Key Design Elements of Self-Regulation Spaces within Inclusive Elementary School Classrooms

by

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AN APPLIED PROJECT

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We accept the Applied Project as conforming to the required standard.

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Abstract

Studies have shown that students who struggle with self-regulation often have increased difficulty meeting learning and behavioural demands in the typical classroom environment. Various researchers recommend the inclusion of a withdrawal space within the classroom, where students can go when they are feeling upset, angry, or otherwise dysregulated. Such a space can help students to calm down, self-regulate, and then rejoin the rest of the class. The purpose of this applied project is to support educators in designing self-regulation spaces rooted in research, within their inclusive classroom environments. An in-depth analysis of the literature around self-regulation, inclusion, classroom design, and self-regulation spaces informed the design and implementation of a website that supports educators and answers the guiding questions, “How can elementary school teachers design research-informed self-regulation spaces in their inclusive classroom environments to support students with self-regulation?” and “What are the key design elements of effective self-regulation spaces?”

https://selfregulationspaces.herokuapp.com
Acknowledgements

I am grateful to my supportive colleagues for encouraging me throughout this process, to my supervisor Christina, and my second reader Shawna, for their time and advice, to my partner David, for his invaluable help with the development of my website, and to my family for their unwavering support of my educational goals over the years.
Dedication

For my students.
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Chapter 1

Introduction

Self-Regulation

According to the British Columbia Teacher Regulation Branch (2012), “many children with special needs face specific biological and physical challenges that make it particularly difficult for them to control their energy and emotional states” (p. 6). Baumeister and Vohs (2004) provide five definitions of self-regulation in their *Handbook of Self-Regulation*. Stuart Shanker’s (2010) Five Domain Model postulates that each of these definitions relates to a level on which a child may engage in self-regulation, as can be seen in Table 1.

<table>
<thead>
<tr>
<th>Baumeister &amp; Vohs’ definitions of self-regulation</th>
<th>Shanker’s Five Domain Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. “The ability to attain, maintain and change one’s level of arousal appropriately for a task or situation”</td>
<td>“Biological (e.g., how well the child regulates her arousal states)”</td>
</tr>
<tr>
<td>2. “The ability to control one’s emotions”</td>
<td>“Emotional (e.g., how well the child monitors and modifies her emotional responses)”</td>
</tr>
<tr>
<td>3. “The ability to formulate a goal, monitor goal-progress, adjust one’s behaviors”</td>
<td>“Cognitive (e.g., how well the child can sustain and switch her attention; inhibit impulses; deal with frustration, delay, distractions; sequence her thoughts)”</td>
</tr>
<tr>
<td>4. The ability to manage social interactions, to co-regulate”</td>
<td>“Social (e.g., the child’s mastery of rules of appropriate behaviour; how well the child can co-regulate and thereby develop prosocial attributes)”</td>
</tr>
</tbody>
</table>
To be aware of one’s academic strengths and weaknesses, and have a repertoire of strategies to tackle day-to-day challenges of academic tasks”

“Reflective thinking skills”

Note. As cited in Shanker (2010).

In the elementary school classroom, “too much colour, too much noise (volume or constant background sound) or too much of any variable can overload the student’s brain and block it from achieving the calm, focused and alert state a learner needs” (British Columbia Teacher Regulation Branch, 2012, p. 6). When a student experiences challenges with self-regulation, that “overload” can result in overwhelming feelings of discomfort, frustration, anxiety, or anger, which significantly impacts their ability to learn. The physical classroom environment of a typical elementary school includes many of the variables described above, including colour, noise, distractions, and various other stimuli. Students with special needs, such as Autism Spectrum Disorder (ASD) or Generalized Anxiety Disorder (GAD), who are already prone to struggle with self-regulation, are known to have difficulty self-regulating in the typical elementary school classroom (CDC, 2014, Martin, 2014, Roemer et al., 2009).

Inclusive classrooms. Classrooms in British Columbia and around the world are increasingly moving towards a model of inclusive education, where students with special needs are participants in the general classroom environment to the greatest extent possible. Martin (2014) states that “inclusion is challenging the classroom teacher to meet the needs of children with and without special needs in terms of pedagogy,” but “few educators are relying on research-based practices” (p. 281). If students with special needs are to be included in the general classroom, it is the job of teachers and special educators to ensure that we are supporting them...
through appropriate practices and methods. I believe that if we can find empirically sound models of classroom design, we can support those students who particularly struggle with self-regulation. In addition, there is potential for the rest of the students in the class to use and benefit from an inclusively-designed physical classroom environment.

**Classroom design.** Classroom design is certainly a trend in education these days; “cozy corners,” “natural lighting” and “visual clutter” are buzz words both in schools and on the internet. At my school, if you walk into many of the classrooms there, you are likely to find ambient lighting, cozy reading nooks, soft music playing, flexible seating options, and perhaps even a diffuser emitting essential oils. Teachers at my school have made huge efforts when it comes to creating welcoming and calm physical environments for their students. They are conscious of sensory stimulants, including noise levels, colour, lighting, organization, cleanliness, and even scent. Their efforts and intentions are admirable; these are teachers who truly care about helping their students to self-regulate in spaces they feel comfortable and safe in. Researchers such as Barrett, Davies, Zhang, and Barrett (2016), Khare and Mullick (2009), Martin (2014), McAllister (2010), McAllister and Maguire (2012), Ramirez (2014), Roulston (2012), and Scott (2009) have added to the literature in the area of physical classroom design. By exploring recent, scientifically grounded research, I would like to explore the assumptions that myself and my fellow teachers have around the relationship between self-regulation and the classroom environment. It is important to ensure that what we are doing to support students is actually effective, as educational time is valuable, both for teachers and their students.
**Problem**

Inclusive education policies have resulted in students with exceptionalities, including many who struggle with self-regulation, participating in the regular classroom environment. These classrooms have not been designed to support self-regulation. Many teachers are making significant efforts to create inclusive classroom environments, but their design decisions are often not grounded in scientific evidence.

As a teacher, it is important for me to examine and re-examine my beliefs and assumptions about how students learn. Each student I encounter challenges me in new ways, and one thing I have come to know is that no two students are exactly alike. They arrive at school with different life experiences, cultural and ethnic backgrounds, socio-economic statuses, learning styles, abilities, levels of readiness, strengths, and challenges.

Take my classroom for example: nineteen grade two and three students from the ages of six-ten. One has a learning disability. Three are refugees from a war-torn country. Two have extreme medical needs which require the assistance of a trained adult. One has Generalized Anxiety Disorder, and is designated as requiring “intensive behaviour support”. Two are new immigrants to Canada. One has a moderate intellectual disability. Four are First Nations, and are considered to speak English as a second dialect. One has Attention Deficit/Hyperactivity Disorder. Eleven receive support from the English Language Teacher. Three attend counselling both in and outside of school. Eight are directly supported by the Learning Support Teacher. One has Obsessive Compulsive Disorder. Each of them is incredibly special, talented, and resilient. These students are representative of a typical class at my school.

We place these children into one inclusive learning community, where they explore, play, inquire, learn, and grow together. As Shelley Moore writes in *One Without the Other: Stories of*
Unity Through Diversity and Inclusion (2016), inclusion is the concept of “teaching to the diversity of all” (p. 5). This is a beautiful, but somewhat daunting idea. How can one teacher provide an inclusive educational environment that meets the needs of each of those diverse learners? And in particular, what about those students who are already inclined to struggle with self-regulation, the ability to “inhibit first responses, [and] to resist interference from irrelevant stimulation?” (Cook & Cook, 2009, p. 1). How are they to be successful in the typical (noisy, colourful and sometimes downright chaotic) elementary school classroom?

In my work as a special educator and general classroom teacher, I have encountered many different students who struggle with self-regulation. I believe that every child deserves to feel safe and calm in the classroom environment, and I intend to adapt my own classroom environment to help students achieve those feelings through self-regulation. I also want to share my learning with other educators through an educational website about self-regulation spaces.

