

Running Head: PROVIDING A TOOL BASKET FOR SELF-REGULATION
FOR STUDENTS WITH AUTISM

by

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Abstract

Students with autism spectrum disorder (ASD) face many challenges in school including gaining access to curriculum due to the need for adaptations for learning challenges, overstimulation from the environment, and the need for support with lagging skills in areas such as self-regulation. The research sought to explore why students with autism have challenges with self-regulation, what self-regulation is, why it is important, and what interventions would support students' self-regulation in the classroom. The purpose of the study was to investigate the engagement and attention effects on students with ASD when they had access to a self-regulation tool basket. The exploration involved pre- and post-observations and teacher interview/questionnaires related to the implementation of a basket containing sensory tools to support in students' self-regulation. Results showed that students with ASD improved in many aspects of regulation with the intervention of a sensory tool basket in their classroom. With students being regulated, classroom teachers will be able to have them focused and ready to engage in class activities that will support them in learning.

Keywords

self-regulation, autism

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Chapter One

INTRODUCTION

Introduction and background

As a teacher consultant attached to six different schools in the district, the classrooms I have observed have many students with diverse learning needs and classroom teachers needing support in meeting them. One of the challenges I see is keeping students regulated so they are ready to engage in learning. Many students need support with self-regulation, in particular students with a diagnosis of autism. Complex tasks that need several components of self-regulation and executive functioning present major challenges for students with autism as well as those with learning disabilities and emotional and behaviour disorders (Korinek & DeFur, 2016; Graziano et. al, 2007; Zimmerman 2010; Sparapani et. al, 2015). The research sought to explore what self-regulation is, how sensory challenges affect self-regulation, why it is important, and which interventions can support self-regulation in the classroom. The purpose of the study was to investigate the engagement and attention effects on students with autism when they had access to a self-regulation tool basket. The exploration involved observations before and after the tool basket was put into the classrooms and a discussion with the classroom teachers pre- and post-intervention.

Definition of self-regulation

A review of current literature revealed that self-regulation does not seem to have a clear definition recognized by everyone and is looked at with different sub-categories depending on the profession (Burman, Green & Shanker, 2015; Gillebaart, 2018). The ability to regulate requires controlling emotions as well as the body. Burman, Green and Shanker (2015) searched

for definitions of self-regulation and found that not all of the terms are useful for classroom teachers. Teachers want students to be able to have self-control so that they can attend to classroom instruction and participate in class activities. For this research, a functional definition of self-regulation is as follows: monitoring and managing the self so behaviour can be appropriate in learning situations (Burman et al. 2015).

Why is self-regulation important?

Meaningful inclusion in today's classrooms means finding ways to provide access points for learning, and providing self-regulation tools and the use of strategies for those who need it. Students need to have strategies and materials available to assist in self-regulation so that they can be successful in their classroom. Many teachers who work with students on the autism spectrum share concern about lack of student attention during instruction, which may negatively affect student performance (Mays, Beal-Alvarez & Jolivette, 2011). One of the reasons students with ASD struggle with self-regulation is due to their sensory challenges. When students are not regulated, they are not able to attend to teacher instruction and therefore miss out on learning in academics but in opportunities for social interactions as well. Missing out on opportunities to interact with peers in the classroom risks alienating peers from wanting to interact with them. Zimmerman (2002) points out that with so many distractions in today's society with all of the technology children are surrounded by, it is not a surprise that so many children have not learned to self-regulate. Many children are spending too much time on screens creating over stimulation on their brain and exposure to inappropriate information. Jahromi, Bryce and Swanson (2013) further acknowledge the importance of self-regulation and academic outcomes as "self-regulation is a significant predictor of school engagement and success in typically developing

children” and can be even more significant for students with ASD (p.237). In order to support students with ASD in regulating, we must address their sensory needs and challenges.

Sensory needs

Students with autism often have sensory challenges which can make self-regulation difficult (Ashburner, Rodger, Ziviani & Hinder, 2014). Many of today’s schools and classrooms are full of sensory overload and thus contributes to this problem. Sensory overload involves “moments when sensory processing, already known to be an issue in autism, is dramatically disturbed, leading to an agonistic feeling” (Chocron & Ponce, 2019, p. 51). Fluorescent lighting, loud noises, crowded spaces and clutter are some of the sensory overload experienced in schools. By providing tools for students with autism to calm the sensory overload, we support them with the opportunity to be included and successful in the classroom. A self-regulation tool basket with a variety of tools can meet those sensory needs and provide students with autism the support they need to regulate themselves.

Interventions

Although research on the topic of self-regulation spans over the last 40 years, it has mainly been a concept in schools since Stuart Shanker’s publication of *Calm, Alert and Learning* came out in 2013. Shanker (2012) suggests that the reason emotional regulation or self-regulation has become such an issue is because of rapid societal demands and changes resulting in a growing number of children who have challenges regulating themselves. There are class-wide and school-wide programs, sensory strategies recommended by occupational therapists (OTs), social stories, smartwatches, and many other options available. Autism spectrum disorder is characterized by the challenges of integrating sensory experiences, so providing sensory

programming in schools for students with ASD encourages them to have interactions with their environment and can provide long-term changes (Larkey, 2007). The school-wide programs seen in most Lower Mainland schools for self-regulation are the *Mind Up* program and *The Zones of Regulation*. *The Mind Up* program is a social- emotional program based in neuroscience that teaches children how to use mindful practice to regulate their stress and emotion, building awareness and self-regulation (Goldie Hawn Foundation, 2018). *The Zones of Regulation* program uses a cognitive behavioural approach incorporating social thinking to teach self-regulation through identification of four zones that reflect emotions and levels of regulation and then what strategies can be used to manage their feelings and emotions (Kuypers, 2020). In a feasibility study on implementing *The Zones of Regulation* curriculum in the classroom, McQuaid (2018) found that the implementation of *The Zones of Regulation* program was effective. The aim of *The Zones of Regulation* program is to “teach self-regulation skills while incorporating executive functions, emotional regulation, and sensory processing” (McQuaid, 2018, p. 1). Class-wide approaches do not single out students with ASD and shows that all students benefit from learning strategies for self-regulation. The incorporation of a multi-sensory approach with activities and materials using more than one sense may increase the interest level for children, which can facilitate learning (Deris & DiCarlo, 2015). Consideration of all of the sensory systems and incorporating materials that support these systems allows students with autism to benefit from having access to these materials when needed in order for them to have a productive day (Deris & DiCarlo, 2015). The management of sensory processing challenges in classrooms can be difficult, but using targeted intervention can improve task mastery when utilizing sensory scheduling for students with ASD (Mills, Chapparo, & Hinitt, 2016).

The research intervention provided access to items that are readily available in the classroom to support students so they do not have to leave to get the sensory input needed to stay engaged in peer interactions and classroom activities. Larger items such as trampolines, swings, and stationary bikes that can be seen in sensory rooms would be too distracting in the classroom. The items in the tool basket were chosen as they would be small enough and easily used so as not to distract others from their learning, while still providing sensory input for the students with ASD to continue to finish a class activity. The items in the tool basket used in the intervention address each of the senses and are easily made so that classroom teachers and students could make many of the tools on their own without much cost. The balloons and putty can be used as fidgets and provide touch sensation. The essential oil smell jars provide input for smell with both calming and invigorating smells. The calm sparkle jars provide something calming to focus on as a distraction from what may be upsetting a student and provide input for sight. The noise-cancelling headphones provide both pressure and filter out all of the background noise so that the students can calm themselves and focus on the task at hand.

Provision of tools to support learning fits with the Universal Design for Learning (UDL) principle. The basic principles of UDL include:

- a.) equitable use (useful for all abilities)
- b.) flexibility in use (accommodates for a wide range of interests and abilities)
- c.) simple and intuitive use (easy to understand)
- d.) perceptible information (effectively communicates the information)
- e.) tolerance for error (instruction and assessment are designed to account for differences in learning needs)
- f.) low physical effort (focus on big ideas to be more efficient)

g.) size and space for approach and use (accessible environment) (Katz, 2012).

These principles are then used to design curriculum using “multiple means of representation, expression, and engagement” that is accessible for diverse learners whose abilities, ethnic backgrounds, learning styles, and skills vary (Katz, 2012, p. 14). Multiple means of representation and expression can be through technology, use of manipulatives, or any way that a student can show their understanding of what they have learned. UDL is such a huge shift in mindset for many teachers who have been teaching using a different style for many years that consisted of creating unit plans involving mostly worksheet style lessons without consideration of adaptations needed for various learning styles and needs. It is not something that is just an easy switch and having the necessary support and professional development to do so is needed. For teachers who started their teaching career without the use and understanding of technology and a variety of teaching methods, it can be challenging to learn new ways of doing something you have been used to doing. Factors to consider when planning UDL activities and instruction presented by Katz include:

- a.) class climate (valuing diversity)
- b.) interaction (supportive group work)
- c.) physical environments and products (accessibility of materials)
- d.) instructional standards (support with maintaining high standards for all)
- e.) delivery methods (variety of methods for instruction with accessibility for all students)
- f.) information resources and technology (engaging, accessible, flexible resources)
- g.) feedback (regular feedback on progress)
- h.) assessment (regular assessment using a variety of tools and methods).

