Exploring Mathematics Instructional Strategies Working for Students with Emotional and/or Behavioural Disorders

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By

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ABSTRACT

This study explored instructional strategies elementary-year mathematics teachers of students with emotional and/or behavioural disorders (EBD) perceived to be helpful in improving students' performance in mathematics using a resiliency perspective (i.e., the ability to positively adapt despite experiencing significant adversity; Luthar, Cicchetti, & Becker, 2000). The researcher interviewed three elementary-year teachers to gain insight into their teaching experiences and the instructional strategies. A basic interpretive qualitative approach (Merriam, 2002) was used to understand the underlying meaning of the experiences of these mathematics teachers of students with EBD as they used evidence-based instructional strategies to improve students' academic performance in mathematics and behaviour during instruction. A definitional focus on resiliency was the lens utilized for analyzing data generated through the interviews (Luthar, Cicchetti & Becker, 2000; Masten, 2001; Smith & Prior, 1995; Smokowski, 1998). Three themes emerged from participant interviews: ways of engaging students in learning; from dead time to active learning; and promoting positive student behaviour. Specifically, teachers reported an instructional strategy that met the needs of students of EBD which helped them obtain academic success in mathematics, and students were also better behaved in classrooms where instructional strategies employed were meeting their individual needs. These findings suggest an appropriate instructional strategy influences how students of EBD make meaning of mathematics, since teachers observed students were able to do higher thinking mathematics when strategies were in place in the classroom that met their individual needs. Teachers also shared that students were able to make good behavioural choices when they were experiencing academic success in the classroom. Practical implications of the findings, the limitations and strengths of the current study, and areas for future research are discussed.

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A special thanks to my parents for their encouragement, support and prayers. Finally, I would like to thank Kwame and Senanu for their support, encouragement and unwavering love. The product of this research paper would not have been possible without them.

DEDICATION

I dedicate this research paper to my parents Isaac Newton Kwaku Wuaku and Fidelia Akosua Ayeh who have been my constant source of inspiration.

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Chapter 1: Introduction

The last three years of my teaching career were spent in substitute teaching assignments in Emotional and/or Behavioural Disorder (EBD) classrooms in the United States. The most challenging task of these assignments was getting my students settled and engaged in the teaching and learning process. Students with EBD demonstrate internalizing and externalizing behaviours (Hallahan, Kauffman, & Pullen, 2009). Internalizing behaviours are emotional or mental conflicts, such as social withdrawal and difficulty concentrating (Hallahan, Kauffman, & Pullen, 2009). Externalizing behaviours are outwardly expressed actions, such as physical aggression and outbursts (Hallahan, Kauffman, & Pullen, 2009). Students demonstrated slow academic progress since more time was spent on disciplinary issues caused by these behaviours than on academic matters. My experience while performing these substitute teacher assignments convinced me that students with EBD needed instructional strategies tailored to their unique needs to help them focus more on academic tasks and reduce their negative behaviours. Some researchers have even suggested the use of inappropriate instructional practices is the aversive antecedent to students avoiding tasks, which leads them to frequently make wrong behaviour choices, for example boring or difficult academic tasks. The researchers who were also teachers of students with EBD stressed the importance of using research-based teaching strategies and positive behavioural supports for all academic areas when teaching students with EBD (Stevens & Lingo, 2005). For example one instructional strategy they identified that increased student engagement, provided ample opportunities for them to respond; followed by consistent feedback, and taught content mastery was the constant time delay strategy (Stevens & Lingo, 2005).

In Canada, research has identified EBDs to be the second most common condition for which students receive special education (Statistics Canada, 1999). One in every four students (23%) received special education due to a diagnosis of EBD (Statistics Canada, 1999). According to teachers, males accounted for 83% of all students receiving special education for an EBD, 65% for a form of learning disability, and 76% due to problems at home (Statistics Canada, 1999). Students with EBD demonstrate academic and social difficulties in and out of school (Statistics Canada, 1999; Templeton, Neel, & Blood, 2008). For example, only 30% of students with EBD were estimated to perform at or above grade level in mathematics in the US in 2000 and 2001 academic year (Anderson, Kutash, & Duchnowski, 2001). These students performed poorly in mathematics and performed significantly worse in spelling, reading, written

expression, reading comprehension, and understanding and using vocabulary compared to their peers without disabilities (George, 2010; Lane, Barton-Arwood, Nelson, & Wehby, 2008; Reid,Gonzalez, Nordness, Trout, & Epstein, 2004). Students with EBD have also been found to have difficulty socially connecting with their teachers and peers during instruction, and/or more likely to develop internalizing behavioural problems like depression, anxiety, or withdrawal (Gunter, Caldarella, Korth, & Young, 2012). Students may also try to use aggression, such as screaming or banging on tables, to convey their needs in the classroom (Gunter et al., 2012).

The probability of students with EBD being involved with the criminal justice system at an early age and dropping out of school before graduation is high (Templeton, Neel, & Blood, 2008). Dropping out of school can likely be associated with the significant social and behavioural challenges students with EBD demonstrate both at school and at home (Alter, Brown, & Pyle, 2011; Templeton, Neel, & Blood, 2008). Students with EBD also unceasingly demonstrate off-task and disruptive behaviours in class (Blood, Johnson, Ridenour, Simmons, & Crouch, 2011). Off-task behaviours could include distracting and repetitive acts, such as: tapping fingers, chewing gum, yelling, and/or using aggressive body movements; using intimidating or abusive language; confronting peers during class hours; and/or are involved in unsolicited conversation during instruction (Blood et al., 2011). A disruptive behaviour is defined as conduct that "upsets the pace of work and obstructs students' coexistence in the classroom" (Vallés, 1997, p. 20). Examples of disruptive behaviours, include: interrupting in class, speaking with classmates during class, small offenses, late arrivals to class, failure to do homework, defiance, disobedience, physical and verbal aggressiveness, threats, shouting, inappropriate gestures, destroying school property, getting out of one's seat without permission, talking aloud, speaking out of turn, not respecting the rules, unprovoked tantrums, impulsiveness, not accepting mistakes, and being vindictive (Esturgo-Deu & Sala-Roca, 2010). In addition, students with disruptive behaviours show a certain amount of rebelliousness, challenge authority, and are disrespectful to other individuals (Extremera & Fernandez-Berrocal, 2004; Hernandez & Fister, 2001). These inappropriate behaviours hinder students with EBD from learning and developing appropriate interpersonal relations with teachers and peers in the classroom environment (Munoz, Carreras, & Braza, 2004).

Research has drawn associations between disruptive behaviour and poor academic performance (e.g., Barriga et al., 2002; Blood et al., 2011). For example, disruptive and off-task

behaviours exhibited by students often results in the students being removed from the instructional environment (Blood et al., 2011). Removing students from the classroom decreases their exposure to academic work (Blood et al., 2011). The continuous removal of students from the learning environment adversely affects their academic performance (Hodge, Riccomini, Buford, & Herbst, 2006). Students who are disruptive and off-task tend to have a higher dropout rate and a greater incidence of underachievement (Johnson, McGue, & Iacono, 2005). Studies show students with EBD who tend to demonstrate these behaviours do not make progress across grade levels when compared to their peers (e.g., Alter et al., 2011). An explanation given is that some students with EBD are identified as having some form of learning disability (LD), hence their academic deficiency (Jitendra & Star, 2011). One area in which students with emotional and/or behaviour disorders have demonstrated academic difficulty is mathematics.