**Purpose statement.** The purpose of my project is to support elementary school teachers in designing self-regulation spaces rooted in research, within their inclusive classroom environments. In-depth analysis of the literature around self-regulation, inclusion, classroom design, and self-regulation spaces will inform the design and implementation of a website that supports educators in designing research-based self-regulation spaces.

**Justification.** Shanker (2010) asserts that there is a “growing awareness among developmental scientists that the better a child can self-regulate, the better she can rise to the challenge of mastering ever more complex skills and concepts” (para. 1). That being said, Martin (2014) states that there is a knowledge gap in the research in this area. This limited research on design criteria for physical classroom spaces “leaves designers, teachers, and school
administrators substantially reliant on anecdotal information in terms of creating optimal learning environments” (Martin, 2014, p. 280). Since designers have “little empirical evidence upon which to base design solutions…the challenge remains - how to support the well-being and education of children with ASD [and other children who struggle with self-regulation] via the classroom environment?” (Martin, 2014, p. 281). My website on self-regulation spaces will directly support teachers in supporting student self-regulation in the classroom environment.

Questions. Through the creation of my website, I would like to address the following questions: How can elementary school teachers design research-informed self-regulation spaces in their inclusive classroom environments to support students with self-regulation? What are the key design elements of effective self-regulation spaces?

Overview of Applied Project

I plan to review the literature and research that has already been published on inclusion, self-regulation, physical learning environments, and self-regulation spaces. I will use my findings that come from the literature review to support other practitioners in what they are doing in their own classrooms through a website, “Self-Regulation Spaces.” The aim of the website will be to provide information on how to create an effective self-regulation space in an inclusive classroom environment. See Chapter 3 for a detailed description of this project.

Definition of Key Terms

Self-regulation: Self-regulation is the ability to “inhibit first responses, [and] to resist interference from irrelevant stimulation” (Cook & Cook, 2009, p. 1). Students who have
difficulties with self-regulation may experience overwhelming feelings of anxiety, discomfort, anger or frustration in the typical elementary school classroom setting.

**Physical classroom environment:** I am defining the physical classroom environment as any elements found in the typical elementary school classroom. Some elements of the classroom environment may provide excess sensory stimulation to students who struggle with self-regulation, such as light, sound, movement, texture, furniture layout, smell, visual clutter, and so on (Shanker, 2010).

**Self-Regulation Space:** I am defining a self-regulation space as a space within an elementary school classroom, specifically designed to help students to calm down and “re-regulate” their bodies and emotions.

**Conclusion**

It is evident that the ability to self-regulate plays an important role in the success of many students in British Columbia’s inclusive classroom model. The physical classroom, while often designed with the best of intentions, is not often grounded in scientific evidence, or designed to support all learners. In the following chapter, a review of the literature will be completed, focusing on themes of “inclusive classrooms,” “self-regulation,” and “physical classroom design.” These themes will be synthesized in a discussion of how, together, they can support the design and implementation of self-regulation spaces in today’s inclusive classrooms.
Chapter 2

Literature Review

Introduction

Helping students to self-regulate within the classroom environment is vital if British Columbia’s current model of inclusive education is to be successful. According to the Ministry of Education (2015), 57 060, or 10.4% of students in British Columbia’s public schools have some kind of designated disability. In the inclusive education model, all students, regardless of ability or special needs, learn in the same classroom environment, and all students are encouraged to participate to the fullest extent possible (Ministry of Education, 2013, p. 2). There has been a large push towards inclusive education in the past several years in British Columbia’s education system. Many students in these inclusive classrooms struggle with self-regulation, thus it is important to support them in this area to the greatest extent possible. The purpose of this literature review is to examine the foundational theories behind “self-regulation” and “physical classroom design,” describe the existing studies and conversation of ideas in the field, and discuss how self-regulation and physical classroom design relate to each other within the inclusive classroom environment. I will begin with the broad theme of “inclusive classrooms,” discuss the meaning of the term “self-regulation,” and then move into a review of what the literature says about why supporting students with their self-regulation is important. I will then look at what is known about physical classroom design, narrow to a discussion of how the physical classroom environment impacts self-regulation, and finally, synthesize this information with a discussion on specific design recommendations for self-regulation spaces in classrooms. I will conclude by reviewing what is known about these topics and connecting the literature to my applied project. This information will be used to create a comprehensive website, “Self-
Regulation Spaces,” to support teachers in designing self-regulation spaces in their own classrooms. It is my intention for this resource to be useful for school planners, school districts, administrators, parents, and educators.

**Inclusive Classrooms**

Being part of an inclusive classroom environment can be a very meaningful experience for a student with special needs. Fitch (2003) completed a qualitative study of two groups of students with special needs over the course of six years. One group of four students was part of a segregated educational setting, and the other group of five students was part of an inclusive classroom environment. According to Fitch, the students’ “sense of self varied widely according to the nature of their educational placements” (p. 237). The segregated students reported feeling like “outsiders” (p. 238). They also felt a “sense of shame, embarrassment, and desire to eventually escape” the confines of the segregated setting (p. 239). In contrast, the students in the inclusive setting reflected a “relatively high degree of confidence in their academic ability and sense of belonging in the main-stream community” (p. 243). As Fitch states, it is evident that the students in the inclusive classroom environment “constructed a sense of themselves that was significantly different (and more positive) from those in either segregated or traditionalist classrooms” (p. 233). According to additional studies by Loreman, McGhie-Richmond, Lupart, and Barber (2008), Fitch’s (2003) findings are “consistent with recent research literature” (p. 2). These authors state that inclusive classrooms have “positive implications for all students,” and students with disabilities in inclusive classrooms reported feeling as though they “learned more, made more friends and had higher levels of self-concept, including self-efficacy and self-esteem” (p. 3). A significant amount of research has shown that inclusive education is a positive change
in our educational system, and it is certainly the model that British Columbia has embraced. However, the question remains: How can we design inclusive classrooms to support all students, and particularly those who need support with self-regulation?