When children are exposed to a variety of stimuli, they learn to live with diversity and to function independently, which are skills shown in research to be best practice for inclusion (Katz, 2012). When observing classrooms that are following a UDL approach the level of engagement of all students is evident and the learning environment is rich.

In considering the importance of self-regulation interventions to allow for meaningful inclusion by meeting the sensory needs of students with ASD, this research project was created. The hope was to support students in a way that they could continue to access curriculum and gain skills if they were regulated in their classrooms.

Project description

The purpose of the study was to investigate the engagement and attention effects on students with autism when they had access to a self-regulation tool basket. Provision of a self-regulation tool basket with a variety of tools to meet the sensory needs of students with ASD was implemented to allow for students to remain in their classrooms. When providing support for students to be regulated in the classroom, we ensure they are not missing valuable instruction time to further their learning, as well as opportunities to develop social skills.

Three schools volunteered to take part in the intervention. Pre- and post-observations were conducted at each school as well as pre- and post-teacher interview questionnaires. The observations followed a checklist adapted from the Classroom measure of active engagement checklist (CMAE) observing emotional regulation, productivity in the classroom, classroom independence, flexible behaviour & attention, and response to social connection (Sparapani, Morgan, Reinhardt, Schatschneider, and Wetherby, 2015). To observe emotional regulation, the ability to manage emotional state using strategies or seeking support to match the classroom environment was the criteria. Tracking productivity in the classroom was observed through the

use of materials appropriately and performing the roles necessary in the activity. For classroom independence, the ability to self-initiate, get their materials out or put them away and complete the task at hand was recorded. The criteria for flexible behaviour and attention was the ability to change activities, locations and shift attention if the teacher changed expectations. To track response to social connection, showing a response physically to social bids and using expectant language was observed, and for a response to social connection with eye gaze, eye gaze directed toward the partner communicating with them was the criteria. Teacher interview/ questionnaires involved a discussion with the classroom teacher asking questions from Likert scales and short answer questions regarding the teacher and student knowledge about self-regulation, students' ability to self-regulate and their level of engagement in class. The teachers responded for their student with ASD as well as the class as a whole. Each classroom was given a video to show the students that went through all of the tools in the basket, how to use the tools and why learning to self-regulate is important. The self-regulation tools baskets were used in the classrooms for over a month during the intervention.

Limitations

Limitations in this study include time, money and access. A greater outcome for the study could have been shown if it had been conducted near the beginning of a school year and then compared results near the end of the year. With just over a month of implementation before the post-observation, it didn't give a lot of time for the novelty of the new tool basket to wear off. Looking at the effects over the school year could eliminate the novelty as well as provide data as to if there were particular times over the school year that the tools were used most. The tool baskets have a cost attached to create the materials and although having more classrooms partake in the research could have provided more generalizable results, the cost would have been a

factor. Results of the study may have been skewed by several factors. Firstly, a video or audio recording of the interview/questionnaire with the teachers with a transcription of the interviews wasn't done. Secondly, the observation could have been done in increments of 5 minutes and at the same time of day for pre- and post-intervention during similar activities for consistency.

Video recording the class to watch back at a later date so that some behaviours weren't missed could have provided more data. Lastly, interviews and questionnaires from students about their feelings on the implementation and if it helped them with strategies for self-regulating could have given valuable information but would have made ethics review more complicated.

Chapter Two

PROJECT METHOD

The purpose of the study was to investigate the engagement and attention effects on students with autism when they had access to a self-regulation tool basket. The research sought to explore why students with autism have challenges with self-regulation, what self-regulation is, why it is important, and what interventions can support self-regulation in the classroom. A qualitative action research design was chosen to explore the research question and gain an understanding of supports that students with autism could use daily to allow for inclusion in classroom activities.

Qualitative research allows for “the study of accommodations needed for individual students that are specifically developed to address that student’s learning needs and how they are supported” (Mertens, 2014, p.238). In using a qualitative design, it allowed for personal contact with the classroom teachers and inclusion of their differences in beliefs, values and intentions, so that answers could emerge as to how to best support them in implementing self-regulation strategies to support their diverse learners (Mertens, 2014). Action research can create a path towards better achievement for students through reflection from the teacher and spark initiatives within them for better assessment, pedagogy, and involvement from parents (Morales et. al, 2016). Promoting action research allows teachers to solve educational problems, think of alternatives, reflect on observations and report on changes in their pedagogical thinking (Takala,1994). This research created that opportunity for the classroom teachers’ involvement.

Takala (as cited in Levine,1992) points out that teacher action research can enrich the knowledge base for other practitioners and enhance staff development as they engage in the

construction of their learning through interactions with students and colleagues (Takala, 1994). Discussion around the intervention created interest with other teachers in all three schools. “When teachers’ work is increasingly defined as finding successful teaching practices that help students to learn, as opposed to simply covering the prescribed curriculum” it is more meaningful (Takala, 1994, p. 58). As a powerful platform for professional development for teachers, action research “should find its best expression in the transformation of the classroom” (Morales et. al, 2016, p. 480). There is often a mismatch between intervention goals in other types of research trials compared to what school staff have for students which is why action research is a better fit (Iadarola et al., 2014). With interventions supported by other types of research, there is often inconsistency in its implementation and adhering to the procedures, even with ongoing training (Iadarola et al., 2014). Schools have so much going on day to day that having to follow specific procedures that some interventions require can be challenging. Lofman (as cited in Denscombe, 1998) states that action research is practical, participatory, cyclical and change-promoting because it involves the participants as collaborators and is connected with problems of daily practice (Lofman, 2004). Most importantly, action research focuses on change in a natural social situation, with participants and the researcher as ‘insiders’ giving access to knowledge and understanding that aren’t accessible to traditional researchers coming from outside, in hopes of the intervention being useful in other classrooms (Somekh, 2005). “Action research starts from a vision of social transformation and aspirations for greater social justice for all” and in this study was a subject of personal engagement (Somekh, 2005, p.7). This research brings about learning for participants through combining research with a reflection on practice, which was evident in the post-interview/ questionnaires in this study (Somekh, 2005). Ongoing

reflection in the education field is imperative to continue to build on best practices and responding to the intervention and support that students need.

Data collection and analysis

A pre-observation in each of the classrooms was conducted. An observation checklist was used with criteria adapted from the Classroom Measure of Active Engagement-CMAE (Sparapani, Morgan, Reinhardt, Schatschneider, and Wetherby, 2015), see Appendix 4. The CMAE is an observational tool designed by Sparapani et al. (2015) to measure active engagement in students with ASD, which this research aimed to measure when provided a self-regulation tool basket. For the observation, the student behaviours observed included: emotional regulation, productivity in the classroom; classroom independence; flexible behaviour and attention; and response to social connection. Students in the research were scored for either yes or no if they performed the above behaviours. The yes or no scores were calculated against the total number of times the behaviour was observed or not.

After the pre-observation, the basket with the tools was provided for the classroom teacher, along with a link to the video to be shown to the students. Classroom teachers showed the video to the class and then placed the basket with stipulations on when the tools could be used (left to the teacher's discretion). The video explains how to use each of the tools in the basket, as well as when you might need to use them (see appendix 3 for the script used in the video).

The basket included: putty, balloons filled with a variety of substances for fidgets, essential oil smell jars with calming and energizing smells, calming sparkle jars, a breathing feather, and noise-cancelling headphones. The items in the basket were chosen to target many of the senses. The putty and balloons provide tactile sensory feedback, the calming sparkle jars

provide visual sensory input, the noise-cancelling headphones block out auditory stimuli, and the essential oil smell jars provide olfactory stimulation.

A structured interview/ pre-questionnaire was conducted with each classroom teacher. There were seven questions (see Appendix 1) ranging from Likert scales to short answer questions regarding the teacher and student knowledge about self-regulation, students' ability to self-regulate and their level of engagement in class. The teachers responded to the same questions for their students with ASD as well as the class as a whole. The baskets were left in the classrooms for implementation for 45 days (classroom #3), 39 days (classroom #2) and 38 days (classroom #1). A post-observation, as well as a questionnaire/ interview with the teachers, was conducted. The post-observation included the same checklist and areas as the pre-observation. The post-questionnaire/ interview had similar questions as the pre-questionnaire, with some slight changes and additions as well as a debriefing document (see Appendix 2).