1.1 Mathematics Difficulties and Students with EBD

The academic difficulties documented to be the most challenging to students with EBD are in the areas of reading, mathematics, and spelling (Reid et al., 2004). However, the area of the most concern to teachers is students' performance in mathematics (Reid et al., 2004). Many students with EBD fail to master the basic skills in mathematics. For example, students demonstrate: (1) low early numeracy and basic computation skills, including addition, subtraction, multiplication, division, and computation involving fractions and decimals; (2) difficulty accessing semantic information conveyed by numerical symbols; and/or (3) difficulty solving mathematics word problems (Alter, Brown, & Pyle, 2011; Bryant, Bryant, Roberts, Vaughn, & Pfannenstiel, 2011; Hodge et al., 2006; Rousselle & Noel, 2007). This failure has led to students with EDB being unsuccessful in school, and consequently having difficulty in the work world (Meadows, Neel, Scott, & Parker, 1994). Students' deficits in mathematics tend to persist and increase over time, especially between the ages of 9 to 14 years (Bouck, Kulkarni, & Johnson, 2011; Nelson, Benner, Lane, & Smith 2004). For example, one study found 56% of students with EBD between the ages of 5 to 12 to score below the norm on a standardized measure of mathematics achievement, whereas 83% of such students aged 13 and older scored below the norm (Nelson et al., 2004). Mathematics performance for students with EBD has been found to be typically lower than that of their peers without disabilities, but comparable to that of students with learning disability (Trout, Nordness, Pierce, & Epstein, 2003). Greenbaum, Dedrick, Friedman, Kutash, Brown, Lardieri, et al. (1996) also found 93% of students with EBD

between 12 to 14 years of age performed below grade level in mathematics. Another study also found the scores of elementary and secondary students of EBD in mathematics, reading and written expressions to be well below the "25th percentile with high magnitude differences between the two groups" (Lane, Barton-Arwood, Nelson & Wehby, 2008, p. 57). The students in Hodge et al.'s (2006) study demonstrated marginal progress in computation from one year to the next compared to their typical achieving peers. They also failed to master basic mathematics skills (Hodge et al., 2006). The importance of mastering basic principles in mathematics cannot be overemphasized, as the lack of it could lead to students' inability to learn other curricular areas like science and business (Choate, 1987). The need for students to grasp the basic principles in mathematics for the purpose of ensuring success in school and in life is essential (Choate, 1987).

Researchers have also noted students with EBD and LD who have difficulty with basic mathematical concepts may also lack the skills needed to solve novel problems (Jitendra & Star, 2011). For example, students may not easily understand the structure of mathematical problems or develop appropriate strategies that can help them improve their problem-solving skills (Jitendra & Star, 2011). Educators in this study found the task of improving the problem-solving skills of students with EBD significantly challenging. Students' difficulties in problem solving are likely due to the students' deficits in "attention, memory, background knowledge, vocabulary, language processes, strategy knowledge and use, visual spatial processing, and self-regulation" (Jitendra & Star, 2011, p. 13). Research is needed that identifies effective instructional strategies to improve skills of basic computation and mathematics outcomes for students with EBD (Hodge et al., 2006).

Research concerning the effective instruction of students with EBD is worryingly limited (Billingsley, Scheuermann, & Webber, 2009; Hodge et al., 2006; Wehby, Lane & Falk, 2003). Of further concern is the scarcity of academic, treatment-outcome studies conducted on this population, particularly in a Canadian context (Wehby, Lane & Falk, 2003). Unfortunately, most research conducted on students with EBD has focused on finding effective interventions to modify the behaviour problems in schools rather than finding the instructional strategies that could be used to mitigate these problems (Alter, Brown, & Pyle, 2011; Templeton, Neel, & Blood, 2008). Research studies investigating the effects of academic instruction in a range of skills across the content areas is also needed to better serve the needs of students with EBD by

informing practicing teachers, educators, and administrators responsible for teacher preparation programs how the academic, social, and emotional needs of these students can be best met (Wehby, Lane, & Falk, 2003).

An increasing number of teachers are finding themselves responsible for teaching students with special needs (Niesyn, 2009). However, these teachers typically lack the training and support needed to successfully utilize instructional strategies that will meet the needs and enhance the academic performance of their students (Niesyn, 2009). For example, teachers still lack data to help them implement comprehensive mathematics instruction for students with EBD. This deficiency is present even in countries like the United States, where researchers have taken the lead in investigating instructional strategies that best work for students with EBD (Templeton, Neel, & Blood, 2008). Students with EBD demonstrate a variety of externalizing (i.e., aggressiveness such as screaming, arguing, bullying, threatening, being demanding, losing their temper, etc.) and internalizing behaviours (i.e., depression, anxiety or withdrawal; Gunter et al., 2012; Templeton, Neel, & Blood, 2008). These disruptive behaviours keep students from engaging in meaningful instruction, and negatively influence their poor performance in mathematics over time (Hodge et al., 2006). Therefore, there is a need for research exploring instructional strategies that are effective in increasing mathematics performance of students with EBD (Hodge et al., 2006) that may also help boost socially acceptable behaviours in class.

It is well documented that students in elementary school have great difficulty in mathematics and that this deficit persists and increases over time (Hodge et al., 2006; Lane, Barton-Arwood, Nelson & Wehby, 2009; Rousselle & Noel, 2007). Students' time in elementary schools has been recognized as a critical stage in a student's education (Bouck, Kulkarni, & Johnson, 2011). Specifically, the acquisition of basic mathematics skills in elementary school is very important for laying the foundations for proficient use of mathematics in subsequent years (Bryant et al., 2011; Hodge et al., 2006; Rousselle & Noel, 2007). Therefore, students' performance in mathematics at that stage has continued to be of great concern to mathematicians and educators (Bouck, Kulkarni, & Johnson, 2011). This group of students, notably between the ages of 9 and 14, tend to perform below grade level. If the problem is not addressed, this deficit in mathematical ability may increase as students progress in school (Greenbaum et al., 1996).

The importance of using the right instructional strategies to help reduce the amount of class time spent on disciplinary issues, and to boost the academic performance of students with EBD, has received renewed focus in the field of emotional and/or behavioural disorders (Maggin, Wehby, Partin, Robertson, & Oliver, 2011). The academic achievement level of students with EBD is adversely influenced by various inappropriate behaviours (i.e., externalizing and/or internalizing; Wehby, Lane, & Falk, 2003). These students need instructions and instructional materials that are tailored to meet their needs, which can help them focus on academic tasks and reduce destructive behaviours (Stevens & Lingo 2005). The use of inappropriate instructional practices is the aversive antecedent to students avoiding tasks and frequently making wrong behaviour choices (Stevens & Lingo, 2005). The common misconception is that blanket instructional strategies will work for all students with special needs (Maggin et al., 2011). Research focused on instructional strategies that fit the needs of students with EBD is needed, and the findings would be beneficial for both teachers of and students with EBD. Specifically, research focused on instructional strategies would assist teachers of students with EBD in selecting and using the right instructional strategy when planning meaningful lessons for their students.