**Self-Regulation**

**What is it?** Despite its popularity in current educational research, the definition of the term self-regulation has multiple interpretations. According to Burman, Green, and Shanker (2015), inter-related terms describing self-regulation include “self-control,” “self-management,” “self-observation,” “learning,” “social behaviour,” and “self-monitoring” (p. 1). Each of these self-management skills is needed during a typical school day, as students self-reflect on their progress, engage in social situations, and manage their emotions during exciting, boring, or challenging activities. Kuypers and Winner (2011), the authors of the popular self-regulation handbook, *The Zones of Regulation*, include the terms “self-control,” “self-management,” “anger control,” and “impulse control” in their definition of self-regulation. They describe students who are self-regulated (ex. calm, happy, ready to learn) as being in the “Green Zone,” students who need to “up-regulate” (ex. sick, sad, tired, bored) as being in the “Blue Zone,” and students who need to “down-regulate” (ex. hyper, excited, silly, anxious, angry) as being in the “Yellow Zone” or the “Red Zone.” Students face many stressors, obstacles, and emotional experiences as they navigate through a typical school day. Their ability to manage these experiences appropriately is defined by Denham and Brown (2010) as “self-regulation” and “self-management” (p. 656). Denham and Brown use the terms self-regulation and self-management interchangeably, asserting that these terms describe “handling stress, persevering through obstacles, and expressing emotions appropriately” (p. 656). Eisenberg, Valiente and Eggum (2010) agree,
suggesting that the ability to self-regulate is the ability to change how one experiences and expresses emotions during emotionally charged situations (p. 681). They argue that self-regulation “refers to the processes used to manage and change, if, when, and how one experiences emotions and emotion-related motivational and physiological states and how emotions are expressed behaviourally” (p. 681). Bodrova and Leong (2005) define self-regulation as the “capacity to control one’s impulses, both to stop doing something (even if one wants to continue doing it) and to start doing something (even if one doesn’t want to do it)” (p. 55). According to Munro (2017), this definition “works effectively in the school setting, since in the classroom teachers are continually asking students to stop certain behaviours (e.g. calling-out, getting out of their desk) and to start certain behaviours (e.g. lining up at the door, starting an assigned task)” (p. 11). Braet et al. (2014), emphasize that children may control their emotions or change the situations they are feeling emotional about; they describe self-regulation as the “process by which individuals modify their emotions or the situations eliciting these emotions” (p. 493). Danuser (2017) describes times students may require self-regulation, including “transitioning between subjects, dealing with routine changes, persevering if the workload increases, and remaining calm when something doesn’t go your way” (p. 1). She asserts that the ability to self-regulate “enables students to be in the best state to learn” (p. 2). It is clear that the definition of self-regulation is complex and varied, but there are many common aspects in the descriptions above. For the purposes of my project, I will be working with the operational understanding that self-regulation involves the ability to gain control over oneself, one’s situation, and/or one’s emotional response, in order to get through a difficult experience. Krouse and Krouse (1981) suggest that the inability to self-regulate is a major cause of student underachievement (as cited in Dembo and Eaton, 2000).
Why is self-regulation important? Woodford (2014) states that “students who are unable to control their emotions and behaviour or hold their attention appear to have more challenges when it comes to school and learning” (p. 2). In today’s inclusive classrooms, many students enrolled in the typical classroom have specific difficulties in the area of self-regulation. Self-regulation challenges for students with Autism Spectrum Disorder (ASD) and Generalized Anxiety Disorder (GAD) are well documented, as described below (CDC, 2014; Martin, 2014; Roemer et al., 2009).

**Autism Spectrum Disorder (ASD).** According to The Centre for Disease Control (CDC), based on a representational sample of 8-year-olds, 1 in 68 children have Autism Spectrum Disorder (ASD) (CDC, 2014). Martin (2014) asserts that ASD experts believe that the years from early childhood education through 6th grade “are critical in reaching these children and establishing a foundation for their educational experiences” (p. 281). The self-regulation of students with ASD is known to be impacted by sensory and biological aspects of the physical classroom environment, such as “sound, light, proximity/personal space, textures, and movement” (p. 281). The classrooms they attend, however, are “highly interactive, unpredictable environments, even when the daily activities have been carefully orchestrated” (p. 283).

**Generalized Anxiety Disorder (GAD).** Roemer et al. (2009) state that Generalized Anxiety Disorder (GAD) is “a chronic anxiety disorder, centrally defined by pervasive, excessive worry” (p. 142). Symptoms of GAD include “diminished levels of mindfulness” and “difficulties in emotion regulation” (p. 142). Difficulty managing emotional states disrupts the “functional use of emotional responses…creating a self-perpetuating cycle of emotional dysregulation” (p.
143). It is clear that students with GAD experience difficulties with self-regulation. By researching and implementing classroom-based interventions that support student self-regulation, perhaps we can better meet the needs of these vulnerable children.

**Students with and without designations.** Even students without specific designations may struggle with the ability to self-regulate from time to time (Woodford, 2014, p. 3). Due to the variety of students and learning needs in the inclusive elementary school classroom, Woodford asserts that “It is important to teach all students self-regulation strategies and allow them to select those that work, in order to target specific strategies for specific students in a general classroom setting without singling out or stigmatizing individual students” (p. 3). Pelco and Victor (2007) state that “given the results of the research accumulated to date, it is becoming clear that children who have difficulty regulating their emotions and behaviour experience more conflict in relationships with parents, teachers, and peers and show lower academic achievement than do their more regulated peers” (p. 37). Woodford (2014) agrees, asserting that “self-regulation affects the life-long learning potential and emotional well-being of students” (p. 18).

A longitudinal study of 200 kindergarten students is described by Pelco and Victor (2007). Over the course of one school year, it was identified that students who demonstrated poor self-regulation skills at the beginning of the school year did not form as strong relationships with their teachers and other students in comparison to their more regulated peers. This study suggests that school success, student-teacher relationships, and student-peer relationships are impacted by self-regulation skills.

Dignath, Buettner and Langfeldt (2008) demonstrated similar findings through their meta-analysis of 30 articles on self-regulated learning for elementary school students. The study
found that programs that specifically taught self-regulation skills were effective at the elementary school level. The researchers assert that “providing students with knowledge and skills about how to self-regulate their learning helps them to self-initiate motivational, behavioural, and metacognitive activities in order to control their learning” (p.102).

The assertions of Pelco and Victor (2007) and Dignath, Buettner, and Langfeldt (2008) are supported by Denham and Brown (2010), who state that students’ “ability to regulate emotion, attention, and behavior has been found to be related to their school/classroom adjustment and academic achievement” (p. 659). Florez (2011) also echoes these claims, stating that “regulating one’s thinking, emotions, and behavior is critical for success in school, work, and life” (p. 46). Because self-regulation offers important benefits to students, it can be argued that a focus in elementary schools should be placed on both the direct instruction of self-regulation skills, and on designing the classroom environment with the mindset of supporting student self-regulation (Bodrova & Leong, 2005, p.57). In the following section, relevant studies and findings on how the physical design of the classroom environment can support student self-regulation will be explored.

**Physical Classroom Design**

In most elementary schools, the general classroom is where students spend the majority of their time at school. Six hours a day, five days a week, students join together in a classroom community to learn, play, and grow. An enormous amount of their educational experiences will occur within the classroom setting. In inclusive classrooms, this is true for all students, those with and without special needs. However, the traditional classroom model that is still popular
today, was not originally designed for inclusion. This begs the question: how does the physical classroom space affect our ability to support all students within an inclusive model?

**Impact on student learning.** According to Roulston (2012), “participating in a classroom together is not enough to ensure the benefits of inclusion” (p. 13). Roulston states that it is very important that educational professionals “structure the classroom environment… to support all children. This structuring begins with designing the physical space” (p. 13). Barrett, Davies, Zhang, and Barrett (2016), conducted a study in order to raise evidence-based awareness about the importance of designing schools with the physical environment in mind. Their research examined various features of the classroom environment in order to find out their impact upon students’ learning in the areas of math, reading and writing. Data was collected from 157 classrooms (27 schools) in the United Kingdom. Surveys were done of shared spaces in the schools, as well as individual classrooms. The classroom surveys included measurements such as door placement and window height, as well as observations about the learning zones and other areas of the classrooms. Data on reading, writing, and math improvements was collected through standardized testing for 3,766 students from ages 5-11. The study found that the physical aspects of the environment did have an impact on the students’ achievement. For example, when examining the impact of colour in classrooms, it was found that neither low nor vivid colours were the most effective; rather, “wall and display colors were subsequently found to be curvilinear, meaning that the optimum level for learning was in the middle of the ranges” (pg. 442). Architectural structure, room layout, and wall displays were “optimal if the overall balance was considered” (pg. 442). Both low levels of complexity and high levels of complexity rated poorly; structures, layouts, and displays that featured either too much content or too little content
were not as successful as well-balanced models. Strengths of this study include the large sample size and level of detail obtained. Weaknesses include data limitations (they could not access data on individual pupil characteristics such as socioeconomic status, parental background, or individual abilities) and possible skewed results based on influences beyond the physical environment, such as student and teacher skill. Nevertheless, as Barrett et al. (2016) state, “Pupils from the age of 5 years spend over 6 hours every day of the week within the school environment. Apart from their home, they spend more time in class than anywhere else” (pg. 444). As such, it is vitally important that the environment be designed with the utmost care in order to provide a learning space that is effective for all students.

