrs. Johnson how much she liked adding up the number of Thomas the Trains™ and wished she had that many.

Science. After experiencing such success with Denise during math instruction, Mrs. Johnson figured out a way to use Denise's obsession with Thomas the Train™ to improve her engagement and learning during Science lessons. She realized she could use the restricted interest to help her teach Denise concepts like (a) basic gears, and (b) solids, liquids, and gases. Since several Thomas the Train™ toy engines have motors, Mrs. Johnson thought Denise's interest would

be perfect for discussing how basic gears work. Mrs. Johnson used pictures of Thomas the Train™ engine gears to demonstrate the effects one gear have on other gears turning.

In addition to using Thomas the Train™ to analyze gear movements, Mrs. Johnson discovered a great use for a Thomas the Train™ engine that blew steam. The engine required water in the top and then changed the water to steam. She thought this was the perfect opportunity to teach Denise about solids, liquids, and gases. At the beginning of the lesson, Mrs. Johnson put the Thomas the Train™ engine on the long table in the classroom. Denise immediately became interested. She asked Mrs. Johnson what they were going to do. Before providing an immediate response, Mrs. Johnson opened her cooler and took out some ice. She then said, "We are going to learn about solids, liquids, and gases." Denise appeared puzzled. She wanted to play with Thomas the Train™, but listened intently to the teacher because she knew that she had to do each step Mrs. Johnson asked before she could play with Thomas the Train™.

Mrs. Johnson described the process of ice (solid) melting into water (liquid). She had Denise and the other students observe the process, time how long it took, and measure the amount of liquid present after the ice melted. Mrs. Johnson noticed that Denise seemed anxious, but actually was participating by taking measurements and keeping notes in her tablet. This was a big change from past science experiments that typically resulted in Denise going back to her seat and not engaging in the task.

After the last measurement, it was time to put the water in the Thomas the Train™ engine and observe the water convert to water vapor (gas). Denise was excited. When Denise finished putting the water in the Thomas the Train™ engine, Mrs. Johnson reminded her that she had to keep data on how long the water lasted. Denise happily completed this task because she could 'play' with the Thomas the Train™ engine.

Reading. For the first half of the school year, Denise had improved very little in her reading fluency and comprehension scores. Mrs. Johnson had been using an intensive one on one reading program with Denise. Although she was in the 2nd grade, she was still reading at a 1st grade level and showed very little interest in reading independently. To address Denise's lack of motivation to read, Mrs. Johnson had tried redirection, buddy reading, and providing extra free time as a reinforcer. But none of these techniques had worked.

After having success using Denise's restricted interest for math and science, Mrs. Johnson began using Thomas the Train™ to engage Denise during reading activities while continuing to use the intensive one on one reading program. Mrs. Johnson found several books about Thomas the Train™. She found that, when reading the books about Thomas the Train™, Denise completed the reading assignments on time. During past reading sessions, she would have a passage for 30 minutes, barely finish, and still not recall the information. After using Thomas the Train™ books to motivate Denise for a couple of months, Mrs. Johnson discovered great improvements in Denise's reading fluency and comprehension. Denise was reading at a 2.5 grade level by the end of the school year. Perhaps this increase occurred because Denise realized that she needed to improve if she were to continue reading to find out more about her favorite topic, Thomas the Train™ or the ability could have been there the entire time and the restricted interest was the tool

that helped Mrs. Johnson discover Denise's true reading ability.

Middle School

Just as restricted interests benefited Denise in elementary school, restricted interests also have the potential to improve outcomes for students in middle school. This was definitely the case for Zeb, whose restricted interest was hurricanes. Several of Zeb's teachers capitalized on Zeb's restricted interests. Similar to Denise's teacher, Zeb's various teachers noted marked improvements in math, science, reading, and history.

Math. For example, Zeb's math teacher, Mr. Pascal, developed activities that required Zeb to calculate wind speed. Based on the wind speed, Zeb had to determine the time it would take to make landfall. This activity required Zeb to practice several of his math skills. First, he had to use a ruler to measure distance from the plotted hurricane to the landmass. Then, he had to convert the ruler measurement to miles using the scale provided on the map. After completing this, he calculated the time it would take to reach land given the current speed of movement of the hurricane. Although several of these tasks were difficult for Zeb, he did not give up immediately as he had in the past. He still did not breeze through the assignments, but was able to focus more and work through difficult problems, possibly because of his intense interest in hurricanes.

Embedding these interests into the curriculum can make previously difficult and 'boring' tasks more interesting for the student.

Science. Zeb's science teacher, Mrs. Johnson, smoothly incorporated Zeb's interest of hurricanes into science. She had Zeb research the conditions that are favorable to produce hurricanes. In addition, Zeb researched the effects hurricanes had on other weather patterns and sea life. Whereas in the past Zeb refused to conduct research on the Internet for his assignments, Zeb now spoke about how eager he was to find out more information about the topic. He discovered such things as how animals begin to move before storms. During the research, Zeb improved his data collection and recording skills.