1.2 Statement of Purpose

It is necessary to use the right instructional strategy to boost the academic performance of elementary school students with EBD whose achievement level is normally low in mathematics (Hodge et al., 2006). The purpose of this study was to explore instructional strategies elementary school mathematics teachers working with students with EBD perceived to be helpful in improving students' performance in mathematics using a resiliency perspective (i.e., the ability to positively adapt despite experiencing significant adversity; Luthar, Cicchetti, & Becker, 2000). This information would be beneficial to teachers working to plan engaging mathematics lessons for students with EBD. Engaged students are more focused and attentive in class, typically resulting in an improvement in their mathematics performance (Lane, Barton-Arwood, Nelson, & Wehby, 2008). The following research question guided this study:

1. What are elementary school mathematics teachers' thoughts and experiences related to the instructional strategies they perceive to be helpful in: engaging students with EBD in the teaching and learning process, improving their mathematics performance, and helping to better manage students' disruptive behaviours in the classroom?

1.3 Definition of Terms

The following terms are defined to give clarity to the study:

1.3.1 Emotional and/or behavioural disorders (EBD). The United States has a common federal definition of Emotional and/or Behavioural Disorders, while the Canadian provinces/territories have a wide variety of definitions for EBD since Education falls under the jurisdiction of individual provinces and/or territories (Dworet & Kimberly, 2007; U.S. Department of Education, 2004). Therefore, the definition of Emotional and/or Behavioural Disorders as outlined in the Individuals with Disabilities Education Act (IDEA; U.S. Department of Education, 2004) will be used as a reference for the purpose of this study. The IDEA (2004) defined *EBD* as a condition that presents one or more characteristics which could persist over a "long period of time to a marked degree that adversely affects a child's educational performance" (U.S. Department of Education, 2004 (4) (1)). For example, one such characteristic mentioned is the inability of students with EBD to learn when their inability to learn is not due to any intellectual, sensory, or health factors (U.S. Department of Education, 2004). Another characteristic identified in this definition is that students with EBD find it difficult to build and maintain social relationships with their peers and teachers. These students could also demonstrate inappropriate types of behaviour or feelings under normal circumstances and show a general pervasive mood of unhappiness or depression. Also, students with EBD have the tendency to develop physical symptoms or fears associated with personal or school factors (U.S. Department of Education, 2004).

1.3.2 Mathematics strategy. The term *mathematics strategy* is defined in this study as teaching that is measured by learning gains (International Center for Leadership in Education, 2000). An academic gain is attained when instructional strategies are combined with teachers' expertise, leading to more learning and higher academic achievement for students with EBD (International Center for Leadership in Education, 2000). Teachers employ mathematics strategies that work well to improve mathematics performance of students with EBD. These strategies should not only engage students in the learning process, but also make them active participants in any class activity, thereby helping to check any emotional and behavioural problems that might be exhibited (International Center for Leadership in Education, 2000).

1.4 Significance of Study

The findings resulting from this study have the potential to enlighten educators, students, parents, professionals (i.e., psychologists, speech-language pathologists), and organizations and institutions supporting individuals with EBD (i.e., juvenile detention centres; Meyen & Greer, 2009). It is very important for educational stakeholders to understand the various evidence-based instructional strategies teachers are using in their classrooms to meet the social, emotional, and learning needs of students with EBD. For example, a student who exhibits oppositional defiant and disruptive behaviour in class due to bipolar disorder would need a different instructional approach from that which would be used with a student with EBD diagnosed with a learning disability (Jitendra, George, Sood, & Price, 2010; Templeton, Neel, & Blood, 2008). This study has the potential to provide educational stakeholders with information to assist in the creation of a positive learning atmosphere that uses instructional strategies in which students of EBD are actively engaged, negative behaviours are under control, and students are progressing academically (Hodge et al., 2006; Meyen & Greer, 2009). Students with EBD have been found to be better able to make good academic and social choices if the instructional strategies being used meet their individual needs (Meyen & Greer, 2009). Furthermore, knowledge of these strategies helps students in discovering their learning styles, strengths and weaknesses, and abilities and interests. This information should help them successfully accomplish tasks and achieve the academic success needed to graduate from school (Hodge et al., 2006; Jitendra, George, Sood, & Price, 2010). Finally, having a better understanding of evidence-based instructional strategies that have been found to help meet the social, emotional, and academic needs of students with EBD would help assist curriculum developers in better meeting the learning needs of students with EBD (Hodge et al., 2006).

1.5 Chapter Organization

Literature on emotional and behavioural disorders is reviewed in Chapter 2. Chapter 3 describes the research methods and procedures used for the study. Chapter 4 presents the results of the study based on the data collected. Chapter 5 discusses the findings in line with existing literature, and outlines the strengths and limitations of the current study and its implications for educational practice and future research.

Chapter 2: Literature Review

The review of the literature related to mathematics instructional strategies for students with emotional and/or behavioural disorders is divided into three major sections. Section one defines emotional and/or behavioural disorders and considers the academic performance of students with EBD, specifically looking at the area of mathematics. Section two focuses on teachers' training to work with students with EBD in the area of mathematics, and teachers' perceptions of teaching mathematics. Finally, section three considers resiliency and students with EBD.

2.1 Students with Emotional and/or Behavioural Disorders

2.1.1 Defining EBD. Students with (EBD) display a number of undesirable emotions and behaviours in and out of class (Abrams, 2005). These students' patterns of behaviour depart significantly from the norm. Canadian provinces and territories have a wide variety of definitions for EBD since Education falls under the jurisdiction of individual provinces and/or territories, unlike the United States which has a common federal definition of Emotional and/or Behavioural Disorders (Dworet & Kimberly, 2007; U.S. Department of Education, 2004). For example, the province of New Brunswick, and the territories of Nunavut, the Northwest Territories, and the Yukon do not have any "provincial or territorial law, rule, or regulation specifically defining EBD" (Dworet & Kimberly, 2007, p. 35). However, Prince Edward Island and Saskatchewan "defer their definition to clinical diagnostic information provided by medical personnel rather than developing an educational definition" (Dworet & Kimberly, 2007, p. 36). The provinces of Alberta, Nova Scotia, Ontario and Quebec have a single definition for EBD that emphasizes the varying levels of the severity of EBD in students (Dworet & Kimberly, 2007). For example, the province of Nova Scotia defines EBD as the program, support services and funding provided for students with special needs which do not relate to any form of disability or their definitions (Government of Newfoundland and Labrador, 1999). This single level definition for EBD is used solely for administrative purposes, and is not intended to be used as labels for students (Dworet & Kimberly, 2007). The provinces of Newfoundland and Labrador, British Columbia, and Manitoba define Emotional and/or Behavioural Disorders based on the severity of the disorder (Dworet & Kimberly, 2007). It is difficult to determine what is considered an emotional and/or behavioural disorder using the varying descriptions and criteria used across these provincial/territorial definitions. Therefore, the definition of Emotional and/or

Behavioural Disorders (2004) as outlined in the Individuals with Disabilities Education Act (IDEA; U.S. Department of Education, 2004) will be used as a reference for the purpose of this study. The IDEA (2004) defined EBD as a condition that presents one or more characteristics which could persist over a "long period of time to a marked degree that adversely affects a child's educational performance" (U.S. Department of Education, 2004 (4) (1)). One of the characteristics is the inability of students to learn when this inability is not due to any intellectual, sensory, or health factors (U.S. Department of Education, 2004). One other characteristic students with EBD demonstrate is difficulty in building and maintaining social relationships with others.