**Impact on student behaviour.** In another study, Ramirez (2014) focused on how the classroom environment impacts students who struggle with behavioural engagement and anxiety. These challenges are closely related to self-regulation, as many students who have behavioural and anxiety issues display poor self-regulation skills. Ramirez designed and studied a classroom with the hopes that it would “promote positive behavioral engagement (i.e. on-task behavior) and reduce anxiety” (p. 11). An A/B multiple baseline approach was used, in which three students with similar behaviours were observed at three times of the day in the baseline room (pre-intervention), and then in the adapted room (intervention). The adapted room contained therapy balls instead of regular chairs, modified paint colour on the walls (blue-green to promote a sense of calm and wellbeing), and a variety of plants. The study took 1 month. All three students demonstrated considerably more on-task behaviour during the intervention phase, suggesting that the modifications to the physical classroom environment were effective. Though this study took place over a relatively short period of time, and it is unknown whether the positive effects noted
would have endured throughout the school year, this study makes an important contribution to advancing knowledge in the field of classroom design, and may be a catalyst for future research.

**Broad design recommendations.** Martin (2014) conducted a broad literature review, covering hundreds of articles from the years 2000-2012. He wished to compile evidence about how physical environments from preschool to sixth grade classrooms can be designed for student success. He compared his findings with the needs of children with Autism Spectrum Disorder (ASD), and summarized them. These findings are of note here, as students with ASD tend to experience difficulty with self-regulation. Martin organized his findings into seven main themes: space, visual sensory aspects, lighting, auditory sensory aspects, furnishing, fixtures and equipment, flexibility, and design process (p. 291). I have summarized specific recommendations noted by Martin in Table 2.

<table>
<thead>
<tr>
<th>Table 2</th>
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<tbody>
<tr>
<td><strong>Summary of Martin’s (2014) Recommendations for Classroom Design</strong></td>
</tr>
<tr>
<td><strong>Space</strong></td>
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<tr>
<td>- Areas should be clearly defined</td>
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<tr>
<td>- Adults should be able to see into the space</td>
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<td>- Physical boundaries such as filing cabinets can be used to create designated spaces</td>
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<tr>
<td>- Create separate learning zones</td>
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<tr>
<td>- Provide a visually secluded area with minimal wall decorations for independent work</td>
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<td>- Lower ceiling areas promote a sense of calm; high ceiling areas promote energy</td>
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<tr>
<td>- All students should be able to move around the space safely (provide ramps if needed)</td>
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<tr>
<td>- Avoid sharp edges, limit climbing opportunities</td>
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<tr>
<td>- Provide opportunities for physical stimulation, such as weighted belts, fidgets, exercise bands</td>
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<tr>
<td>- Provide withdrawal space to lessen stress</td>
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<tr>
<td>- Provide an escape space as a baseline neutral sensory environment</td>
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<tr>
<td><strong>Visual Sensory</strong></td>
</tr>
<tr>
<td>- Use physical elements (storage, visual schedule) in the classroom to block distractions</td>
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Aspects

- Incorporate signage, visual cues (colour, light and texture increase visual hierarchy), and landmarks
- Eliminate extra clutter
- Wall decorations are distracting
- Patterns (e.g., brickwork) and colour variations should be avoided
- Avoid complexity in detailing and colour palette

Lighting

- Provide natural daylight as much as possible
- Eliminate light fixtures that strobe or hum
- Increase lighting in task areas
- Provide lighting that can be dimmed

Auditory Sensory Aspects

- Use acoustical tiles, draperies and carpet to minimize noise
- Eliminate noise filtering into the classroom from outside or other building spaces

Furnishing, Fixtures, and Equipment

- Use pillow seats
- Provide at least three options for work stations
- Use therapy balls for seated time
- Design the space to accommodate technology

Flexibility

- Modify areas as needed
- Storage and screens should be moveable
- Lighting and other factors should be customizable to meet needs

Design Process

- All stakeholders should be involved (especially teaching staff)
- The space will change over time as the user interacts with it

*Note. From Martin (2014), Table 2, p. 290-291.*

Martin (2014) concludes his discussion with the statement that “It is essential that we can identify supportive [classroom design] so that in the future, the learning outcomes for young children… can be enhanced through appropriately designed inclusive classrooms for all children” (p. 293).

While some of the researchers cited in this section have studied the classroom environment’s impact on academics, and others have focused on the impact it can have on social
and emotional challenges, Roulston (2012), Barrett et al. (2016), Ramirez (2014), and Martin (2014) agree that classroom design has an important impact on students in inclusive classrooms.

**Designing Self-Regulation Spaces in Classrooms**

Educators can include self-regulation spaces in their classrooms as a place for students who are experiencing difficulties with self-regulation to withdraw and regroup. Recommendations for such spaces are explored below. It is worth noting that there can be different purposes for self-regulation spaces, and naturally, these purposes guide the design.

**Withdrawal spaces.** Khare and Mullick (2009), McAllister (2010), McAllister and Maguire (2012), Scott (2009) and Martin (2014) recommend that teachers provide a “withdrawal” or “sensory integration” space for students’ stress relief and self-regulation. Martin (2014) calls the creation of this space the “inclusion of an ‘escape’ space or quiet area” (p. 291). Mostafa (2008) states that an “escape space” should be provided as a “baseline neutral sensory environment” (p. 204). In Learn: The Magazine of BC Education (2012), Shanker encourages even just something as simple as “blankets draped over two desks with a mat on the floor” in order to “provide a refuge for the child who is overloaded and needs some quiet time” (p. 8).

Khare and Mullick (2009) conducted a research project in which they examined the learning behaviours, strengths, and weaknesses of children with Autism Spectrum Disorder (ASD), in order to provide evidence-based, “universally acceptable” information to help architects and educators “design autism friendly inclusive educational spaces” (p. 45). They describe ASD as a “triad of deficits,” including “social interaction,” “communication,” “repetitive behaviors,” and “sensory dysfunction” (p. 48). Because many of these characteristics,
specifically those related to deficits in social interaction and sensory dysfunction, are seen in students (with and without ASD) who struggle with self-regulation, I believe we can generalize the findings of this study to the creation of self-regulation spaces. Khare and Mullick (2009) presented their findings, which they call “the enabling aspects” of the educational environment, and developed a measurement scale to evaluate the effects of these aspects on students’ “functional performance” (p. 45). In their study, the need to “provide withdrawal spaces” emerged as one of 18 dominant design parameters. They discussed that children with ASD often have difficulty with aspects of self-regulation, such as “handling socially demanding situations,” and thus recommend that educators provide withdrawal spaces within the classroom environment (Khare and Mullick, 2009, p. 50). They assert that such spaces are “helpful for children, to avoid unnecessary stress and anxiety in socially demanding spaces” (p. 50). Khare and Mullick also state that the withdrawal area can be used as a place for “students to get away from distractions and stimulations and regain some self-control” (p. 50). They encourage the provision of carefully designed “multisensory opportunities” in the self-regulation space, that “help children to integrate their senses… sensory integration calms children with under reactive senses and develops tolerance in over reactive children” (p. 51). Sensory integration is not to be confused with allowing a space to become overloaded with sensory stimulation, which may trigger student dysregulation. Sensory items should be carefully designed and implemented to support student self-regulation. The specific self-regulation space that Khare and Mullick reference within their study consists of a quiet space, included in but separated from the main classroom using a partition, with a bean bag chair and few visual or physical distractions (Fig. 9.1, p. 52).
**Within the inclusive classroom.** The space referenced by Khare and Mullick (2009) would likely be approved of by Scott (2009). Scott, who argues that “designing low sensory-stimulus environments reduces sensory overload, stress and anxiety” (p. 37), rejects the idea that a self-regulation space should be located in a separate room or area of the school. He describes such spaces as “a failing in [themselves]… We wanted the children to have the opportunity to withdraw, but still remain within the social fabric of the school” (p. 38). We can take what is known about designing supportive physical classroom spaces and apply that information to carefully-designed self-regulation spaces. By creating self-regulation spaces within the classroom environment, students will have a “mini-oasis” to access in order to calm down, de-stress, and self-regulate. Scott (2009) demonstrates that rather than being located elsewhere in the school building, self-regulation spaces can be developed in the most inclusive place of all, within the inclusive classroom environment, where all students can access it as needed. The next section will outline specific design recommendations for self-regulation spaces based on research.