English. Zeb had similar difficulties in his English class for the first half of the school year. He refused to read books, instead choosing to sit and stare at a page for an hour or longer, throw the book on the floor, or just lay his head down and sleep. The same thing occurred when he was asked to write. He would put down a few sentences and then lose interest. Ms. Stella, the English teacher, tried to redirect Zeb back to the task sitting down with him to practice words she felt were particularly difficult for Zeb and suggesting ideas to stimulate his writing. Unfortunately, these strategies were not successful. Then Ms. Stella noticed that Zeb enjoyed looking up material on hurricanes on the computer and she had a 'eureka' moment. She decided to find books on hurricanes for him. When reading books about hurricanes, Zeb no longer immediately withdrew as he had with material that was of little interest to him. He began to identify the main idea and key points. Ms. Stella encouraged him to write a report about hurricanes and he actually wrote a five-paragraph report. Overall, Ms. Stella, found great improvements in Zeb's motivation to read and write and subsequent improvements in both areas.

History. Similar to the reading teacher, Zeb's history teacher, Mr. Skinner, readily discovered a way to incorporate Zeb's interest into history. He had Zeb research the history of naming hurricanes and the history of major hurricanes that have affected the United States. For the latter, Mr. Skinner required Zeb to collect information on dates and other statistics (e.g., homes destroyed).

Zeb excitedly began looking up the history of naming hurricanes. In the past, he had refused to research topics on the Internet or in the library, but not that day. While he was researching information, he discovered numerous interesting facts such as hurricanes were once named for the saint's day the hurricane occurred, hurricanes were once given only female names, and they now received names of both genders with each successive storm started with the next letter of the alphabet (e.g., Angie, Billy, etc.).

In addition to the history of naming hurricanes, Zeb researched the history of major hurricanes that affected the United States. In contrast to past projects, Zeb maintained his focus, took detailed notes, and synthesized the information he collected. At times he became frustrated, but his interest in hurricanes kept him motivated to complete the task.

High School

Similar to Denise at the elementary level and Zeb at the middle school level, Jeffrey, working at the high school level, experienced improvements as a result of his teachers embedding his restricted interest in electronic gadgets into his subjects. Jeffrey was considered to be an underachiever. His teachers knew he was capable of the work, but he seldom turned anything in.

Figure 3: Collaboration Tips

Eight Tips on Collaboration

1. Cross-train in each other's procedures and norms.
2. Build a sense of community.
3. Obtain and maintain support at all organizational levels.
4. Develop joint procedures and eliminate conflicting procedures.
5. Write policies that encourage collaboration.
6. Remember, the more democratic, the better.
7. Work to develop high levels of trust.
8. Define the decision-making process.

Adapted from Dettmer, Thurston, and Dyck, 2005

Math. Jeffrey's math teacher, Ms. Conroy, was frustrated with Jeffrey's performance in math class. Jeffrey seldom completed his incomplete assignments, often late. She knew that Jeffrey was capable of the work. She had observed Jeffrey numerous times figuring out how various electronic gadgets operated. This thought gave Ms. Conroy an idea. She would create math lessons for Jeffrey that used electronic gadgets as a central focus.

The next day, Ms. Conroy brought several electronic gadgets to class. She brought a graphing calculator and several

gadgets that measure weather (e.g., thermometer, barometer). Ms. Conroy had Jeffrey keep track of the weather and perform various calculations with the temperature and barometric readings he obtained. Many of these calculations were advanced and required the use of the graphing calculator.

Ms. Conroy discovered that this motivated Jeffrey to perform math calculations that he previously left undone. For example, Jeffrey now readily calculated ratios and graphed data. He also began to derive the functions of the weather patterns based on his data. Overall, Jeffrey participated more in class and improved his math grades.

Science. Ms. Jackson, Jeffrey's science teacher, had no problem incorporating Jeffrey's restricted interest of electronic gadgets into science lessons. Fortunately, she worked along with Ms. Conroy, Jeffrey's math teacher (see Figure 3 for collaboration tips). That is, she used the same gadgets in her science class to measure weather. Ms. Jackson taught Jeffrey how to use the various weather instruments. He quickly learned to read barometers and other instruments. Ms. Jackson immediately noticed an improvement in Jeffrey's on task behavior and science scores.

English. In contrast to the math and science teachers, Mr. Jones, Jeffrey's English teacher, found it difficult to incorporate electronic gadgets into English. However, after a few days of contemplating and researching the area, he discovered a great fiction series for young readers that involved characters who invented new electronic gadgets.