The term *emotional and behavioural disorders* has in recent times gained favour over *emotional disturbance* as a more accurate term that helps to make a more objective decision and to avoid negative connotations (Council for Exceptional Children, 2011). Students' abilities to disrupt the teaching and learning process are demonstrated in a variety of settings with no consideration to the social or cultural rules (Council for Exceptional Children, 2011). Students demonstrating such characteristics are also likely to be impulsive, inattentive, distracted and preoccupied in class. Furthermore, students with EBD are unable to follow or do not seem to care much about classroom rules (Council for Exceptional Children, 2011). Students of EBD can have short concentration spans and can resist any change or transitions in class routines (Council for Exceptional Children, 2011). During class or group discussions, these students are likely to blurt out irrelevant information and pay very little attention to turn-taking rules (Council for Exceptional Children, 2011). They may demonstrate aggressive behaviours and may intimidate or bully fellow students in or outside the classroom (Abrams, 2005; Council for Exceptional Children, 2011). These students are frequently absent from school and constantly blame others for their bad behaviour (Council for Exceptional Children, 2011). Students sometimes demonstrate low self-esteem and find it difficult to work in groups or to complete class assignments (Abrams, 2005; Council for Exceptional Children, 2011). Showing self-injurious behaviour, not applying social rules related to others' personal space and belongings, and often manipulating situations to their advantage are other identifiable academic characteristics students with EBD exhibit (U.S. Department of Education, 2004).

Abrams (2005) also identified some destructive behaviours demonstrated by students with EBD as acting out and being verbally and physically aggressive with teachers, educational

aides, and peers. He also reported that students with EBD could be argumentative, depressed, anxious, withdrawn, and defensive. Besides these behaviours, many of the students "have poor impulse control, are easily frustrated, and lack self-control" (Abrams, 2005, p. 40). Abrams (2005) agreed with the U.S. Department of Education (2004) that not only do students with EBD have narrow insight into their behaviour, but they also blame others for their negative behaviour. For example, students could be disruptive in the classroom, refuse to do class assignments, call out or make loud noises, throw objects across the classroom or tear up classmates' assignment papers (Quinn, Osher, Warger, Hanley, DeHaven-Bader, Tate, Hoffman, 2000). Thus, the academic work of students with EBD is adversely affected due to the students' emotional and behavioural deficits. Academic difficulties experienced by students with EBD are well documented in mathematics, reading, and spelling (Reid et al., 2004). These students may also have poor or short attention spans and are difficult to motivate during the teaching and learning process because of their behavioural excesses or deficits (Hodge et al., 2006). In fact, students may be typically apathetic to school work and are not very concerned about their academic performance (Abrams, 2005; (Maggin et al., 2011). Although students with EBD are sometimes placed in self-contained classrooms to be provided with the best academic instruction and social support, research has shown students' academic work does not improve but instead deteriorates (Maggin et al., 2011). Unfortunately, the emotional and behavioural disorders demonstrated by this population have in part contributed to the extremely poor academic outcomes for students with EBD (Wehby, Lane, & Falk, 2003).

2.1.2 Academic performance and students with EBD. Students with EBD show a variety of academic and social difficulties in and out of school (Templeton, Neel, & Blood, 2008). For example, students may have difficulty socially connecting with their teachers and peers during the teaching and learning process, and/or demonstrate verbal and physical aggression, social skills acquisition and performance deficits; (Gunter et al., 2012; Lane, et al., 2008). In addition, students may also develop internalizing behavioural problems like depression, anxiety or withdrawal syndromes (Gunter et al., 2012). Students could also use aggression, such as screaming, banging on tables throwing school supplies and throwing tantrums, to convey their needs in the classroom (Gunter et al., 2012).

The educational prognosis for students with EBD has been identified to be poor (Billingsley, Scheuermann, & Webber, 2009). They are less likely than their peers to receive a

grade of A or B in any class. Compared to other students, students with EBD are prone to academic failure, grade retention, absences, suspension, and dropping out of school (Alter, Brown & Pyle, 2011; Billingsley, Scheuermann, & Webber, 2009). Students with EBD are among the least successful of all students academically (Gable, Tonelson, Sheth, Wilson & Park, 2012). They rarely show significant educational progress (Gable et al., 2012). Three different studies revealed a number of findings concerning the educational progress of students with EBD. The first study indicated that students with comorbid EBD have academic deficits that do not improve over time (Lane, Barton-Arwood, Nelson, & Wehby, 2008). The second study stated that the academic deficits of students remain stable over time. However, the last study observed that academic deficits worsen with some students with EBD as they advance in age (Lane et al., 2008; George, 2010). Most students with EBD are also identified to be more than one year below grade level (Alter, Brown, & Pyle, 2011; Cullinan, 2002; Jitendra, George, Sood, & Price, 2010; Mason, Kubina, Valasa & Cramer, 2010; Lane et al., 2008; Stevens & Lingo 2005). Chesapeake Institute (1994) and Valdes, Williamson, and Wagner, (1990) broke down the sampled students' poor academic performance as follows: (a) inability to pass competency examinations for their grade levels, (b) having the lowest grade-point average among any group of students with disabilities, and (c) having the highest rate of absenteeism among any group of students. These findings point to the fact that there is a dire need for the appropriate instructional strategies in mathematics to be used in instruction that meets the academic needs of students with EBD, thereby boosting their academic performance.

Students with EBD tend to have difficulties in self-regulating the social and/or behavioural skills needed for academic success (Mason et. al., 2010) and are described as "inefficient learners who cannot easily access and coordinate the multiple mental processes needed for academic learning" (Mason et al., 2010, p. 140). Some researchers have also attributed students' academic difficulties to their negative attitudes toward class assignments and homework completion (Cancio, West, & Young, 2004; Hagan-Burke & Burke, 2007). Moreover, studies have recognized a consistently higher level of disruptive behaviour (verbal and physical aggression, social skills acquisition and performance deficits etc.) and lower levels of on-task behaviours (acting out, talking etc.) in students with EBD when they are faced with challenging academic tasks in the classroom (Hagan-Burke & Burke, 2007). These researchers have explained the disruptive behaviours as a way to avoid completing class assignments (Mason

et al., 2010). The dropout rate for students with EBD is also significantly higher than that of their peers, ranging from 47% to 65%. Students also have a higher probability for a shortened educational experience (U.S. Department of Education, 2005). This fact affects their academic performance adversely.

The general consensus in research related to mathematics and EBD is that students with EBD encounter the greatest challenges with learning mathematics compared to all other academic areas in which students experience difficulties (Jitendra et al., 2010; Hodge et al., 2006; Lane et al, 2010). When considering students' progress in specific academic subjects, only 30% of students with EBD perform at or above grade level in mathematics in the United States (Anderson, Kutash, & Duchnowski, 2001; Knitzer, Sternberg, and Fleisch, 1990). Most of students with EBD do not make academic progress across grade levels compared to their peers (e.g., Alter et al., 2011). An explanation for this phenomenon could be related to the fact that some students with EBD have forms of learning disabilities (LD), hence their academic deficiency (Jitendra & Star, 2011). One academic area identified to be particularly challenging to students with EBD is that of mathematics (Templeton, Neel, & Blood, 2008). Researchers have noted that students with EBD have difficulty with basic mathematical concepts and lack the skills needed to solve novel problems (Bryant et al., 2011; Jitendra & Star, 2011; Rousselle & Noel, 2007). For example, students cannot easily understand the structure of mathematical problems or develop appropriate solution strategies that could help them improve their problem solving skills (Jitendra & Star, 2011; Rousselle & Noel, 2007). Students' deficits in mathematics also tend to persist and increase over time between the ages of 9 to 14 years (Greenbaum et al., (1996; Jitendra et al., 2010; Nelson et al., 2004).