The pre-and post-observations were conducted using an adapted version of the Classroom Measure of Active Engagement-CMAE (Sparapani, Morgan, Reinhardt, Schatschneider, and Wetherby, 2015), see Appendix 4. The criteria that were sought to determine emotional regulation, included the ability to manage emotional state using strategies or seeking support to match the classroom environment. The measure for productivity in the classroom included using materials appropriately and performing the roles necessary in the activity. The criteria for determining classroom independence included the ability to self-initiate, get materials out or put them away and complete the task at hand. Flexible behaviour was measured by observing attention, the ability to change activities and locations, as well as the ability to shift attention if the teacher changed expectations. Finally, the criteria for determining response to social connection included showing a response physically to social bids and using expectant language,

as well as, a response to social connection with eye gaze (eye gaze directed toward the partner communicating with them). A checklist was used to tally the number of times the criteria was observed or not during the observation, as well as during transitions to different classroom activities. The total number of yes and no observations in each category compared to the total yes or total no tallies created the percentage.

As a thank you for participating in the research, teachers were offered the baskets with the tools to keep for their classrooms.

Research participants

Three classrooms (each from a different elementary school) in the Lower Mainland of British Columbia, Canada, took part in the research. Each classroom had one student with a B.C. Ministry designation of autism. The classroom teachers were all female and Caucasian with the number of years of teaching experience ranging from 7 to 25 years. The students in the study ranged from grades 1 to grade 5 and were of diverse ethnic backgrounds. One of the students was Caucasian, another Korean/ Chinese and the third student is of an East Indian ethnic background. The schools involved in the research are multicultural, with diverse ethnic backgrounds, and in predominantly middle-class neighbourhoods.

Limitations to the research design

Action research design does come with some limitations. It is difficult to ensure objectivity in action research with the researcher being an insider in the research setting (Loffman, 2004). The insider-outsider dilemma is a challenge in that the interviewer and interviewee have established rapport and a working relationship which can make the researcher vulnerable to crossing boundaries (Mertens, 2014). The researcher as the instrument is also a limitation in action research, as they have control over what questions to ask and what data to

collect which can be focused on the researcher's beliefs, biases and assumptions (Mertens, 2014). It can be a challenge to not fall into wanting to see positive results in a study when you believe your ideas will make a difference in the lives of the subjects. Researchers with a Postpositivist viewpoint would feel that the possible lack of objectivity and the belief that the natural world and social world can be studied in the same way, make action research less valid and reliable (Mertens, 2014)

Chapter Three

LITERATURE REVIEW

A review on current literature and self-regulation and children with autism, reveals a variety of topics. To begin, looking at what self-regulation is defined as is necessary. Looking further, the reasons why self-regulation is an important skill to have and the sensory challenges that can make self-regulation difficult for children with ASD is researched. Finally, consideration of the implementation of interventions to support and build skills for self-regulation is reported.

What is self-regulation?

Within the last decade, a considerable amount of literature has been published on self-regulation. According to Zimmerman (2002), “self-regulation is not a mental ability or an academic performance skill; rather it is the self-directive process by which learners transform their mental abilities into academic skills” (p.65). Although the term self-regulation is frequently used, there isn’t consensus on the definition. Burman, Green and Shanker (2015) conducted two studies to examine the definition of self-regulation through the American Psychological Association’s (APA) system of controlled vocabulary. The authors' concern was that with the definition of self-regulation being somewhat ambiguous, it might affect how it is seen and used in students’ classroom experiences. Burman et al. (2015) examined the perceived meaning of self-regulation using terminology closely associated to explicate self-regulation: emotional regulation, self-monitoring, self-monitoring personality, self-control, self-management, self-regulated learner, and agency. Their first study was done in PsycINFO and used controlled vocabulary to pick out the dominant meanings that can influence the perceptions of American psychologists, whereas, their second study was an illustration of the findings and looked at how the dominant definitions cluster to form groups (Burman et al., 2015). Their analysis showed that

the highest connected term was self-control, which the authors suggest is not useful for teachers as it is not language they would be using in the classroom, while some of the others such as emotional regulation, self- management and self- monitoring are more suitable (Burman et al., 2015). In study two, their results provided a precise definition: “self-regulation involves the monitoring and management of the self, by the self, so that behaviour can be appropriately controlled-especially in learning situations” (Burman et al., 2015 p. 1516). The hope is that understanding the definition of self-regulation can help develop school environments so classrooms are focused on positive interactions (Burman et al., 2015). Overall, these studies highlight the need to precisely define self-regulation, and not leave it ambiguous so that best practices in classrooms can be established to support students in regulating with engagement in successful learning. Using common language when developing skills for students can be valuable.

Self-regulation and self-control are such closely related concepts that they are often used interchangeably, but Gillebaart (2018) cautions that clustering the two terms together “does not do either of the concepts justice” (p.2). Although self-regulation includes self-control as a component, it is not synonymous with it (Gillebaart, 2018). Successful self-regulation involves a desired end state identified by the individual, whereas self-control is what is done to move a behaviour towards that desired state (Gillebaart, 2018). Self-regulation programs such as the *Zones of Regulation*, work on the skills of identifying what emotion your body is feeling and then using a strategy to get your body back to feeling calm and regulated (Kuypers, 2020). This is very different from self-control in which you don’t identify the emotions, but just stop them from happening to you. “Self-regulation entails scaffolding for goal pursuit, including setting standards and monitoring discrepancies” (Gillebaart, 2018, p. 1). The skill of being able to

identify what your body is feeling and knowing what strategies and tools you need to self-regulate is one that if taught early on in life, can be beneficial for a lifetime.

Why is self-regulation important?

Teaching children how to self-regulate and providing them with tools to do so is a crucial part of supporting children to be successful in school. Lacking the skills in regulation can lead to struggles in many areas, including academics, communication and relationships. Children who have better emotional regulation skills score higher on mathematics and early literacy skills standardized measures (Graziano, Reavis, Keane & Calkins, 2007). There are many things in teaching that we can't control in terms of what happens with children when they aren't at school, as well as their genetic factors, but we can control what we teach them. If we want students to be engaged and at their best for learning, we need to teach them the skills to do so.

Jahromi, Bryce and Swanson (2013) reveal that children with ASD show significant impairments in multiple areas of self-regulation and, as a result, are less emotionally and behaviorally engaged in the school setting and exhibit less prosocial behaviour. "Self-regulation is a significant predictor of school engagement and success in typically developing children" and can be even more significant for students with ASD (Jahromi, et al. 2013, p. 237). When students with autism start engaging in stereotypy behaviours such as self-stimming, Mays et al. (2011) suggests trying interventions that can replace or decrease this to allow for instruction and learning in the classroom. Today's society is full of distractions for children with cell phones, computers, and television, and therefore, it is not surprising to discover that many students have not learned to self-regulate when it comes to academics (Zimmerman, 2002). Processes involved in learning self-regulation according to Zimmerman (2002) include:

- a.) setting specific proximal goals for oneself
- b.) adopting powerful strategies for attaining the goals
- c.) monitoring one' s performance selectively for signs of progress
- d.) restructuring one' s physical and social context to make it compatible with one' s goals
- e.) managing one' s time use efficiently
- f.) self-evaluating one' s methods
- g.) attributing causation to results
- h.) adapting future methods (Zimmerman, 2002, p.66).

These processes involve skills that many students find challenging. Self-regulatory processes from a psychologist view, fall into three phases: forethought (processes and beliefs occurring before efforts to learn) which includes task analysis and self-motivation; performance (processes occurring during behavioural implementation) which provides for self-control and self-observation; self-reflection (processes occurring after each learning effort) including self-judgement; and self-reaction (Zimmerman, 2002). Again, many skills are involved in these processes and need explicit teaching for most children. Not enough self-evaluation from students or assessment about their beliefs about learning is happening in classrooms, which is necessary so they can be proactive in their learning and advocate for themselves (Zimmerman, 2002). Student-centred programming and having students' voices imbedded in Individual Education Plans have recently been implemented in many school districts in the Lower Mainland of British Columbia. With instruction and modelling by parents, peers, teachers, and coaches, self-regulatory processes like strategy use, self-evaluation and goal setting can be learned. (Zimmerman, 2002). School teams and home teams working together on the same page is integral for setting up students for success. Students who are regulated focus on how they sustain

specific learning practices in social and solitary contexts, which are essential qualities for life-long learning and are unfortunately absent in many students (Zimmerman, 2002, p. 70).