**Specific Design Recommendations**

**Lighting in the self-regulation space.** In his study of the influence of light on humans, Holzman (2010) made a clear case for the need to account for the biological and behavioural impacts of light, beyond the traditional values of “visual comfort, aesthetics, and energy efficiency” (p. 27). Holzman asserted that, ultimately, lighting choices “should improve people’s health and well-being in the built environment” (p. 27). Winterbottom and Wilkins (2009) examined aspects of lighting that “promote discomfort” in 90 classrooms in the United Kingdom. Results demonstrated that 80% of the classrooms studied were lit with 100Hz fluorescent
lighting, which has been found to “cause headaches and impair visual performance” (Winterbottom & Wilkins, 2009, p. 2). Many additional researchers have also noted changes in behaviour under certain lighting conditions. According to Fenton and Penney (1985), students with Autism Spectrum Disorder (ASD) exhibited more repetitive behaviours under fluorescent lighting, and Schreiber (1996) observed that students are more relaxed in situations where brightness is reduced. Research has shown that children in classrooms with more natural lighting demonstrated fewer behavioural problems (Waldecker, 2005). Shanker (2013) also recommended that classrooms incorporate natural light as much as possible (p. 20). These findings suggest that in the creation of a self-regulation space, lighting choices can certainly play an important role. Waldecker (2005) suggested that, “Although furniture can’t bring more natural light into the classroom, it can help maximize daylight that already comes into the room” (p. 32). He recommended that by using furniture and materials with lighter surfaces, ambient daylight can be let through the material (p. 32). This information is important to consider in the design of a self-regulation withdrawal space, which may be more effective if created from light-coloured furniture or materials, in order to encourage ambient daylight. The findings of Winterbottom and Wilkins (2009), Fenton and Penney (1985), Schreiber (1996), and Waldecker (2005) agree that fluorescent lighting should be avoided, and that ambient, daylit spaces promote comfort and seem to help students to exhibit more relaxed behaviours.

**Colour in the self-regulation space.** It is important to note that scientific findings on the effect of colour on humans are fairly contentious, and tend to be inconclusive (Kaiser, 1984). Additionally, while many studies were completed in the 1970s and 1980s, there is a lack of up-to-date research on the subject. That being said, in the somewhat more recent studies conducted on this topic (particularly with regards to the colours red and blue), many did conclude with
similar results. In a study by Grangaard (1995), the effects of colours on eleven 6-year-old elementary school students were analyzed. Videotapes and blood pressure monitoring were used to study changes in the children’s behaviours in two different settings. In the first setting, which had white walls, the students had 22% more off-task behaviours than in the second setting, which had light blue walls. It was also found that the students’ mean blood pressure readings were 9% lower in the light blue classroom. These findings suggests that the light blue colour had a calming effect on the students. Singh (2006) discussed the effects of blue and red colouring on the human body, stating that blue is associated with calmness and relaxation, while red is associated with an “increasing metabolic state” (p. 784). As an example, Singh referred to restaurants that use blue colours to “calm and relax their customers,” and to encourage them to linger longer and thus order more food and beverages (p. 785). Sasson (2007) found that blue walls were less distracting when compared to red walls, which were more stimulating (p. 555). The findings of Grangaard (1995), Singh (2006), and Sasson (2007) suggest that blue may be an important colour to feature when choosing materials and colours to design a self-regulation space. It is important to acknowledge that there are varying theories about the effects of colour on human mood and behaviour. As Singh (2006) stated, some researchers feel that human responses to colours are “stable, therefore applicable to everyone, whereas others disagree, asserting that responses and preferences to colors vary across culture, gender, and age, among others” (p. 786).

Sensory tools in the self-regulation space. Scanlan and Novak (2015) stated that sensory approaches “are designed to assist [users] to regulate physiological and emotional arousal” (p. 277). Mullen et al. (2008) completed a study on the calming effects of a specific sensory tool: weighted blankets. In their study of 32 adults, it was found that after using a
weighted blanket, 63% reported lower anxiety, and 78% felt that the weighted blanket was calming. Chen et al. (2012) reported similar findings in their study of the positive effects of weighted blankets on anxiety modulation for dental patients (p. 463). Sutton et al. (2013) wrote that “sensory-based interventions are thought to promote adaptive regulation of arousal and emotion” (p. 500). They studied the effects of sensory-based interventions on three adult and one youth inpatient mental health units in New Zealand. They introduced a sensory room, with a variety of calming sensory tools, including “a massage chair, rocking chair, beanbag, faux-fur blankets, weighted blankets, weighted soft toys, ‘stress’ balls, portable audio and DVD players with relaxing sounds and visual scenes, aromatic oils and diffusers, scented hand creams, and adjustable coloured ambient lighting” (p. 502). Patients had access to the sensory room and were encouraged to use it when experiencing increased levels of distress. It was found that these changes to the environment seemed to “moderate or optimize arousal and promote an ability to adaptively regulate emotion” (p. 500). The researchers emphasized three main themes which emerged from their results, including “(i) facilitating a calm state; (ii) enhancing interpersonal connection; and (iii) supporting self-management” (p. 503). It was reported that, for many of the patients, the sensory room was viewed as a “space to withdraw to, where the room and sensory equipment were experienced as relaxing” (p. 503). Shanker (2013) stated that “highly tactile activities [such as playdough] can have a wonderful regulating effect on a child” (p. 19). Champagne and Stromberg (2004) also wrote that “Sensory-based approaches and multisensory rooms are valuable resources as cultures of care shift to become more responsive and collaborative” (p. 1). Similarly, by incorporating sensory equipment into a classroom self-regulation space, students can use these tools to “withdraw,” “relax,” and “self-regulate” (Sutton et al., 2013, p. 503).
Activities in the self-regulation space. McWhorter (2018) wrote that when children are angry or upset, those feelings “must be taken care of in a positive way with an activity that can relax the child’s mind, and reduce their frustration” (p. 3). McWhorter recommends self-calming activities such as reading and drawing (p. 5). Allowing time and space for children to read, draw or colour can help them to develop self-awareness around their feelings, thoughts and behaviours (Coholic, 2010, p. 128). Children often “choose to develop their own depiction of their feelings in their own ways” (p. 128). Some students may also prefer to write about their feelings (p. 133). In order to facilitate this process, a variety of materials can be provided within a self-regulation space, such as appropriate picture books, blank paper, and different types of colouring, drawing, and writing supplies. Including the option to listen to music may also help students to calm down and self-regulate (Hallam & Price, 2003; Scott, 1970; Wilson & Prior, 2006). Hallam and Price (2003) studied the effects of calming background music on the behaviour of ten students with emotional and behavioural difficulties. It was found that the music resulted in a significant improvement in behaviour, academic performance, co-operation, and reduced aggression (p. 1). Scott (1970) found that allowing students to listen to calming music reduced hyperactivity (p. 1). Wilson and Prior (2006) found that music helps students with special education needs to calm down and focus (p. 1). In a self-regulation space, calming music could be included through the use of a device with headphones in order to minimize the distraction to the rest of the students in the class.