Research has shown that basic mathematics skills acquisition in elementary school is very important for laying the foundation for proficiency in mathematics in subsequent years. Unfortunately, 93% of elementary school students with EBD perform below grade level in mathematics (Greenbaum et al., 1996). Students with EBD need instructions and instructional materials that are tailored to meet their unique needs for the purpose of helping them focus on academic tasks and reducing destructive behaviours (Stevens & Lingo 2005). For instance, only 30% of students with EBD were estimated to perform at or above grade level in mathematics in the United States of America in the 2000 and 2001 academic year (Anderson, Kutash,

& Duchnowski, 2001). The poor performance of students with EDB in mathematics has been of great concern to educators (Hodge et al., 2006). Teachers, however, attribute students' poor performance in mathematics to a lack of the appropriate teaching and learning materials. This deficiency was found to affect teachers' confidence in their ability to teach mathematics (Cole & Wasburn, 2010). Despite the fact that schools provided students with EBD with specialized services, the students' academic performance remained well below the national average (Lane et al., 2008). Studies on students' academic performance have shown that students with EBD perform significantly below grade level in all subjects, especially in mathematics, where the greatest deficit is seen (Jitendra et al., 2010). This deficit in mathematics tends to persist and increase over time in students (Jitendra et al., 2010) between the ages of 9 to 14, who demonstrate marginal progress in computation from one year to the next compared to their typical peers (Bouck, Kulkarni, & Johnson, 2011; Cihak & Bowlin, 2009; Greenbaum et al., 1996; Jitendra et al., 2010; Nelson, Benner, Lane, & Smith 2004). Students also fail to master basic mathematics skills (Hodge et al., 2006). The importance of mastering the basic mathematics skills cannot be overemphasized. The lack of these skills could lead to academic failure and, perhaps, to later failures in general life (Hodge et al., 2006) as proficiency in solving problems that require the use of mathematical skill is crucial for adequate functioning in everyday situations (George, 2010; Hodge et al., 2006; Jitendra et al. 2010; Jitendra & Star, 2011; Lane et al, 2008). Students' mathematical ability is also essential in other curricular areas, such as chemistry, business and science, which all require arithmetic skills (Hodge et al., 2006). However, some researchers have revealed that most instructional interventions in mathematics for students with EBD seemed to emphasize basic skills rather over higher-level mathematics skills (Jitendra et al., 2010; Cihak, & Bowlin, 2009). This finding indicated that the previously mentioned benefits of adequate mathematical instruction may not materialize unless new instructional strategies are adopted.

Research has shown that compared to their peers, students with EBD have broad academic deficits in the area of mathematics (Lane et al., 2008). However, there are available instructional strategies which have been shown to be effective through rigorous research that teachers can use to help students with EBD improve their academic performance in mathematics. For example, the opportunities for students to respond, receive praise and be active during instruction have been linked to increased student engagement and improved behaviour (Maggin

et al., 2011; Wehby, Lane, & Falk, 2003). Maggin et al., 2011 study also indicated that students with EBD benefited from receiving instructions in small groups. It is a persistent challenge to meet the mathematics need of students with EBD (Alter, Brown & Pyle, 2011). An instructional strategy that engages students can help check their negative behaviours in class, thereby helping them develop positive in-school behaviour (Quinn et al., 2000). Students lose focus and comprehend little of classroom instruction when teachers do not use the instructional strategies that match the learning styles of their students (Morgan, 2014). Using a variety of remediation and/or instructional strategies during instruction is important because different students learn in different ways.

2.1.3 Mathematics instruction: Remediation and/or instructional strategies.

Teaching students with EBD is not easy; the teaching and learning process could be difficult and challenging (Niesyn, 2009). Most teachers teach from their own experience, replicating the teaching models of mentors that influenced their lives. However, these teachers eventually find that not all teaching approaches work for all students, especially students with EBD. It is necessary for teachers of EBD to look for the instructional strategies that work for this group of students (International Center for Leadership in Education, 2000) in order to tackle the low performance of students with EBD in mathematics. It is important to consider examples of evidence-based instructional strategies that have been found to engage students in learning mathematics, and could be used by teachers of EBD in teaching mathematics in their classrooms.

The Schema-Based instructional approach is based on the schema theory of cognitive psychology (Jitendra & Star, 2011). The purpose of this strategy is to help learners understand the structure of mathematical word problems (Cole & Wesburn-Moses, 2010; Jitendra & Star, 2011; Jitendra et al., 2010). During the teaching and learning process, students break mathematical problems into specific parts to determine the most appropriate solution procedures (Cole & Wasburn-Moses, 2010; Jitendra & Star, 2011; Jitendra et al., 2010). For instance, using semantic cues (both yellow pencils and blue pencils are pencils) and schematic diagrams, schema-based instruction shows the relationship between objects in the problem *text* (‘yellow pencils’ and ‘blue pencils’ are subsets, and ‘all pencils’ is a superset) (Jitendra et al., 2010). Understanding this relationship is critical to setting up the mathematical model (e.g., n yellow pencils + m blue pencils = x pencils) and selecting an appropriate mathematical operation to solve the problem (adding to solve for the superset or subtracting to solve for the subset (Jitendra

et al., 2010). The schema-based model incorporates other research-supported instructional practices (systematic and explicit instruction, strategic integration, judicious review etc.) that special education encourages for the teaching of students with disabilities (Jitendra & Star, 2011; Jitendra et al., 2010). This model goes on to address some of the loopholes in traditional problem-solving instruction by going beyond surface features of word problems to identify the problem schema (semantic structure) and analyzing underlying mathematical relationships that are important for successful problem solving (Jitendra, 2002; Jitendra et al., 2010; Jitendra, & Star, 2011).

Inquiry-based teaching is another effective way of engaging students in the learning process (Cole & Wasburn-Moses, 2010). The inquiry-based teaching approach is a student-centred instructional strategy that involves students solving problems in groups. Mathematical problems are ones that require students with EBD to apply a variety of mathematical skills in real-world contexts (Cole & Wasburn-Moses, 2010). Inquiry-based teaching emphasizes the conceptual understanding of mathematics over the memorization of facts and the application of algorithms (Cole & Wesburn-Moses, 2010). Teachers are able to use this method to help "students make, refine and explore conjectures on the basis of evidence and the use of a variety of reasoning and proof techniques to confirm or disprove those conjectures" (Cole & Wesburn-Moses, 2010, p. 15). This model also allows students to become flexible and resourceful problem-solvers during the learning process. An advantage of the inquiry-based teaching strategy is that it promotes student motivation and develops active engagers in mathematical thinking in the classroom (Cole & Wesburn-Moses, 2010).

Another such approach, known as cognitive strategy, allows students with EBD to focus on the necessary steps for solving mathematical word problems (Cole & Wesburn-Moses, 2010). Elementary school students could use cognitive strategy to *"say, ask,* and *check*" to ensure that they are thinking through mathematical problems and checking their work (Cole & Wesburn-Moses, 2010). Other researchers described cognitive strategy as a heuristic or guide that serves to support students as they "develop the internal procedures that enable them to perform higher level operations" (Jitendra, Burgess, & Gajria, 2011, p. 136). The idea behind cognitive strategy instruction is to instill in students the ability to interact with a problem, so that "learning becomes more deliberate, self-directed, and self-regulated" (Jitendra, Burgess, & Gajria, 2011, p. 136). The difference between the cognitive strategy of instruction and schema-based instruction

is that in cognitive strategy, teachers do not require students to diagram the steps involved in solving problems (Cole & Wesburn-Moses, 2010).