Sparapani, Morgan, Reinhardt, Schatschneider, and Wetherby (2015) created and reviewed an observational tool designed to measure active engagement in students with autism. The tool is called the Classroom Measure of Active Engagement (CMAE). “In the general education literature, active engagement has been defined as the interaction between the student’s observable behaviours in response to the demands of the classroom” (Sparapani et al., 2015, p. 783). Since most of the research in this area looks at on-task, and on-schedule behaviour there is a need for a tool that can measure more than just that, including emotional regulation, social connectedness, classroom participation and independence, initiating communication and flexibility to adapt to classroom expectations and change (what the CMAE does) (Sparapani et al., 2015). The measurement of this tool was used within a project using the Social Communication Emotional Regulation and Transactional Supports (SCERTS) intervention program, which teaches social communication, emotional regulation and transactional supports (e.g. visuals, sensory tools, picture communication). The outcome of the study showed that when students are in a well-regulated state they are productive and independent (Sparapani, et al., 2015). This study affirmed that if we want to be fully inclusive and promote success for students with ASD in our classrooms, we need to be providing them with the resources and tools they need to regulate themselves, so they are ready to engage in learning. Emotional regulation defined by the CMAE is the ability to manage emotional states using strategies or seeking support to match the classroom environment (Sparapani et al. 2015). Emotional regulation “hinges on the development of emotional awareness and self-reflection, and if a student’s emotions are not regulated, their cognitive abilities are affected (Shanker, 2013, p.28).

Productivity in the classroom (using materials appropriately and performing the roles necessary in the activity) and classroom independence (ability to self-initiate, get their materials out or put them away and complete the task at hand) are what Sparapani et al. (2015) found in their research to be lacking for students with ASD in many classrooms. Flexible behaviour (ability to change activities, locations) and flexible attention (ability to shift attention if the teacher changed expectations) are significant given the nature of classroom environments and the necessity of this for successful classroom performance and active engagement (Sparapani et al., 2005). Response to a social connection (showing a response physically to social bids and using expectant language) and response to social connection with eye gaze (eye gaze directed toward the partner communicating with them) is a core deficit of ASD (Sparapani et al., 2005). According to Shanker (2013), social domain problems can exacerbate self-regulatory issues in all of the other domains (biological, emotional, cognitive).

Through the case study of a school exemplifying effective inclusive practices, McLesky, Waldron and Redd (2012) suggest that many schools are not successfully meeting the demands of an inclusive environment and new practices are needed to support an effective inclusive school. Progress has been made in the area of inclusion in schools from past eras, but there is not much evidence that schools have been able to have both successful inclusion and achieve high academic outcomes (McLesky et al., 2012). The teachers and administrator at the exemplar school noted that when children were in separate classes, they weren't getting pushed enough and special education teachers had large caseloads which made it challenging to meet all of the range of needs (McLesky et al., 2012). By switching how the school was run to having special education teachers providing in-class carefully planned support, providing high-quality professional development and having data drive everything, the school was kept on track

(McLesky et al., 2012). This school model could provide an exemplar for successful inclusion. Unfortunately, many schools do not have enough staff to follow all of the components of this model. As presented by the authors, the shift needs to come from a district level in terms of allocation of resources. Schools must find ways to ensure that students have the opportunity to be meaningfully included and engaged in classrooms.

Jahromi, Bryce and Swanson (2013) looked at the differences between self-regulation, behavioural and emotional engagement in school, and prosocial peer engagement. Executive functioning, effortful control, and joint engagement are part of the self-regulation process and are deficits known in ASD (Jahromi et al., 2013). With all of the deficits to battle against, it's no wonder staying regulated is a challenge for students with autism. Research is showing self-regulated students are more able to engage in class activities and peer engagement, therefore, we need to be working on finding ways to support students in developing self-regulation strategies.

The Sensory Needs of students with ASD

The sensory needs of students with autism is one of the challenges as to why self-regulation can be difficult for them. For students with ASD to be regulated and engaged in classrooms, their sensory needs must be met. "Sensory processing problems can influence the behaviour of children with ASD" and when they do, "interventions that use sensory modalities to support self-regulation, promote optimal arousal, improve behavioural organization, and lower over-reactivity are often recommended" (Case-Smith, Weaver & Fristad, 2014, p. 134).

Ashburner, Rodger, Ziviani, and Hinder (2014) created a framework for strategies and interventions for children with ASD with sensory issues based on evidence that reveals how sensory responses impact the level of participating students with ASD can have in daily living

activities. “Sensory challenges can emerge when there is a mismatch between the way the person processes sensory input and environmental demands” (Ashburner et al., 2014, p. 30). Students with ASD need to be provided with interventions and tools to calm the sensory overload.

Occupational Therapists (OTs) are often consulted for students with ASD to help with sensory processing interventions. Ashburner et al. (2014) report there has been some criticism as to the evidence for the types of therapies OTs are using, and if they are appropriate for families to be spending money on for their children. Families often struggle with what is the best use of their autism funding to maximize the support needed for their child, as the private therapies available, including OTs and speech pathologists, are expensive.

The variety of domains present in ASD are complex and involve challenges with language, social-emotional issues, as well as cognition and therefore, sensory needs are just a piece of the puzzle. “A child in an over-aroused state is likely to be distractible, hyperactive and impulsive,” and it is essential to find the optimal arousal state for being able to be engaged in learning (Ashburner et al., 2014, p.33). Support from OTs can be helpful with programming for successful learning, and for families to have support with ways to help meet their child’s sensory needs so they can be in a calm state at home and school. The function of a student's stereotypical behaviour is often to seek or to avoid sensory input and therefore it is clear that sensory interventions would be effective if the function of the behaviour is sensory-based (Mays et al., 2011).

Sensory processing problems in ASD are a factor in behavioural and/or functional performance issues as well as linked to anxiety in children with autism (Case-Smith et al., 2014). Trying to manage sensory issues and anxiety is challenging, especially if you don’t have the

support or tools you need. Mays et al. (2011) outline a three-step process to help teachers determine whether or not the function of the stereotypical behaviour is sensory-based and then suggest how to implement the appropriate intervention to allow students to be successful and engaged in instruction in class. The first step in Mays et al. (2011) process involves a functional behaviour assessment, which consists of conducting direct observations of the student engaging in stereotypy behaviour within the environment to determine the function of the behaviour.

Within the observation, describing which body parts are engaged, which directions the student moves those body parts, and the duration, frequency, and intensity of the behaviour should be documented (Mays et al., 2011). The next step is coming up with a replacement behaviour and intervention. Mays et al. (2011) state that the alternate activities need to provide the same type of movement with consideration of rate and intensity to match the stereotypy of the original behaviour and should involve the student actively participating. The last step Mays, et al. (2011) suggest is to monitor and adjust the response to intervention allowing for changing of the length of time, intensity, and what might work better for the student. “When students have opportunities to gain or reduce sensory input in meaningful ways, their need to self-stimulate is decreased, and they are able to focus on instructional tasks and activities” (Mays et al., 2011, p. 52).

“Stereotypical behaviours with a determined function of Behaviours that function as self-stimulation or self-regulation can be replaced with other appropriate behaviours to increase classroom participation and improved performance (Mays et al., 2011). Thus, with the knowledge that students with autism require interventions to support their sensory needs, we need to provide them with the sensory tools to regulate themselves.

Self-regulation interventions

Self-regulation interventions vary in terms of individual, class-wide, within and outside of school. Ashburner et al. (2014) suggest a variety of supports for self-regulation that are used in schools including:

- a.) information-sharing and coaching for families and teachers
- b.) adapting the environment and tasks for participation
- c.) embedding sensory input in daily routines to keep arousal controlled (e.g., movement breaks, flexible seating, weighted vests, vestibular input)
- d.) using behavioural strategies (e.g., graduated exposure, modelling, reinforcement)
- e.) guiding students to develop their strategies for self-regulation
- f.) universal design of environment for learning

Korinek and DeFur (2016) state that self-regulation skills can help students to engage in attending, following directions, participating, managing time and materials, organizing, and completing assignments. Effective practices they suggest include checklists, student choice, setting clear expectations and routines, use of organizational techniques and tools, as well as teacher modelling, questioning, feedback and goal setting. Also noted is the importance of teacher modelling with self-regulation language and skills ‘thinking aloud’ so that students hear the language they can use and see the teacher using the skills (Korinek & DeFur, 2016). Teacher and peer modelling can be powerful tools for learning. Setting goals both individually and class-wide, using strategic questioning and providing positive feedback can also support students in gaining self-regulation skills (Korinek & DeFur, 2016). When implementing these self-regulation practices, Korinek and DeFur (2016) recommend initially looking at the routines and environment surrounding the student’s un-regulated behaviour to see if some changes can be

made. Changes to the environment and teaching strategies can be tools to support students with ASD to be regulated and ready to participate in inclusion with others.

Morgan et al. (2018) evaluated an intervention program called SCERTS (Social Communication Emotional Regulation Transactional Supports). The program is a Naturalistic Developmental Behaviour Intervention used in conjunction with the curriculum for targeting the needs of students with ASD and the same program that Sparapani et al. (2015) tested their CMAE tool on. With the increase in students with ASD in general education classrooms, there is a need for interventions like this so that they can address the challenges and keep students with ASD engaged in learning activities and social interaction. The results of their research showed significant improvement in social participation, social skills, adaptive communication, executive functioning and reduction of problem behaviour (Morgan et al., 2018). Being one of the largest teacher implemented school-based interventions conducted at the time, Morgan et al. (2018) used five different measured outcomes in multiple domains. Most of the intervention for regulation in students with autism involves leaving the classroom, so this program being a classroom-based intervention allows for more inclusion for students with ASD.