Noise-levels, location and size of the self-regulation space. Three factors that may influence where a teacher chooses to set up a self-regulation space in the classroom include noise levels, location, and size. According to Burke and Burke-Samide (2004), “Sound is an element of
the environment that can affect academic achievement. The decibel level and kinds of sounds in a classroom can influence students’ abilities to concentrate, think, and perform well (p. 237).
Shanker, (2013) wrote that some children are “extremely sensitive” to auditory sensory input in the classroom, and that research on self-regulation firmly indicates that “auditory stimuli are by far the most powerful of all distractors” (p. xiv, 12). He goes on to describe that a child who is sensitive to sound may “try to minimize the noise physically by covering her ears or psychologically by disengaging from her environment” (p. xiv). Sensitivity to auditory sensory input “interferes with a child’s ability to regulate him or herself” (p. xvii). Lord, Rutter, and Le Couteur (1994) discuss that students with Autism Spectrum Disorder (ASD) may be particularly sensitive to noise levels in the classroom (p. 661). Waldecker (2005) states that “Acoustics, another important environment factor in a classroom, can be enhanced significantly through proper furniture choices” (p. 32).

These findings suggest that in order to create a self-regulation space where students can calm down within the classroom, areas with higher noise levels should be avoided. A calm corner, with furniture placed strategically to block out excess sound, may be an appropriate location (Waldecker, 2005, p. 32). In doing so, teachers can “[modulate] the intensity of stimuli” in order to help children with self-regulation (Shanker, 2013, p. 10). For example, after consulting with Shanker on how to optimize her classroom environment for self-regulation, one teacher placed noisier centres on one side of the room, and quieter centres on the other. On the quieter side, she also placed a self-regulation space, where “students could simply sit and regroup” (p. 14). Another option to reduce noise in the self-regulation space is to provide noise-cancelling headphones, or headphones connected to a music device, with soft, calming music options (Hallam & Price, 2003; Scott, 1970; Wilson & Prior, 2006).
As for the size of the self-regulation space, Shanker (2012) emphasizes that the space need not take up a large part of the classroom; even just “blankets draped over two desks with a mat on the floor provide a refuge for the child who is overloaded and needs some quiet time” (p. 8). In fact, some students “will be frightened by large, open spaces and wish to withdraw to smaller spaces” (Scott, 2009, p. 37). Perhaps the most important aspect to consider in the creation of a self-regulation space is whether it is inclusive. Scott (2009) emphasizes that withdrawal spaces must remain within the classroom, rather than another room in the building (p. 38). Scott studied the effects of design characteristics of a school building on students with ASD. Jim Taylor, the head teacher of the school rejected the idea that the withdrawal space should be located outside the classroom, stating that, “We felt that would have been a failing in itself. We wanted the children to have the opportunity to withdraw, but still remain within the social fabric [of the space]” (Scott, 2009, p. 38).

**Structure of the self-regulation space.** There are many different options for how to structure a self-regulation space. As in Shanker’s (2013) example described above, something as simple as a blanket draped over furniture can be sufficient to create a simple and quick self-regulation space (p. 8). There are, however, many different structures that educators have used, as is evident when researching “self-regulation spaces” using online search engines, such as Google Images and Pinterest.com (see Table 3). Some of these examples are included on my website in order to give teachers ideas and inspiration for creating a self-regulation space in their own classrooms. It is important to remember that there is no specific “best way” to structure a self-regulation space. Rather, teachers can incorporate many of the factors described in the
sections above (natural lighting, calming colours, sensory items, calming activities, and so on) into a space that works for them and their students, and adjust as needed.

<table>
<thead>
<tr>
<th>Image</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.jpg" alt="Small blue tent" /></td>
<td>Small blue tent separated from rest of class by bookshelves, with cushions, noise cancelling headphones and stuffed animals inside. Next to window for natural lighting.</td>
</tr>
<tr>
<td><img src="image2.jpg" alt="Blue egg chair" /></td>
<td>Blue Ikea egg chair with fold-down lid to create enclosed space, lit by string of lights.</td>
</tr>
<tr>
<td>Corner space with mats, pillows, and leaf roof. Lit by soft lamp lighting.</td>
<td></td>
</tr>
<tr>
<td>Separated from rest of room with blue curtains, near window to let in ambient daylight. Books and colouring supplies inside.</td>
<td></td>
</tr>
</tbody>
</table>
**Conclusion**

It has been discussed that British Columbia supports a model of inclusive education, in which all students participate in the general classroom environment to the greatest extent possible. Many students in inclusive classrooms struggle with self-regulation, or the ability to
regulate their emotions and responses to stimuli in the classroom environment, including the physical space and the social, emotional and academic interactions they experience within it. Students who struggle with self-regulation often experience challenges with school and learning. Research has shown that the physical classroom environment, including aspects such as lighting, colour, visual clutter, and more, can impact students’ abilities to self-regulate. Some researchers have studied the physical characteristics that make a classroom the “ideal” learning and self-regulation environment. It has been found that creating a self-regulation, or ‘withdrawal’ space within the classroom can be a supportive way to help students with self-regulation. Therefore, if the design characteristics that make the physical classroom environment effective for learning and self-regulation can be applied to the self-regulation space, it may be a very effective place for helping students to calm down and regulate their bodies and emotions.
Chapter 3

Considerations for Implementation of Project

Self-Regulation Website

For my applied project, I have created a website, “Self-Regulation Spaces,” including detailed information, grounded in empirical studies and the literature, to support educators in designing self-regulation spaces within their classrooms. It is my desire that this website be useful to school planners, school districts, administrators, parents, and most of all, educators. In this chapter, I will outline my design for the website.

Overview of the Product

The website was designed with the purpose of providing evidence-based, user-friendly information about designing self-regulation spaces in inclusive classrooms. It is my hope that this information will be useful to a variety of people who have a vested interest in the education system, but I expect it will be most relevant to teachers who are looking for help and ideas for setting up the physical areas of their classrooms. I know that personally, I have spent many hours researching classroom design on teachers’ blogs and websites such as Pinterest, hoping to be inspired by ideas that are easy to implement, aesthetically pleasing, and educationally sound. In my own experience, I have not been able to find many resources online that are based on peer-reviewed, empirically sound research. I hope to contribute to this gap with a simple, clear, and easy to use website that is based on information gleaned from peer-reviewed articles and studies.

I have presented the information on the website in a user-friendly manner, with easy to read font, simple, jargon-free language, and many photos and visuals. My sources are cited.
throughout the website, and I have included a separate section that includes detailed APA style references for anyone who would like to explore the research for themselves.

**Detailed Description of the Product**

The website is divided into several sections, or “tabs” that can be clicked through according to interest and desired information. These sections were chosen and designed based upon the evidence presented in my literature review.

**Home page: Introduction to self-regulation spaces.** I believe it was important to begin the website with a home page that clearly lays out the answer to the question, “What is a Self-Regulation Space?” It includes other common names that one might hear for a Self-Regulation Space, such as a “Cozy Corner,” “Relaxation Station,” “Cool Down Spot,” “Relaxation Zone,” or “Withdrawal Space.” This section also includes an easy to understand explanation of self-regulation, why it is important to support students in this area, and common environmental triggers for students who struggle with self-regulation, such as overstimulation from aspects like visual clutter, lighting, colour, noise, and so on. As Khare and Mullick (2009) state, a self-regulation area can be used as a place for “students to get away from distractions and stimulations and regain some self-control” (p. 50). Further sections of the website include recommendations for specific design characteristics of a self-regulation space, based upon my analysis of the literature. These sections are outlined in Table 4.

<table>
<thead>
<tr>
<th>Table 4</th>
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<tbody>
<tr>
<td><strong>Sections Included in the Self-Regulation Spaces Website</strong></td>
</tr>
<tr>
<td><strong>Section Title</strong></td>
</tr>
<tr>
<td>Location Ideas</td>
</tr>
</tbody>
</table>
(Where to set up your self-regulation spaces) | • size  
• space available in the classroom  
• area of the classroom

Structure Ideas  
(What can you build it out of?) | • examples of how to create the physical space (ex. using moveable screens, small tents, etc.)  
• flooring ideas (ex. pillows, blankets, beanbag chairs, etc.)  
• sizing ideas

Lighting Ideas  
(What is the best type of lighting?) | • Lighting style options  
• Brightness recommendations

Colour Ideas  
(What colours should you choose?) | • Optimal colours for a calming environment

Sensory Ideas  
(What sensory items should you include?) | • Options for sensory items to include in the space (ex. weighted blankets, fidget toys, noise-cancelling headphones, soft music, etc.)