The peer tutoring instruction strategy is defined as "pairs of students working collaboratively on structured, individualized activities" (Cole & Wesburn-Moses, 2010, p. 17). The efficacy of peer tutoring for students with EBD is supported in scientific literature (Spencer, 2006). Peer tutoring is reported to improve academic and behavioural deficits in students with EBD, and to increase student engagement and response rates (Niesyn, 2009). Peer interaction has a great outcome on academic motivation and achievement. The model does not only give tutors the opportunity to construct their own meaning of a problem, but also gives tutees the opportunity for guided practice (Niesyn, 2009; Spencer, 2006). Furthermore, studies recommend that when students with EBD play the part of older tutors in cross-age peer tutoring, they gain confidence and show improvement in social functioning and academics (Miller, 2005). This instructional strategy can be used at different ability levels within the same classroom, thereby enhancing the instructional time for all students (Spencer, 2006). Peer tutoring may come in different forms and names: peer assisted learning, reciprocal peer tutoring, peer monitoring, peer facilitation, peer mediated instruction, or class-wide peer tutoring (Niesyn, 2009; Miller, 2005). The few research studies available on peer tutoring were contested to test the effectiveness of using the strategy to improve academic deficits (Miller, 2005).

Student choice is used to increase the time students with EBD spent on class assignments to decrease their level of disruptive behaviour (Niesyn, 2009). The student choice strategy affords students a choice of instructional materials which incorporate students' interests into curricular activities (Niesyn, 2009). For example, students are given the choice to select from a variety of mathematics worksheets to complete for a particular assignment. Research indicates that those students who are allowed the option to select academic activity to complete from other options for independent work time are able to show greater on-task behaviour (Niesyn, 2009).

Direct instruction refers to the presentation of academic material through the use of lectures, demonstrations, discussions or the elaboration on students' ideas (Maggin et al., 2011). Though the effect of direct instruction on student behaviour is still not very clear, research suggests that the use of this strategy to deliver new information to students with EBD brings the most benefit to students and teachers (Billingsley, Scheuermann, & Webber, 2009; Niesyn, 2009; Maggin et al., 2011). Furthermore, it has been shown that students with EBD need direct and

explicit instruction to learn basic mathematics facts and problem solving skills (Kroesbergen, Van Luit, & Maas, 2004). The six components that make up this model are: (1) gaining students' attention, (2) reviewing past learning, (3) presenting new information, (4) assisting students to perform task-guided practice, (5) evaluation of students' independent performance and (6) reviewing the lesson" (Niesyn, 2009, p. 229). All instructional practices mentioned above can be used alongside direct instruction. Direct instruction allows teachers to increase the frequency and accuracy of students' responses by letting teachers supply students with the required information before students answer questions about a lesson (Niesyn, 2009). Again, by using this model, teachers can delay student independent work until they are confident that students will be able to complete any task at 90% accuracy rate or more (Niesyn, 2009).

Scaffolding students' independent seat work is an instructional model that allows students to use what they have previously learned for the mastering of new knowledge (Cole & Wesburn-Moses, 2010). Studies show that 70% of the school day is spent completing independent seatwork, and that students with EBD find it difficult managing their behaviour during independent seat work due to their off-task behaviour (Niesyn, 2009). To help students with EBD be on-task, studies indicate that, where learning materials are given out to them in smaller portions or in shorter assignments, students are more able to concentrate and complete classwork. Researchers found that students with EBD are less stressed out when they complete smaller or shorter assignments (Niesyn, 2009). Furthermore, findings indicate that when teachers move around the classroom to scaffold independent work or verbally interact and to assist students, the number of instances where desired behaviour is exhibited by students with EBD are increased (Niesyn, 2009). Scaffolding independent seatwork offers the framework for teachers to connect the end of one lesson to the beginning of another (Cole & Wesburn-Moses, 2010).

Increasing the opportunities for students to make correct responses is a strategy that has also been shown to increase the desired behaviour in students with EBD during independent work. Studies reveal that students who respond to more questions during instruction learn better than students who make fewer responses (George, 2010). Although this strategy gives students opportunities to make correct responses, research points out that low-achieving students do not have many chances to respond to questions compared to their higher-achieving peers (Maggin et al., 2011; Niesyn, 2009). The result of this difference in opportunity is that students who have

the highest learning needs receive less practice and feedback. Consequently, this situation affects students' learning opportunities and their ability to remain engaged in the teaching and learning process (Maggin et al., 2011). For this strategy to work, teachers elicit 4 to 6 responses from students, ensuring that 80% of these responses are accurate before students are allowed to do independent practice (Niesyn, 2009). During independent practice, the number of student responses can be increased to 9 to12 per minute with at least 90% accuracy rate (Niesyn, 2009). Teachers of EBD frontload their questions with the required information in order to increase the probability of students giving correct answers (Maggin et al., 2011; Niesyn, 2009). Choral responding and response cards are other ways teachers of EBD can elicit academic response from students (George, 2010).

Technology was used in the past to help students with learning disabilities circumvent characteristics that were the result of learning problems (Allsopp, McHatton, & Farmer, 2010). An example of such technology is the calculator for calculating basic arithmetic within higher-level mathematics (Allsopp, McHatton, & Farmer, 2010). Teachers also used technology to enhance instructional effectiveness, such as allowing students the use of graphic calculators to "create and test out mathematical models and conjectures" (Allsopp, McHatton, & Farmer, 2010, p. 274). The 21st century has seen a growing number of technologies that have significantly changed the way society conceptualizes technology integration (Allsopp, McHatton, & Farmer, 2010). New technologies continue to be developed that have the potential to enhance students' learning outcomes in mathematics if used effectively (Allsopp, McHatton, & Farmer, 2010). The integration of technology with mathematics should improve students' ability to understand and apply mathematics in successful ways. Unfortunately, although technology has been used to analyze, display, and share student performance data through curriculum-based measurement, studies report that "research specific to the integration of technology with mathematics is unavailable or has not yet been published" (Allsopp, McHatton, & Farmer, 2010, p. 274). Because technology plays a very prominent role in today's schools and society, it is important that research studies explore its use and function in mathematics for students with disabilities (Bouck, Okolo, & Courtad, 2007). Also, the integration of technology into lessons to enhance instructional presentation has been shown to increase student motivation in the learning of mathematics (Billingsley, Scheuermann, & Webber, 2009). However, this concept has very little

research support for students with learning and behavioural difficulties (Billingsley, Scheuermann, & Webber, 2009; Bouck, Okolo, & Courtad, 2007).

Naturalistic studies and other research have shown that teachers hardly give praise to students with EBD (Maggin et al., 2011). Teacher praise has long been said to be an antecedent-based intervention that helps to reduce inappropriate behaviour exhibited by students with EBD (Maggin et al., 2011; Niesyn, 2009). Praise should be immediate and specific to increase desirable behaviour in students (Maggin et al., 2011; Niesyn, 2009). For example, teachers should also describe the behaviour that is being rewarded to the student with EBD (Niesyn, 2009). In addition, praise should be given on a continuous basis every time appropriate behaviour is displayed by students (Niesyn, 2009).