Thompson and Johnson (2013) looked at the two types of sensory processing issues in children with ASD (dysfunction in modulation of sensory stimuli in the nervous system, and dysfunction in the regulation of sensory input into the nervous system) to see if combining the use of social stories and sensory integration strategies could increase self-regulation during a specific challenging activity and to see what the teacher felt about the intervention. The social stories were written specifically for each student using the guidelines of Social Stories 10.0, a program by Gray (2004). The self-regulation tools used included weighted lap buddies, squeezing balls and brushes to provide deep pressure. During the observation period, students

were taught the social story and then transitioned, with the self-regulation tools provided, to the activity that was initially difficult for them (Thompson & Johnson, 2013). All three children increased the frequency of the desired behaviour and a marked increase in independence by each student was noticed (Thompson & Johnson, 2013). The use of a combination of interventions with student specificity in mind to increase a student's level of independence and functioning in a classroom appears to be key.

With many children on the autism spectrum having comorbidity of ADHD, there are research and strategies for ADHD that could also be helpful for students with ASD. "Research has shown that movement, or fidgeting, improves executive functions, allowing people with ADHD to focus, learn, and remember more," but it is effective only when the fidgeting is deliberate and used for self-regulating in a controlled way so as not to be more of a distraction (New Hope Media, 2016, p.4)

ADDitude magazine (2016) looks at what makes a good fidget and lists seven criteria:

- a.) silent: child won't get shushed for disturbing the class
- b.) unobtrusive: fidgets should fit in a fist
- c.) tactile (not visual): fidgets shouldn't draw restless eyes away from the teacher
- d.) safe: kids can choke on small items; some stretchy fidgets sting when they snap
- e.) tools (not toys): balls shouldn't bounce, for instance
- f.) inexpensive: they're likely to be lost (like their lunch bags)
- g.) teacher-approved: consult the teacher before sending in new items (New Hope Media, 2016, p.5)

Case-Smith, Weaver and Fristad (2014) researched the effectiveness of sensory integration therapy (SIT) and sensory behaviour intervention (SBI) for children with ASD (as well as co-occurring sensory processing problems) with self-regulation and behaviour. The main difference between SIT and SBI is the role of the child (child-centred vs adult-directed). They describe traditional SIT as being “provided in a clinic with specially designed equipment (e.g. swings, therapy balls, inner tubes, trampolines, and climbing walls) that can provide vestibular and proprioceptive challenges embedded in playful, goal-directed activities” (Case-Smith et al., 2014, p. 135). SBI’s are “adult-directed sensory modalities that are applied to the child to improve behaviours associated with modulation disorders” and are meant to fit into the child’s daily routine (Case-Smith et al., 2014, p. 135). Only SBIs that activate somatosensory and vestibular systems that promote behavioural regulation such as brushing, massage, swinging, bouncing on a therapy ball, and wearing a weighted were used in the study (Case-Smith et al., 2014). Their study concluded that selecting an intervention that will support a child’s self-regulation is complicated to implement in school environments if you are to ensure individualization in the program and that the intervention is done properly, whereas, in clinical settings, you can (Case-Smith et al., 2014). Schools and school districts don’t have OTs available regularly to ensure that a sensory behaviour intervention is being followed properly, so students having outside therapy as well would ensure the benefits from both.

In looking at types of sensory and self-regulation tools that can be used in a school setting, Schechter, Shah, Fruitman & Milanaik (2017) suggest tools such as stress balls, and therapy putty to calm students, enhance concentration, decrease anxiety and strengthen fine-motor muscles of the hand. Notably, the benefits of self-regulating tools are not limited to improved concentration. Tools can be used for children with autism to incentivize the completion

of daily tasks, improve social bonding efforts or decrease repetitive behaviours (Fidget spinners: a pediatrician take, 2017). “As the benefits of fidget spinner use have yet to be substantiated, their potential for auditory and visual distraction may outweigh their purported educational merits” (Schechter et al., 2017, p.618). “Unlike fidget spinners, other self-regulatory devices have been used successfully in the academic setting and therefore, parents should be encouraged to consult their child’s school-based intervention team to develop an individualized treatment strategy” (Schechter et al., 2017, p.618).

Schools have constant sensory output, from the noise of children, the ringing of bells, the bright, fluorescent lighting, bright colourful pictures, and writing all over the walls. The literature points to the necessity for defining self-regulation in a school setting; understanding why it is an important skill to be taught; why sensory needs must be addressed for students with autism; and what options are available for self-regulation interventions. While typically developing children start self-regulation as infants with sleep, feeding and self-soothing, which are skills needed to build on the foundation for cognitive and social-emotional development, children with autism may not (Silva & Schalock, 2012). This study looked to introduce an intervention that could meet the sensory needs of students with autism in a classroom setting and allow them to stay regulated so that they could engage in in-class activities with their peers.

Chapter Four

RESULTS

Results from the pre and post observations, as well as the teacher questionnaire/interviews, were analyzed. The pre- and post-observations revealed positive results from two out of the three classrooms. The teacher questionnaire/interviews yielded some common themes including the amount of knowledge about teaching self-regulation, interventions taught in classrooms by learning support teachers, the most frequently used tools in the basket, placement of the tool basket, reactions from other students, and the need for ongoing teaching about using the tools for self-regulating.

Teacher questionnaire/ interview

The questionnaire had seven questions, with four of them being a Likert rating from 1-10 (1 being the lowest and 10 being the highest score). Question #1 related to how much knowledge the teachers felt they had about teaching self-regulation pre and post-intervention. Classroom teachers #1 (both 13 years teaching experience, job share) and #2, (7 years teaching experience) answered on the pre-test that they felt they didn't have enough knowledge about teaching self-regulation. Classroom teacher #3 (25 years teaching experience) said she had done some professional development on the subject and felt her knowledge was adequate. All three of the teachers did say they gained more knowledge on the subject from the intervention. Classroom teachers #2 and #3 also mentioned that they found having the language to use from the video provided was helpful.

Questions #2 and #3 were Likert scaled and related to how the teachers would rate their overall class (2) and then their students with ASD (3) on their ability to self-regulate. Classroom

teachers #1 scored the student with ASD a two on the pre and one on the post questionnaire. They mentioned that the student was experiencing a difficult time with medication changes during the intervention. In terms of the rest of their class, they rated them at a seven for both pre and post-intervention. Classroom teacher #2 said the student with ASD was a four or five on the pre- and an eight on the post-questionnaire in terms of ability to regulate. She rated the class overall at around six or seven on the pre and seven on the post questionnaire. Classroom teacher #3 scored her student with ASD at a two on the pre and seven on the post-interview for the ability to regulate. Her class overall stayed at a seven for pre and post-interview (same as classroom one and very similar to classroom two).

Questions #4 and #5 asked if the teachers felt their students with and without ASD knew what self-regulation is and what some tools are that they could use to regulate themselves. All three classrooms previously had a school-based learning support teacher come into their classroom in the past year to present some lessons on the Zones of Regulation program. All of the teachers reported that their students knew some strategies and a bit about self-regulation because of the Zones of Regulation lessons they received, but they did learn more from the intervention. Classroom teacher #2 also mentioned that the students were able to identify that some of the tools made them more distracted and realized that it was not the right tool for them.

Questions #6 and #7 asked how they would rate their overall class and then their student with ASD in terms of engagement. Classroom teachers #1 rated their students as a seven on pre- and post- questionnaire, and their student with autism a two on the pre-questionnaire and a one after the intervention. The student with autism in classroom #1 was not able to be engaged and participate in many classroom activities due to her challenges with medication changes and

possibly other medical issues. Classroom teacher #2 rated her class overall an eight on pre- and post-intervention in terms of their level of engagement. It was an engaging class with lots of great lessons and projects. In terms of her student with autism, she rated him a three for pre-intervention and an eight on the post-questionnaire. She mentioned he is focusing and getting into activities more since the intervention. Classroom teacher #3 rated her class as an eight in terms of engagement on the pre-interview and a seven on the post-questionnaire. A possible reason for the drop in one point could be that she didn't remember what she rated them on the pre-questionnaire. She did mention on the post-questionnaire that it was hard to pick an average because, for some students, the intervention did change engagement, and for others, it didn't. She also mentioned that for some of the students, the tools were "contagious," and they just wanted to play with them. For her student with autism, she rated him a three or four on the pre-questionnaire/ interview for engagement and an eight on the post-intervention questionnaire.