Activity Ideas  
(What activities can you make available?) | • Calming activities for students to choose from (ex. books, colouring, etc.)

Introduction Ideas  
(How can you introduce the self-regulation space to your class?) | • Strategies and resources for introducing self-regulation concepts to children  
• Ideas for introducing the self-regulation space

**Background Literature to Support this Type of Project**

I chose to create a website, rather than a workshop, handbook, or different type of project, because I wanted to be able to reach as many people as possible in a mode that is convenient and simple to access. By synthesizing what I have learned and creating a website that can be readily accessed by teachers and anyone else interested in self-regulation spaces, I hope to contribute worthwhile information about creating self-regulation spaces in inclusive classrooms that is easy to find, learn from, and use. In their research about online professional development,
Cook, Jones-Bromenshenkel, Huisinga, and Mullins (2017) state that special educators are always “striving to adjust to the constantly changing demands of the field and [seeking] a way to increase [their] expertise (p. 1). They assert that “Quality professional development must meet the demands and needs of the person engaging in the activity” (p. 1). However, “many opportunities for special educators are often less than optimal in terms of timeliness, expertise, or applicability” (p. 1). Technology is a professional development tool that can be readily accessed by all educators. According to Barikzai (2009), “Technology has played an important role in improving and expanding education worldwide” (p. 4). Ghilay (2017) agrees, stating that “online learning exceeds traditional instruction in many empowering ways” (p. 126). Digital communication allows for the widespread sharing of resources in a way that is flexible, free, and easy to use. Ghilay (2017) emphasizes that learning something online provides the benefit of “learning without limits on time and location” (p. 127). Cook et al. (2017) echo this assertion, stating that online professional development platforms “allow for collaboration and idea sharing outside the confines of place and time” (p. 1).

There is no need for educators to travel beyond their own classroom, school, or home in order to access information on the internet, and there is a broad range of devices with which teachers can connect to websites, “not only via desktop or laptop computers, but also via lightweight mobile devices such as tablets or smartphones” (p. 127). The widespread availability of wireless internet also allows educators to access websites from almost anywhere, thus “globalizing learning” (p. 127). By accessing information online, teachers are granted freedom in choosing their “educational targets,” in other words, what they are most interested in learning about. Everyone is “given the opportunity to consume the resources suitable to their unique learning style,” and enabled to “better fulfill their own potentials” (p. 127). Falk and Drayton
(2009) agree that teachers are empowered when they participate in inquiry learning and engage in their own professional development activities. As Ghilay (2017) asserts, technology certainly opens up “new worlds of experience, interest, activity, and enjoyment” (p. 126).

**Conclusion**

Through my website about self-regulation spaces, I hope to share what I have learned with other educators in a user-friendly, accessible, and flexible manner. As previously discussed in the literature review, research shows that self-regulation spaces have the potential to support students in inclusive classrooms. In Chapter 4, I will reflect on what I have learned over the course of this project, benefits and limitations of the project, and implications and recommendations for myself, other educators, and future research.
Chapter 4

Reflection

Introduction

Throughout the process of choosing a research topic, reviewing the literature and existing studies in the field, developing a website for other educators to use as a resource for creating self-regulation spaces, and using my findings to create a self-regulation space in my own classroom, several key themes and learnings have emerged. British Columbia embraces a model of inclusive education, which means that teachers need to adapt to meet the needs of the diverse variety of students in their classrooms. Several of these students (with and without special needs) have challenges when it comes to self-regulation. Studies discussed in chapters 1 and 2 have shown that students who struggle with self-regulation often have increased difficulty meeting learning and behavioural demands in the typical classroom environment. Additionally, it has been shown that the physical characteristics of a classroom can positively or negatively affect a student’s ability to self-regulate successfully. However, researchers such as Martin (2014) have discussed that classroom design is often not grounded in scientific evidence, and thus, design characteristics are often chosen that do not support all learners. Various researchers recommend the inclusion of a withdrawal space within the classroom, where students can go when they are feeling upset, angry, or otherwise dysregulated. Such a space can help students to calm down, self-regulate, and then rejoin the rest of the class. These themes of inclusion, self-regulation, and physical classroom design have influenced and aided the direction of my research on self-regulation spaces significantly. In this chapter, I will discuss my main learnings with reference to
my guiding question, benefits and limitations of my applied project, the implications of what I have learned, and recommendations for myself, other educators, and future research.

Main Learnings with Reference to the Guiding Question

My guiding questions were “How can elementary school teachers design research-informed self-regulation spaces in their inclusive classroom environments to support students with self-regulation?” and “What are the key design elements of effective self-regulation spaces?”

How can elementary school teachers design research-informed self-regulation spaces in their inclusive classroom environments to support students with self-regulation?

Through my review of the literature and creation of my website, I learned that many students struggle with self-regulation in the typical elementary school classroom, and that having a space for students to withdraw to is a simple and useful strategy to help them calm down and self-regulate. Self-regulation spaces are not difficult or expensive to incorporate, but do require some research, time, and reflection in order to ensure that they are based on scientific evidence. My website, which consolidates what I learned through my extensive review of the literature, will be a helpful resource for educators in this regard.

In the creation of a self-regulation space, knowledge of the effects of physical design elements (such as lighting, colour, and acoustics) on students is key. With that knowledge in mind, educators can choose a space in their classroom, incorporate research-based design elements, and adapt their space as needed for the specific students that use the space.
What are the key design elements of effective self-regulation spaces?

During my literature review, several key design elements emerged, including lighting, colour, sensory tools, activities to include, acoustics, size, location, and structure. Details are included in Table 5.

<table>
<thead>
<tr>
<th>Design Element</th>
<th>Main Learnings</th>
</tr>
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| Lighting       | - Students are more relaxed in settings where brightness is reduced (Schreiber, 1996).  
- Fluorescent lighting can have negative effects on students with special needs (ex. causes more repetitive behaviours). It can also cause headaches and impair visual performance (Winterbottom & Wilkins, 2009; Fenton & Penney, 1985).  
- Students in classrooms with more natural lighting demonstrate fewer behavioural problems (Shanker, 2013; Waldecker, 2005). |
| Colour         | - It is important to note that scientific findings on the effects of colour on humans are fairly contentious and tend to be inconclusive. That being said, many studies (particularly with regards to the colours red and blue) have concluded with similar results, which I will describe here.  
- Blue is associated with calmness and relaxation (Singh, 2006).  
- Blue has been shown to have a calming effect on student behaviour (Grangaard, 1995).  
- Blue may also lower students’ blood pressure (Grangaard, 1995).  
- Red is associated with excitement and stimulation (Sasson, 2007; Singh, 2006). |
| Sensory Tools | - Sensory tools can help children to regulate their physiological and emotional arousal (Scanlan & Novak, 2015, p. 277).  
- Sensory rooms have been used to reduce stress in both schools and in mental health units (Sutton et al., 2013). |
- Sensory tools may include objects such as:
  - Rocking chairs
  - Beanbag chairs
  - Faux-fur blankets
  - Weighted blankets
  - Soft toys and stuffed animals
  - Stress balls
  - Beanbag chairs
  - Portable audio players with relaxing sounds
  - Aromatic diffusers
  - Fidget toys that students can manipulate with their hands
  - Noise-cancelling headphones
  - Playdough
    (Scanlan & Novak, 2015; Chen et al., 2012; Mullen et al., 2008, Sutton et al., 2013).
- These tools are effective because they are highly tactile, which helps with emotional regulation (Shanker, 2013).
- Weighted blankets, for example, can reduce anxiety and help people to feel calm (Chen et al., 2012; Mullen et al., 2008).