The constant time delay instructional delivery procedure has been in use since 1970 to instruct students with EBD (Stevens & Lingo, 2005). This model has a long lasting research base that backs its effectiveness in instruction (Stevens & Lingo, 2005). The constant time delay procedure allows teachers to request a response from a student. An example of the procedure being applied is allowing students to write an answer to a mathematical fact, and then telling or showing the student the correct response if he/she is uncertain about the answer (Stevens & Lingo, 2005). This instructional practice, which originated from the behavioural model, has 3 components: (a) antecedent, (b) student response/behaviour and (c) feedback/consequence (Stevens & Lingo, 2005).

In sum, the instructional strategies discussed above will result in mathematics content acquisition for students of EBD if given enough instruction over a period of time (Billingsley, Scheuermann, & Webber, 2009). Any strategies chosen should be based on students learning needs. An important factor influencing the use of effective instructional strategies in classrooms for student with EBD is the type of training teachers of students with EBD receive during their training (Wehby, Lane, & Falk 2003). However, teacher training may not be providing adequate instruction related to how to select and use instructional strategies to actively engage students with emotional and/or behavioural disorders, particularly in the area of mathematics. Teachers need training and support in developing proactive strategies that focus on "antecedent based interventions to reduce the inappropriate behaviour of students with EBD" (Niesyn, 2009, p. 228). A comprehensive preparation of teachers results in teachers using instructional procedures to meet the academic and social needs of students (Lane, Gresham, & O'Shaughnessy, 2002).

These interventions can result in an increase in desirable behaviour and a decrease in undesirable behaviour in students with EBD (Niesyn, 2009).

2.2 Teacher Preparation and Students with EBD

A number of students with EBD and other disabilities receive some instruction in general education classrooms (Niesyn, 2009). General education teachers, who lack the appropriate training for teaching students with emotional and behavioural needs, are left accountable for the education of these students (Niesyn, 2009). Teachers therefore need to be prepared to address the diverse academic and non-academic needs of these students (Gable et al., 2012). Examination of the available literature on this subject identified a dearth of teacher preparation in the area of academic instruction within teacher training programs for students with EBD (Wehby, Lane, & Falk, 2003). Researchers pointed out that teachers of students with EBD do not receive the adequate preparation necessary to meet the multitude of problems exhibited by this group of students (Wehby, Lane, & Falk, 2003). While special education training stresses the importance of preparing teachers to work with students with learning disabilities in self-contained classrooms, the preparation of general education teachers focuses on training teachers to work with students across various context domains in inclusive classrooms, with little consideration given to students with emotional and behavioural disorders or specialized needs (Niesyn, 2009).

Pre-service training services normally received by teachers are centred on the management of antisocial behaviour exhibited by students, with very little emphasis on academic instruction (Wehby, Lane, & Falk, 2003). Consequently, teachers are unable to efficiently and effectively implement instructional strategies that meet the academic needs of students with EBD (Wehby, Lane, & Falk, 2003). It is worth mentioning that most teachers of students with EBD are also noticeably more exhausted at the end of the school day than other groups of special education teachers. This exhaustion occurs because these teachers spend more energy and time managing disruptive behaviours as opposed to actual academic work or instruction (Wehby, Lane, & Falk, 2003). They are likely to devote too much time and attention to students with EBD at the expense of other students in the classroom, or may even fail to check their unruly behaviours (Quinn et al., 2000). Whatever the case, the education of all students in that class suffers. In sum, many teachers of students with EBD lack the necessary preparation to implement a number of evidence based instructional strategies effectively (Gable et al, 2012). One way to improve the quality of education especially in mathematics for students with EBD is

to ensure that their teachers possess the knowledge and skills required to address the myriad challenges associated with these students.

2.2.1 Teachers' preparation and perspectives on mathematics instruction. Teachers are presented with two seemingly contradictory ways to structure the teaching of mathematics and mathematics classrooms: (1) direct instruction, which is usually perceived as belonging to special education; and (2) inquiry-based teaching, which is seen as appropriate to the general education classroom (Cole & Wasburn-Moses, 2010). Both general and special education teachers believe they have found the right strategy in teaching mathematics to their students. Educators of students with EBD admit that though it is conceptually, emotionally, and legally important that they use research or evidence-based procedures and positive behavioural supports, they still depend on their old learning histories to select instructional strategies when teaching (Stevens & Lingo, 2005). These traditional strategies are generally unsuccessful in meeting the academic needs of those students who are facing chronic academic and social failures (Stevens & Lingo, 2005). According to research studies, special educators also believe their students can respond favorably to the activities and strategies upheld by the national mathematics standards, were it not for the fact that their disabilities held them back (Cole & Wasburn, 2010).

The term *teacher quality* has been a much discussed topic among educators since the No Child Left Behind Act (2002) was passed. Researchers observed that the labelling of educators as high-quality teachers has a significant impact on student learning (Strong, Gargani, & Hacifazlioglu, 2011). Their study identified that, "all things being equal, a student with a very high-quality teacher will achieve a learning gain of 1.5 grade-level equivalents, whereas a student with a low quality teacher achieves a gain of only 0.5 grade-level equivalents" (Strong, Gargani, & Hacifazlioglu, 2011, p. 367). One way to improve the quality of the education of students with EBD is to ensure that all teachers possess the requisite knowledge and skills and are using the appropriate instructional or remedial strategies necessary to address the countless challenges associated with this difficult population of students (Gable et al., 2012). Studies have attributed the aversive situations seen in many EBD classrooms to the poor techniques teachers used in teaching and/or in the selection of teaching materials (Hagan-Burke, Burke, & Sugai, 2007). In sum, teachers of students with EBD need content knowledge and instructional planning skills to be effective in collaboration and in extending the instruction that students with EBD require to be successful in meeting performance expectations in mathematics (Meyen &

Greer, 2009). The key to decreasing the mathematic achievement gaps for students with EBD is to increase teachers' content knowledge, instructional planning skills and preparation in research based instructional strategies in mathematics (Meyen & Greer, 2009).

Teachers of students with EBD must also understand the environmental factors (fear, anxiety, depression, irritability, increased aggression, withdrawal, regression, clinginess and avoidance of trauma-related stimuli) that sometimes affect students of EBD socially, emotionally and behaviourally. These factors can affect students academically. Cognitively, these environmental factors can result in students having deceases in concentration, reasoning, memory and reading disabilities (Lonigan, Phillips, & Richey, 2003; Scheeringa & Zeanah, 2008). However, there are protective factors teachers can use to enhance and strengthen resilience in their students (Alvord & Grados, 2005; Lonigan, Phillips, & Richey, 2003; Scheeringa & Zeanah, 2008).