The post-questionnaire/interview added three additional questions regarding what tool they saw used most, how they managed the tools, and if they had any recommendations on how the research could be conducted differently. All three classroom teachers reported the top two most used tools in the basket for regulating were the noise-cancelling headphones and the smell jars with essential oils. All three classroom teachers used a calming corner in the classroom as the place for the self-regulation tool basket to be housed. All three classroom teachers mentioned that it would have been helpful for more follow-up teaching around the tools. They thought follow-up shortly after the introduction of the basket would have been a good idea to talk about issues that might come up, such as what to do if a tool doesn't work for you, or to remind the students about the importance of using them as tools, not toys.

Observations results

Classroom #1

Table 1.

Classroom #1 -Student observation

	Pre-test		Post-test	
	YES	No	YES	NO
ER	20%	80%	14%	86%
CPP	16%	83%	0%	100%
CPI	20%	80%	16%	83%
FB	50%	50%	20%	80%
FA	80%	20%	0%	100%
SCR	16%	83%	0%	100%
SCEG	20%	80%	0%	100%

**ER- emotional regulation; CPP- classroom participation: Productivity; CPI- classroom participation: Independence; FB- flexible behavior; FA- flexible attention; SCR- social connectedness: responding; SCEG- social connectedness: eye gaze

Pre-observation

During the pre-observation, the class was coming in from recess. They transitioned to a read aloud at the carpet, then to an art activity, and also a presentation from other students in the school (in the classroom), then calendar, and lastly, math. During the pre-observation, the student in the class with autism was unregulated. She was not able to participate with the group for most of the activities but was doing an activity with an Education Assistant (EA) at a separate desk. The EA mentioned being at the table with other students upset her. She was frequently spitting and had a bowl she was supposed to spit into but wasn't always getting it in the bowl. The EA reported that she had started the spitting since starting a new medication. She did come to the carpet at one point using a Howda hug chair that seemed to provide her with support in being successful there for a short time. She then started to make loud noises and got up from the carpet.

The class, overall, was very engaged during most of the activities and transitioned well between them. Near the end of activities, it was noticeable that they started to get a little bit louder in their voices. The transition to math wasn't as smooth as the other activities, although this was close to lunchtime.

Post-observation

For classroom #1, there were no positive results to report between pre- and post-observation. One of the limitations of this class is that it is a job share, and the pre-observation had one teacher, and the post-observation had the other teacher. The different teaching styles could have played a factor. Pre- and post-observation happened at the same time of day in classroom #1, which was after recess. The activities included math, then to the carpet for an art lesson. After cleaning up from art, they were instructed to read or draw and then it was lunch.

For the student with ASD, each observed behaviour was worse in the post-observation. During the post-observation, she wasn't participating in the group activities again and was on her iPad with 1-1 support from the learning support teacher (LST). The student was upset and went to the reading corner in the classroom and laid down, kicking and crying. I asked the LST to offer her the basket, but the student refused it. The LRT mentioned she does like using the tools but in her calm room only, which is a separate space from the classroom. After some time, the student was able to complete an activity with the LRT providing hand over hand prompting.

The class overall during the post-observation was a mix of behaviours during all of the activities. Some of the students stayed on task and others didn't during each transition and activity. Several students needed a lot of teacher encouragement and support. The class overall stayed the same on pre- and post-observation for emotional regulation and social connectedness-eye gaze. For the rest of the behaviours, they did worse on the post-observation. Again, the

limitation of different teachers and different activities could have played a factor in this. The student with autism in classroom #1 needs a higher level of support in all areas of functioning compared to the students in classrooms #2 and #3 who would be considered at a higher functioning level on the autism spectrum.

Classroom #2

Table 2.

Classroom #2 -Student observation

	Pre-test		Post-test	
	YES	No	YES	NO
ER	50%	50%	100%	0%
CPP	60%	40%	67%	33%
CPI	29%	71%	20%	80%
FB	29%	71%	100%	0%
FA	50%	50%	100%	0%
SCR	50%	50%	40%	60%
SCEG	37%	62%	40%	60%

**ER- emotional regulation; CPP- classroom participation: Productivity; CPI- classroom participation: Independence; FB- flexible behavior; FA- flexible attention; SCR- social connectedness: responding; SCEG- social connectedness: eye gaze

Pre-observation

During the pre-observation, the class was finishing in music. They transitioned back to the classroom for math and then to agendas. The time was in the afternoon. During the pre-observation, the student with autism was doing the same activities as the class, but with regular prompting from the EA. He didn't engage socially with peers or his EA, but when he had a few interactions with the classroom teacher, he seemed to light up and looked happy to interact with her and showed eye gaze with her.

The class overall was unregulated in music but was working mostly independently during math. The group was overall very engaged on the iPad math activity. During agenda time at the end of the day, the group was overall quite fidgety and struggling to listen to the classroom

teacher. This seemed normal to me as most children at the end of the school day are antsy to go home.

Post-observation

During the post-observation, the class was transitioning from silent reading to the carpet for instructions shortly after recess time. The instructions were regarding an interview project they were doing on the iPad. At the end of the time for the activity, they were transitioning to lunch. During the post-observation, the student with autism was following what the class was doing and engaged in the activity on the iPad working directly with the classroom teacher. Again, as in the pre-observation, he was very engaged and showing eye gaze and social connection when working with the classroom teacher but wasn't showing this same level with peers and his EA. From pre- to post-observation, the student with autism went up in his emotional regulation, classroom participation-productivity, flexible behaviour, flexible attention and social connectedness- eye gaze. The two areas he did not increase in were classroom participation-independence and social connectedness-responding. The class overall was engaged during the main activity and transitioned well to lunch. Emotional regulation stayed the same in scoring from pre- to post-observation. The group increased in their classroom participation-productivity, classroom participation-independence, flexible behaviour, and flexible attention. The areas they did not increase in were social connectedness-responding and eye gaze.

Classroom # 3

Table 3.

Classroom #3 -Student observation

	Pre-test		Post-test	
	YES	No	YES	NO
ER	67%	33%	75%	25%
CPP	36%	64%	67%	33%
CPI	22%	78%	40%	60%
FB	55%	44%	67%	33%
FA	40%	60%	75%	25%
SCR	60%	40%	100%	0%
SCEG	80%	20%	100%	0%

**ER- emotional regulation; CPP- classroom participation: Productivity; CPI- classroom participation: Independence; FB- flexible behavior; FA- flexible attention; SCR- social connectedness: responding; SCEG- social connectedness: eye gaze

Pre-observation

During the pre-observation, the class was coming in from recess. They then went to the carpet for a lesson regarding a journal activity. After journals, they did a math activity. After math, the students had sharing time (show and tell) at the carpet before transitioning to lunch. During the pre-observation, the student with autism was fidgeting with things often and was constantly losing his pencil. He had an ongoing need for prompting to stay on task and continue the activities. The class overall was engaged during the writing and math activities but was needing a lot of support. During sharing, they were engaged and interested sitting at the carpet.

Post-observation

The post-observation was the same time of the day as the pre-observation, between recess and lunch. The students were at the carpet, watching a picture slide show. The activities the classroom teacher planned had to be postponed as she got word last minute that the class was needed in the gym to practice a performance.

The student with autism did well transitioning to the line-up and walking in the hall. When in the gym, he was struggling with regulating himself and went up to talk with his teacher three times. The teacher told me later that he was concerned about it being a hot lunch day and wanting to make sure they made it back to the class in time for it. On the observation checklist, the student with autism improved in all areas from pre- to post-observation, including emotional regulation, classroom participation-productivity, classroom participation- independence, flexible behaviour, flexible attention, social connectedness- responding and social connectedness-eye gaze.

During the post-observation, the class was successful in transitioning from the carpet to the line-up and then walking down the hall to the gym. Similar to the student with autism, they struggled with regulating in the gym. The walk back from the gym and transition to hot lunch was also a bit challenging for them. On the observation checklist, from pre- to post-observation, the class improved in the areas of classroom participation-productivity, classroom participation-independence, flexible attention, and social connection-eye gaze. The categories they did not score better on from pre- to post-observation were in emotional regulation, functional behaviour and social connectedness-responding.

Summary

Although the student from classroom one did not improve in any of the observation areas, the children with ASD in classrooms #2 and #3 did. It is important to acknowledge that there could be various explanations for the improvement in the students observed behaviours other than just the implementation of the tool basket. Possible explanations include impacts from other interventions and supports the students are exposed to daily as well as the impact that relationships between the students and their classroom teachers and EAs has. General on-going

child development could also be a factor as to the improvement in the students behaviour in particular areas. The student in classroom #2 improved in emotional regulation, classroom productivity, flexible behaviour, flexible attention and use of eye gaze from pre- to post-intervention. He didn't improve in classroom independence or social responding, but it was interesting that he did show social connectedness with his classroom teacher and not with his EA or peers during both the pre- and post-observation. The student in classroom #3 improved in all areas from pre- to post-observation, including emotional regulation, classroom productivity and independence, flexible behaviour and attention and social connectedness- responding and eye gaze.