### Activities

- When children are dysregulated, providing an alternative activity may “relax the child’s mind” and reduce their frustration in a positive way (McWhorter, 2018, p. 3).
- Allowing time and space for children to read, draw, write, or colour can help them to develop self-awareness around their feelings, thoughts and behaviours (Coholic, 2010).
- Listening to music has been found to improve students’ behaviour, focus, academic performance, and co-operation, and to reduce aggression and hyperactivity (Hallam & Price, 2003; Scott, 1970; Wilson & Prior, 2006).

### Acoustics, Size & Location

- Auditory stimuli (noises) can be extremely disruptive to student self-regulation (Burke and Burke-Samide, 2004; Shanker, 2013).
- A child who is sensitive to sound may “try to minimize the noise physically by covering her ears or psychologically by disengaging from her environment” (Shanker, 2013, p. xiv).
- Students with Autism Spectrum Disorder (ASD) may be particularly sensitive to noise levels in the classroom (Lord, Rutter, and Le Coutur, 1994, p. 661).
- Strategic furniture choices can improve the effects of acoustics on students who are sensitive to sound in the classroom (Waldecker, 2005, p.
- Ideally, the self-regulation space should be located within the classroom, rather than another room in the building, so that children who need an opportunity to withdraw are still part of “the social fabric” of the classroom community (Scott, 2009, p. 8).
- Self-regulation spaces need not take up a large part of the classroom; even just “blankets draped over two desks with a mat on the floor provide a refuge for the child who is overloaded and needs some quiet time” (Shanker, 2013, p. 8).

| Structure | There is no specific research on the “best way” to structure a self-regulation space. Rather, teachers can incorporate many of the factors described in the previous sections (natural lighting, calming colours, sensory items, calming activities, choosing a location with low noise-levels, and so on) into a space that works for them and their students, and adjust as needed.
|           | Some examples of tried-and-true structures teachers have used include:
|           |   - Small tents
|           |   - Teepees
|           |   - Moving bookshelves/filing cabinets/etc. to create an enclosed space
|           |   - Bed canopies
|           |   - Cupboards with shelving removed
|           |   - IKEA Egg Chairs
|           |   - Draping fabric/bed sheets
|           |   - Large cardboard boxes
|           |   - Foam mats/bean bag chairs/pillows to create cozy places to curl up
|           |   - Cutting an opening into the side of a garbage can

**Benefits of the Project**
Developing my website was a rewarding process, because I was able to consolidate information from a variety of sources into one easy to access resource. I chose to create a website because it is a free and convenient way to provide meaningful and specific professional development, and to promote research-based practices in the field of special education. All of the information on the website is evidence-based, and contributes to the gap in peer-reviewed, empirically sound information available to educators in the area of classroom design and self-regulation. Websites are powerful tools, as they can be accessed with a variety of devices from anywhere that has internet. Through my website, I hope to reach as many people as possible, in order to support them in designing self-regulation spaces within their own classrooms.

Limitations of the Project

While there are many benefits of using websites as a tool for professional development, there are several limitations that are important to note as well. Websites, while easy to access if you have the direct link, can be difficult to promote. In order to make websites easily searchable through search engines like Google, more technical skills, resources, and finances are required. For example, professional software developers use strategies such as paying for more sophisticated domain names, registering with Google Search Console, including advertisements, and using keywords through Google Analytics to make their websites easier to find. Additionally, websites need frequent maintenance and updates in order to continue to function properly.

The information on a website needs to be fairly concise in order to avoid overwhelming the reader. Because of this, I had to choose only the most pertinent information to include on the website. I would like to have included more information on how to introduce the self-regulation
space to students, perhaps through sample lesson plans. There was a lack of specific research in this area, so I chose not to include it in this version of the website. Additionally, it was challenging to find specific research about self-regulation spaces themselves. Withdrawal spaces were often mentioned as smaller details of wider research projects, and I gleaned what information I could from the sources I was able to find. Much of my information, however, was found by reading research on separate design characteristics, such as lighting or colour, and then summarizing that information to determine what the key design elements of a self-regulation space might be. This project was limited due to the lack of specific research on self-regulation spaces themselves.

**Implications of Learnings and Recommendations**

**Implications and recommendations for myself.** Taking the time to read the existing research on inclusion, self-regulation, physical design characteristics, and self-regulation spaces was a new experience for me. In the past, I have incorporated many strategies to support students with special needs in my classroom, without actually taking the time to do any research myself. Many of these strategies have been based on educational “buzzwords” and trends, or on what other teachers in my school have implemented. Many of these strategies have been successful, and others have not. Until completing my review of the literature for this project, I did not realize how important it is to make sure my practices are research-based. This is certainly a lesson that I will take with me into the future, as I continue to try to improve my own teaching strategies and classroom environment.

This project also inspired me to create a self-regulation space in my own classroom. I found the process of creating the space both easy and enjoyable. My students call our self-
regulation space “The Bear Den,” which aligns with School District 61’s indigenous teachings about the bear, one of our “Spirit of Alliance” animals. The space has been an amazing resource for students who need a few minutes to withdraw from the busyness of the classroom environment. It is used many times a day, by a variety of students with and without special needs, and I truly believe it has made a huge difference in the self-regulation of my students. I would love to continue to research and explore “best-practices” in self-regulation spaces, and to reflect on and adapt my own self-regulation space. In the future, I may complete a self-study of my own space in order to make it even more effective. I would also like to extend my research on physical design characteristics to other areas of my classroom and school.

**Implications and recommendations for other educators.** Classrooms in British Columbia and around the world are increasingly moving towards a model of inclusive education, where students with special needs are participants in the general classroom environment to the greatest extent possible. If students with special needs are to be included in the general classroom, it is the job of teachers and special educators to ensure that we are supporting them through appropriate, research-based practices. One of those research-based methods is to have a space for students to go to when they are feeling upset, angry, or otherwise dysregulated. Based on my review of the research and my own experiences with including a self-regulation space in my classroom, I would highly recommend that educators make self-regulation spaces available in their own classrooms. I would also recommend that educators ensure that any strategies they use to support their students are evidence-based. It is tempting to follow the latest educational trends, but doing a little bit of research first helps to ground educational decisions in science, and ensures that the time and energy educators put into incorporating new strategies is worthwhile.
and effective.

**Implications and recommendations for future research.** As mentioned previously, it was challenging to find specific research about self-regulation spaces. There is a need for specific studies on self-regulation spaces, including design characteristics, implementation details, uses, and effectiveness. These studies should incorporate both qualitative and quantitative research methods, in order to better triangulate the data. It would be worthwhile to study self-regulation spaces through the lens of specific special needs, such as Autism (ASD), Generalized Anxiety Disorder (GAD), or Attention Deficit Hyperactivity Disorder (ADHD). It would also be valuable to study the benefits of self-regulation spaces and other physical design elements on the general student body through a UDL (Universal Design for Learning) lens.

**Conclusion**

The website ThinkInclusive.us provides a quote that I believe applies to all stakeholders in education: “Inclusion is not simply about physical proximity. It is about intentionally planning for the success of all students.” Placing students with special needs in “physical proximity” to their peers in the general classroom environment is not enough. In order for inclusion to be truly effective, governments, school districts, schools, and individual educators need to be intentional in the design of learning spaces. We have a long way to go to ensure that all students receive the supports they need in order to be successful, but self-regulation spaces are one small, evidence-based way that educators can support students who have challenges with self-regulation. As Shelley Moore writes, “The students who are the hardest to reach also have so much that we can learn from… if we can get to them, we can get to everyone.” (2016, p. 52).
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Appendix

URL to access applied project (self-regulation spaces website):

https://selfregulationspaces.herokuapp.com