Reading the new series motivated Jeffrey to summarize paragraphs, decide on the key points, main idea, and themes of the story. In the past, he would quit reading the text because he did not want to summarize the key points. In contrast, the stories involving electronic gadgets motivated Jeffrey enough to complete these tasks so he could continue reading about his restricted interest.

In addition to the fiction series, Mr. Jones discovered nonfiction science articles about electronic gadgets for Jeffrey to read, summarize, and synthesize in a research paper. After embedding Jeffrey's restricted interest into the English assignments, Mr. Jones noticed a vast improvement in Jeffrey's academic outcomes. Jeffrey's fluency and comprehension improved. For example, Jeffrey now read three times the number of books and recalled the majority of the information. He slowly began to improve his skills in finding main ideas, key points, and thematic schemes of stories.

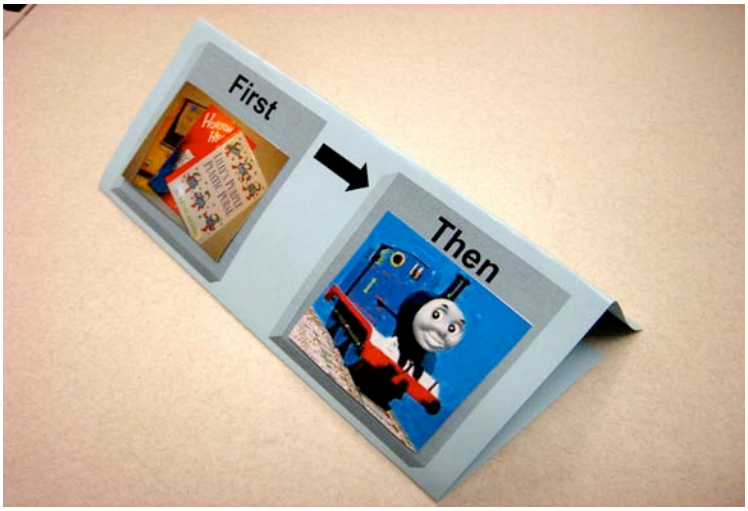
History. Mrs. Nicks, Jeffrey's history teacher, also found ways to incorporate electronic gadgets into her subject. She realized how many inventors there were and that electronic gadgets played a large part in history. Thus, she assigned Jeffrey the task of researching inventors throughout history. Jeffrey had to find information on the inventors, their inventions, and the impact of the inventions on history. He created a timeline of inventions and their impact on various events. For example, he discovered the Civil War was the first conflict in which the train and telegraph were used. In the past, Jeffrey never remembered dates or the effects one event had on multiple other events in history. The focus on the electronic gadgets helped improve this deficit area and his new skills generalized to other topics in his history class (e.g., Civil War timeline and the connection of events leading up to the Civil War).

The Premack Principle and Restricted Interests

What happens when a student must interact with material that cannot include his or her restricted interest as readily as the aforementioned examples? For instance, Zeb will have to learn concepts in Science that do not involve hurricanes. Attempting to embed a restricted interest such as hurricanes into learning about periodic table of elements may prove challenging and improbable. In such cases, it may prove more beneficial to follow the Premack Principle for using the student's restricted interest.

The Premack principle involves following a less preferred activity (e.g., studying the Periodic Table of Elements) with a more preferred activity (e.g., engagement with restricted interest in hurricanes). Denise's, Zeb's, and Jeffrey's teachers followed this principle for some of their lessons and activities.

Figure 4: Denise's First-Then Board



Denise. Mrs. Johnson embedded Thomas the Train™ engine into several of Denise's academic lessons and activities. However, there were a few lessons into which it was not possible and/or efficient to embed her restricted interest. Denise had to read certain books mandated by the school system. Although she was making progress reading books about Thomas the Train™, Denise still did not want to read about other topics. Mrs. Johnson decided to use the Premack principle. She created a First-Then Board for Denise. A First-Then Board is visual support that is commonly used with students with ASD. It is designed to motivate the student by providing clear expectations for what the student must do to access a preferred activity. The pictures on the First-Then Board are designed to be removable. Velcro is often used so that the teacher can switch out pictures of non-preferred and preferred activities as needed or allow the student to choose his or her reward. Mrs. Johnson placed a picture of required books under the word "First" and a picture of a Thomas the Train under the word "Then" (see Figure 4). She folded the tag board so that the First-Then Board could stand up on Denise's desk. This was designed to help Denise focus on the current activity and the rewarding activity to come without distraction. When Denise completed a predetermined amount of the reading assignment, she

was allowed access to a Thomas the Train™ engine.

At first, Denise only read a couple of paragraphs. As the weeks progressed, Denise was able to complete the entire book and recall the main idea and key points. Mrs. Johnson concluded that getting access to Thomas the Train™ motivated Denise to complete her reading assignments.