Not only the students with ASD in this study improved in areas of self-regulation, but the other students in the classes also benefited from having the basket of tools available to use when needed. Deris & DiCarlo (2015) mention that children with autism benefit from a variety of adaptations and strategies in classrooms, but that this is also helpful for all young children. Increases in children diagnosed with ASD is a concern for education professionals (Deris & DiCarlo, 2015). With this in mind, it seems clear that we need to find ways to have classroom environments with tools and strategies that will support these students.

Children with sensory-seeking behaviours need sensory input regularly to support in focussing on learning tasks, as well as consideration of sensory aversions when planning their learning environment while including sensory materials into the classroom to be accessed when needed (Deris & DiCarlo, 2015). "Materials and activities that include more than one sense may elevate the children's interest level and facilitate additional learning" (p.52). One of the goals of the research was that a self-regulation tool basket would become a 'norm' in all classrooms for all learners, not just the student with ASD in the class.

Chapter Five

DISCUSSION AND CONCLUSION

Summary

The research sought to investigate the engagement and attention effects on students with autism when they had access to a self-regulation tool basket. Results showed from observations and teacher questionnaire/ interviews that for two out of the three students with autism in the study, having access to the tool basket improved their ability to self-regulate and engage more in class. Also revealed was that not just students with autism benefit from having the tool basket in the classroom, but many other students in the classroom were assisted by it as well. Themes that emerged from the research were that there were specific tools in the basket that students used most, that having a calm corner to keep the basket in was beneficial and that more professional development in the area of teaching self-regulation is needed.

Discussion

Most frequently used tools

In each classroom, the most frequently used tools reported from the classroom teachers were the noise-cancelling headphones and the essential oil smell jars. Noise level is one of the issues in classrooms that can dysregulate students with ASD, and using the noise-cancelling headphones can prevent that. Auditory sensitivities are common for people with ASD, among other sensory sensitivities (Kuiper, Verhoeven, & Guerts, 2019). There is a possibility that people with ASD physiologically respond more intense to certain auditory stimuli and perceive certain sounds as more intense in particular for certain frequencies (Kuiper et al., 2019).

Research done in Barcelona revealed nine out of ten schools exceeded the standard permitted noise level by the World Health Organization standards, which is 35 dB ("Classrooms far too noisy," n.d.). It is not just inside the classroom that children are exposed to noise. The hallways, playground and gym are often too loud as well. Noise pollution has been found to impact health and well-being in people and for children, it can cause impairments in reading skills, attention level and memory (National geographic society, 2019).

The tool basket contained two essential oil smell jars containing 100% pure therapeutic-grade essential oils. One had lemon essential oil and the other, lavender. The choices of oils were made to represent one calming smell (lavender) for students who need to down-regulate and one uplifting smell (lemon) for students who need to up-regulate. The use of essential oils for medicinal use and aromatherapy dates back to Egyptian times with the oils being used externally for respiratory, intestinal problems, cosmetics and skin (Sanderson & Ruddle, 1992).

Aromatherapy can be used therapeutically with all age groups, including children, to achieve benefits such as relaxation, stimulate sensory awareness, promote alertness and activity, encourage and facilitate communication and interaction (Sanderson & Ruddle, 1992). In considering program supports for students with ASD, it is necessary to understand there can be a "disruption to learning caused by sensory dysfunction and to recognize that stimulating the senses may well be a key to learning about oneself and the world of others" (Solomons, 2005, p. 128). Jarosz (2014) suggests using a few drops of therapeutic grade essential oil on a cotton ball inside a student's desk or directly on a surface in a variety of places on or under the desk for alerting or calming. Solomons (2005) used an aromatherapy massage (hand massage using lavender essential oil) with children with ASD and explained that challenging behaviours are from reactions to environment and learning experiences. During aromatherapy massage, shared

attention is greater, and parents report improvements at home in functional life activities, improved sleep, and changed emotional states (Solomons, 2005). In *Best Essential Oils for Autism and ADHD: The Ultimate Guide*, Tobik (2019) reports that essential oils can be beneficial for children on the autism spectrum to support relaxation and calm emotions. The guide includes recommendations for the top 10 essential oils to use as well as how to use them safely. Many parents of children with ASD are finding the use of essential oils to be beneficial for their children for easing anxiety and restlessness, support in lessening the stress of transitions, and reducing meltdowns (Milner, 2015).

Calm corners

Teachers were informed at the implementation of the research that they could decide where they wanted to keep the tool basket (either on their desk or if they wanted to have a calm or peace corner in their classroom). All three teachers mentioned they created a calm corner where they kept the basket. "Some children with autism need to take a break from the classroom routine or activities, and the establishing of quiet areas in the classroom is imperative" "by creating a quiet, comfortable area in the room, children learn to go to the appropriate location when a break is needed" (Deris & DiCarlo, 2015, p.53). Jarosz (2014) suggests a variety of strategies for being ready to learn and mentions that there is lost instruction time when students need to leave to go to a sensory room to have their sensory needs met, whereas, many sensory needs can be met in the classroom. Having a calm corner in a classroom can help students with implementing skills for social and emotional learning that they will be able to use in other areas of their lives (Harmon, 2019). Using tools like pieces of Velcro under a student's desk, a sensory board personalized for the student, ball chairs, bear hugs, refrigerator tubing as chewie's, pressure vests, and deep touch pressure can all be done in the classroom and produce calming

effects for autistic children (Jarosz, 2014). More time spent in the classroom engaging with peers means more time working on and developing lagging skills which having access to a tool basket to regulate in the classroom allows for.

Professional development

One of the themes from the research showed that there is not enough professional development happening for classroom teachers on teaching self-regulation. Social-emotional learning programs such as those involving self-regulation are designed to create an emotionally supportive climate and enhance the learned skills for students and to increase engagement, and academic success (Reyes, Brackett, Rivers, Elbertson & Salovey, 2012). Although program implementation isn't always perfect in schools, research shows that with proper training, dosage (number of lessons given), implementation quality, and quality instruction, can create success and competence in the area taught (Reyes, et al., 2012). "Implementing SEL programs can be difficult for teachers who are balancing their time between meeting traditional academic requirements and the new demands of SEL programs" (p. 94). It can be pressure for classroom teachers when choosing what professional development to sign up for. School districts and administrators need to encourage, support and promote professional development in the area of self-regulation.

The Canadian self-regulation initiative is an agency that works with schools, districts and communities by providing tools, support and training on bringing awareness and building capacity on knowledge of self-regulation (<http://www.self-regulation.ca>). The director of the initiative, Mike McKay is a retired superintendent for the Surrey school district and aims to support schools and districts to move away from the "old school continuum" on self-regulation to a "new school continuum" with his knowledge from being in the school system for many years

and working alongside Stuart Shanker in co-presenting and facilitating conferences

(<http://www.self-regulation.ca>).

Where is your school on the “old school/ new school” continuum

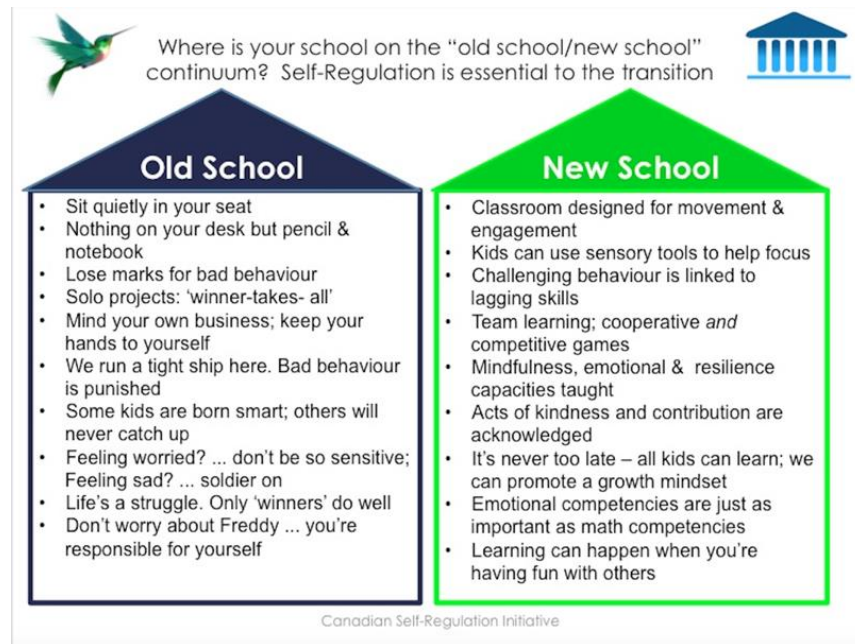


Fig. 1 Canadian self-regulation initiative. Mike McKay, Director (<http://www.self-regulation.ca>).

If schools and classrooms are using an “old school” approach, we are missing the opportunity to teach important skills that go along with self-regulation and not supporting inclusive practices.

Implications and Recommendations for future research

To get started with having schools and classroom teachers teaching and implementing self-regulation in classrooms is to 'go with the go-er's. Start with teachers who are interested and want to make this part of their daily classroom practice. Also, make sure that those teachers who are on-board with it are getting the support and the professional development needed to make it

successful. This research started with the hope that all classrooms in the district would have a tool basket for self-regulation. The results showed that having one did make a difference for students with autism in the class as well as many other students on their ability to self-regulate and be engaged. All children can and deserve to learn and succeed in school, and it is up to educators to provide them with the tools that can support them.

Future research on combining class-wide self-regulation programs with a variety of tools would be beneficial, as well as looking at different tools to use and how they provide sensory input. Trying a variety of different essential oils to smell for supporting students in regulating and seeing what type of oils the students respond to would be interesting future research.

One of the major limitations of this study was time. Looking at the effects over a school year, instead of a just over a month, could provide more data to inform classroom teachers of what tools are working, how to manage the tools, and how to include tools for regulating as part of Universal Design for Learning (UDL). When using a UDL approach in designing classrooms and curriculum, “multiple means of representation, expression, and engagement” allows for accessibility for diverse learners whose abilities, ethnic backgrounds, learning styles, and skills vary (Katz, 2012, p. 14). Shelley Moore (2016) talks about all of the supports adults use in their daily life to help them get through the day (coffee, electronic devices) and suggests that instead of running around trying to get to each of our students, we need to build in the supports ahead of time with planning so that everyone can access the tools they need for learning.

Conducting interviews from students about their feelings on the implementation could provide valuable information to guide future research. Having this information could give the researchers an idea of if they are understanding how to use the tools, what tools they say helps

them most, and why. By practicing with a student-centred approach, we are bringing student voice into planning and setting them up for being more engaged with their interests and views being expressed. In an initiative on student voice with the Vancouver School Board, students expressed a desire to have their voice represented in the design of school environments that are more inviting, as well as, having the ability to give suggestions and solutions that will impact their education (Izen & Shi, 2019).

Conclusion

There are seven times more students with ASD than in 2000-2001 entering British Columbia schools (BCTF, 2019). Students with ASD need support in place to meet their sensory needs, and by allowing them to gain or reduce sensory input, we can enable them to regulate themselves so that they can focus on instructional tasks and activities (Mays et al., 2011). Schools need to focus on the needs of all students and work towards best practices for inclusion. Providing professional development for teachers, encouraging the use of Universal Design for Learning to meet the needs of diverse learners, and implementing environmental changes to increase student success is needed. Commitment from schools and districts to focus on successful inclusive settings where all learners are provided with the support, strategies and tools they need to thrive is imperative. We can start by providing one basket at a time.

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*Appendix 1***Pre-observation teacher questionnaire/interview:**

- 1.) Do you feel you have enough knowledge about teaching self-regulation?
- 2.) How would you rate your class overall on a scale of 1-10 (1 being not at all, 10 being great a self-regulating) on their ability to self-regulate?
- 3.) How would you rate on a scale of 1-10 (1 being not at all, 10 being great a self-regulating) your students with diverse learning needs who have a ministry designation on their ability to self-regulate?
- 4.) Does your class know what self-regulation is?
- 5.) Does your class know what strategies and tools can be used to self-regulate?
- 6.) On a scale of 1- 10 (1 being not at all, 10 being very) how engaged overall would you say you're your students are?
- 7.) On a scale of 1- 10 (1 being not at all, 10 being very) how engaged overall would you say your students with a ministry designation are?

*Appendix 2***Post-observation teacher questionnaire/ interview:**

- 1.) Did having the basket and the video give you more information and knowledge about teaching self-regulation?
- 2.) How would you rate your class overall on a scale of 1-10 (1 being not at all, 10 being great a self-regulating) on their ability to self-regulate after being given the opportunity to use the basket?
- 3.) How would you rate on a scale of 1-10 (1 being not at all, 10 being great a self-regulating) your students with diverse learning needs who have a ministry designation on their ability to self-regulate after being given the opportunity to use the basket?
- 4.) Does your class know more about what self-regulation is after this intervention?
- 5.) Does your class know what strategies and tools they can use to self-regulate after this intervention?
- 6.) On a scale of 1- 10 (1 being not at all, 10 being very) how engaged overall would you say you're your students are with having access to the tool basket to regulate?
- 7.) On a scale of 1- 10 (1 being not at all, 10 being very) how engaged overall would you say you're students with a ministry designation are with having access to the tool basket to regulate?

*** extra questions for post observation

- 1.) What tools did you notice students using the most?
- 2.) How did you manage the use of the tools?
- 3.) Do you have any recommendations of how the research could have been done differently?

Debriefing document

Thank you for participating in my research. Was there any part of the process that was uncomfortable for you that you would like to discuss?

Do you feel the research was beneficial for you and your students?

Is there any information you need from me regarding the research or any of the components including the use and collection of data?

Do you have any concerns about the effects on students or their parents due to the conducting of the research?

Appendix 3

Hello class,

My name is Ms. Musil and I'm going to talk to you about a tool basket that is going to be something new coming into your classroom.

This basket is called a self-regulation tool basket, and it is meant to help with getting calm and being ready to learn.

Inside the basket is a number of tools that you can use.

You have all been learning about what kind of learner you are and what you need to help you learn in school when it comes to reading and math.

It is important for you to also learn what helps you to be calm and focused for learning and what tools you can use to help you if you are upset about something.

Everyone is different and so what works for one person, may not be the same as for someone else. You will figure out what tools work for you and during what times help you the most.

A reminder that these are tools, not toys and they are for helping you be calm, happy and focused.

- 1.) This is a calm sparkle jar- you can turn it upside down or shake it. This can be helpful if you are upset or worried about something. By watching the sparkles gently fall down, it can help calm you and get your mind off of what is upsetting you while your body calms down. These can be made easily at school as an art project or at home. You just need any container (I got these at Michael's) but you can use a recycled water bottle or other recycled plastic bottle, fill it about 1/3 with warm to hot water, then add about ¼ clear glue, then sparkles, then fill the rest with warm to hot water.
- 2.) These are balloons filled with different things. One has sand and the other has rice. These can be helpful to use for focusing on things. If you are someone who needs to squeeze hard, these are not good tools for you as they will break. You can also make these at school or at home. You just need balloons and can fill them with sand, rice, beans, chunks of foam, orbeez. Remember though, these can easily break so don't squeeze them too hard.
- 3.) This is putty. If you are someone who DOES need to squeeze hard, you may find this helpful. I know lots of kids love putty as a toy, but at school you will be using this as a tool for helping with self-regulation. Teachers, you may want to separate the putty in 2 and have 2 containers with putty as it is a large amount.
- 4.) These are feathers that are used for breathing. Breathe in and blow out at the feathers. You may have some other types of breathing that you like to do. Thinking about and concentrating on your breathing is really helpful for calming your body and getting your brain ready to focus.

- 5.) These are smell jars. Inside are essential oils that have different smells. Turn the little plastic piece so it opens and smell the top. One is a citrusy smell that can help perk you up, the other has a calming smell. Some people find the citrusy smell helpful for giving energy and for calming. You may find different times you want to smell each of the containers.
- 6.) These are noise cancelling headphones. These can be helpful if you just need some quiet time or help with concentrating.

Your teacher will be in charge of the tool basket in your classroom. They can either keep it on their desk or find a spot in the classroom they would like it to be, maybe a calming corner. I hope you all find these tools useful for helping you feel calm, happy, focused and ready to be your best self in your classroom, on the playground, and at home.

Appendix 4

Observation checklist

Times observed	Student 1 with ASD-YES	Student 1 with ASD-NO	Students without ASD-YES	Students without ASD-NO
Emotional regulation				
Classroom participation-productivity				
Classroom participation-independence				
Flexibility-flexible behaviour				
Flexibility-flexible attention				
Social connectedness-responding				
Social connectedness-eye gaze				

Emotional regulation: ability to manage emotional states to match the demands of the environment (using strategies, seeking support)

Classroom participation:

- a.) Productivity- actively performing roles within an activity, using materials appropriately
- b.) Independence- self-initiated management of materials and participation in class activity (getting materials out, putting items in backpack, completing assignment)

Flexibility

- a.) Flexible behaviour- students ability to change in response to classroom changes including activity changes, location changes, and material changes

- b.) Flexible attention- students ability to shift attentional focus when presented with opportunities to change (e.g. classroom teacher suggesting the student to attend to another book)

Social connectedness:

- a.) Responding- physical and social response following expectant language
- b.) Eye gaze- eye gaze directed toward communicative partner