Zeb. Mr. Pascal, Zeb's math teacher, also had great success embedding restricted interests into lessons, but discovered this approach was ineffective for lessons on factoring. Similar to Mrs. Johnson's strategy for Denise, Mr. Pascal created a work chart for Zeb. When Zeb completed a predetermined number of factoring problems, he was allowed access to activities involving hurricanes. Over a three-week period, Mr. Pascal noticed that Zeb increased the number of problems he completed during class and performed at a level commensurate with his typical peers.

Figure 5: Jeffrey's work chart.

Reading Assignment	Paragraph Read	Key Points Written	Overall Theme Described	Main Idea Determined
Lincoln's Election				
Lincoln in the South				

Note. The paragraphs required to be read may be modified. At first, you may require one at a time. Later, you may require an entire chapter.

*Jeffrey***.** Jeffrey's history teacher, Mrs. Nicks, had difficulty embedding Jeffrey's interest of electronic gadgets into all lessons about the Civil War. For example, Jeffrey had to learn about the effects Lincoln's election had on the southern states. Mrs. Nicks decided to use the Premack principle for this topic. She created a work chart (see Figure 5) for Jeffrey. The chart depicted what information and how much of the material Jeffrey had to read and write about before he could gain access to his restricted interest. When Jeffrey completed each section of required work, he was allowed access to electronic gadgets for specified amounts of time (e.g., 15 to 30 minutes, depending on the amount of work required). Mrs. Nicks found this approach successful. Jeffrey completed his work. Further, over the course of a few weeks, Jeffrey was able to completed entire assignments before getting access to his restricted interest, electronic gadgets.

Special Considerations When Using Restricted Interests

While many positive ways to use restricted interests have been presented, it is important that the teacher carefully consider what and how much engagement in the restricted interest is appropriate. As previously noted, restricted interests can interfere with the development of peer relationships (Attwood, 1998). It is important that teachers communicate with families to be sure that the parents are in agreement with using the restricted interest in the classroom. Also, teachers should work with their students with ASD to help them identify the interests of others and to learn to participate in a back and forth conversation on a variety of topics. It may be necessary to identify when it is and is not appropriate to engage in the restricted interest. Another concern may be the age appropriateness of a restricted interest. While an interest in Thomas the Train may be acceptable for a primary student, it would not be appropriate for a middle school student and would likely lead to a lack of peer acceptance. Teachers should always be on the lookout for ways to expand or shape such interests to include broader and more mature topics. See Figure 6 for questions teachers should ask when using restricted interests in the classroom.

Figure 6: Ten Questions to Ask Yourself When Using Restricted Interests as Motivators

1. What else attracts this student's interest?
2. How can I encourage and develop a new interest to expand the student's repertoire?
3. Is this restricted interest age appropriate?
4. Will engaging in the restricted interest alienate peers or lead to ridicule?
5. If the interest is not age appropriate, how can I shape the interest toward a related interest that is more appropriate (e.g. Thomas the Train to an interest in trains and transportation.)?
6. How can I provide structure for engagement in this restricted interest?
7. What specific times/settings/activities in the school day are appropriate for engaging in the restricted interest?
8. Is the activity using the restricted interest relevant and related to specific academic or social goals?
9. Have I communicated my strategies for using restricted interests to the student's parents? Are they in agreement?
10. Does data collected for student outcomes support the use of this restricted interest?

Final Thoughts

In summary, restricted interests may serve as motivators in various academic lessons and activities such as math, science, reading, and history. Academic engagement and outcomes can improve as a result of incorporating these interests into lessons. Figure 7 provides a summary of ways that restricted interests can be embedded in the curriculum. In addition, following the Premack principle using restricted interests as reinforcers may have the same effect on the academic engagement and outcomes of students with ASD. Teachers need not view restricted interests as a deficit area for their student with ASD. Temple Grandin is one of many examples of how restricted interests can be channeled into productive, life long careers (Grandin & Scariano, 1996). She shaped her interests of a squeeze machine and developed a successful career designing equipment for cattle. Research supports the use of restricted

interests as evidence-based best practice. However, as seen in the examples provided here, there are numerous applications. Careful planning for the use of these strategies, along with data collection to ensure positive students outcomes and support continued use, are key to successfully using restricted interests in the classroom.

Figure 7: Ten Ways to Embed Restricted Interests in the Curriculum

1. Provide books and reading passages (fiction and nonfiction) related to the restricted interest.
2. Include the restricted interest in a writing prompt.
3. Incorporate illustrations and examples related to the restricted interest in worksheets and materials.
4. Develop math word problems that include the restricted interest.
5. Have the student research topics related the restricted interest.
6. Have the student do internet searches related to the restricted interest.
7. Encourage the student to write a report related to the restricted interest.
8. Encourage the student to do an oral report related to the restricted interest.
9. Identify science concepts that can be demonstrated using examples or objects related to the restricted interest.
10. Incorporate the restricted interest in a social story.

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