2.3 Resiliency and Emotional and/or Behavioural Disorders

This study applied the theory on resilience to investigate instructional strategies in mathematics that work for students with EBD. Resilience theory investigates the reasons why some students strive in the classroom in spite of "serious threats to their adaptation or development" (Masten, 2001, p. 228). This theory aims to understand the reasons and processes that account for these good outcomes (Masten, 2001). A group of psychologists and psychiatrists in the 1970s drew attention to the phenomenon of resilience in children at risk for psychopathology and developmental problems due to genetic or experiential circumstances (Anthony, 1974; Garmezy, 1971; Murphy, 1974; Murphy & Moriaty, 1976; Ruttler, 1979; Werner & Smith, 1982). These researchers argued that children who developed well in the context of traumatic situations held the potential to inform theories of etiology in psychopathology that could help guide intervention strategies and policy (Anthony, 1974; Garmezy, 1971; Murphy, 1974; Murphy & Moriaty, 1976; Ruttler, 1979; Werner & Smith, 1982). Resilience is defined as "a class of phenomenon characterized by good outcomes in spite of serious threats to adaption or development" (Masten, 2001, p. 228). In other words, resilience is a dynamic process that encompasses "positive adaptation within the context of significant adversity" (Luthar, Cicchette, & Becker, 2000, p. 543), or "those skills, attributes, and abilities that enable individuals to adapt to hardships, difficulties, and challenges" (Alvord & Grados 2005, p. 238). Though these attributes are biologically determined, resilience skills can be

learned and strengthened (Alvord & Grados, 2005). In the case of students with EBD, they may have difficulty socially connecting with their teachers and peers during instruction, or develop internalizing behavioural problems like depression, anxiety, or withdrawal (Gunter et al., 2012). Students may also try to use aggression, such as screaming or banging on tables, to convey their needs in the classroom (Gunter et al., 2012). However, educators can work to encourage students' positive adaptation despite their adverse experiences (Luthar, Cicchetti, & Becker, 2000). For example, Smith and Prior (1995) investigated 81 school-age children who experienced severe psychosocial stress. They compared resilient and non-resilient children identified through competence and behaviour disorder measures. The children were observed as well as assessed at home on attributes of temperaments. In addition, their teachers and parents completed questionnaires and rating scales using the 20-item Emotionality, Activity Sociability temperament scale (Buss & Plomin, 1984) to rate the students' temperaments. The teachers also rated the students on how likeable or engaging they were to peers and staff on a 5-point Likert scale. The results showed the children's individual differences and family attributes to be "predictive of competent child functioning varied according to the outcome measure used" (Smith & Prior, 1995, p. 168). The teachers' ratings of positive temperament on low emotional reactivity and high social engagement best discriminated between students who were resilient on all behavioural and social competences at school and at home and those who were not. The authors found levels of maternal stress and the individual differences in child intelligence to be related to academic adjustment. However, the child's age, sex, academic ability, and self-concept were not significant discriminators of behavioural adjustment. These findings emphasized the importance of a positive temperament as a resilience factor, and showed the need to "consider different estimates and contexts in assessing resilience for children growing up in stressful" or traumatic situations (Smith & Prior, 1995, p. 168).

Rae-Grant, Thomas, Offord and Boyle (1988) also investigated the influence of various risks and protective factors on the presence of one or more behavioural or emotional disorders in the children. Three thousand and ninety four children from Ontario, between the ages of 4 and 16 years, were examined using data from the Ontario Child Health Study (1983; Statistics Canada, 1984). Family and parental problems were found to raise the risk for a disorder, while being a good student, getting along with others, and participating in activities reduced these risks. These two findings supported the view that positive temperaments, serving as protective

factors, have a significant role in maintaining adaptive behaviours in school, domestic, and social settings even when students experience severe risk factors or traumatic situations (Rae-Grant, Thomas, Offord & Boyle, 1988). Therefore, it is important to consider how teachers of students diagnosed with EBD can foster resilience among their students.

Teachers of students with EBD can implement instructional strategies in classrooms that foster resilience in students (Berson & Baggerly, 2009). For example, a traumatic situation presents an opportunity for teachers to introduce developmental strategies that empower traumatized students with constructive problem solving skills (Berson & Baggerly, 2009). That is, teachers should build on students' strengths, interests, and their capacity to cope with stress when designing and implementing instructional strategies (Berson & Baggerly, 2009). One instructional strategy that can be used to foster resilience in students is to encourage academically successful students to tutor their peers who are experiencing academic difficulties (Smokowski, 1998). "Beyond the benefits to the less accomplished student, the successful child experiences a sense of mastery and also enhances his/her communication skills or social skills, which are useful protective factors in the social domain" (Stokowski, 1998, p. 341). Easygoing temperament, good self-regulation, and self-control are other protective factors in resilience (Buckner, Mezzacappa, & Beardslee, 2003; Eisenberg et al., 1997, 2003; Werner, 1993). A student who is able to modulate his/her emotions and behaviour, and can self-soothe or calm him/herself, is likely to draw positive attention from others and develop healthy social relationships. A student such as this is more likely to be independent (Buckner, Mezzacappa, &Beardslee, 2003; Eisenberg et al., 1997, 2003; Werner, 1993). For example, teaching students to help others is an effective way to promote responsibility, empathy, and self-esteem (Brooks, 1994; Werner, 1993). Another protective factor is having a smaller class size, since a small class size enables teachers to have more individualized contact with children in the classroom (Smokowski, 1998). "Personal attention from a caring adult is one of the most powerful protective mechanisms for early childhood development" (Smokowski, 1998, p. 350). These strategies are most effective when teachers integrate them in their regular instruction; thereby creating a foundation for social-emotional functioning that can be sustained when there is a traumatic event (Berson & Baggerly, 2009).

The classroom environment needs to be safe, nurturing, and responsive to the needs of students experiencing traumatic events (Berson, 2002). Resilience is best fostered when there is

a culture of support and care in the classroom (Berson, 2002). Teachers can use particular strategies to help students manage their distress when they experience traumatic events (Berson, 2002). Specifically, making accommodations in instruction for students' individual needs in the class and maintaining a balance between adherence to familiar routines helps to establish a comforting and caring classroom environment for students (Berson & Baggerly, 2009).

2.4 Summary

Students with EBD experience significant academic and social difficulties in and out of schools (Templeton, Neel, & Blood, 2008). Socially, students have difficulty connecting with their teachers and peers (Gunter, Caldarella, Korth, & Young, 2012). One academic area identified to be particularly challenging for students with EBD is that of mathematics (Templeton, Neel, & Blood, 2008). Only 30% of students with EBD perform at or above grade level in mathematics in the US (Anderson, Kutash, & Duchnowski, 2001). These students are noted to have difficulty with basic mathematical concepts and lack the skills needed to solve novel problems (Jitendra & Star, 2011). In addition, most students with EBD receive some instruction in general education classrooms, where their teachers lack the appropriate training for teaching students with emotional and behavioural needs (Niesyn, 2009). These issues are but a few of the challenges accompanying the endeavour of educating students with EBD. Therefore, educators need to implement effective research-based instructional strategies to best meet the social, emotional, and academic needs of students with EBD.

One way to improve the quality of the education students with EBD receive is to ensure that all teachers have the required knowledge and skills, and are using the appropriate instructional or remedial strategies, necessary to address the countless challenges associated with this difficult population of students (Gable et al., 2012). Teachers of students with EBD need to use evidence-based instructional strategies found to work for this group of students in order to tackle their typically low performance in mathematics (International Center for Leadership in Education Incorporated, 2000). For example, evidence-based instructional strategies such as the schema-based strategy, peer tutoring, and the use of the constant time delay instructional delivery procedure have been identified to engage students in learning mathematics.

Finally, students diagnosed with EBD may have difficulty socially connecting with their teachers and peers during instruction, or develop internalizing behavioural problems like depression, anxiety, or withdrawal (Gunter et al., 2012). Students may also try to use aggression,

such as screaming or banging on tables, to convey their needs in the classroom (Gunter et al., 2012). Students may also be emotionally and/or behaviourally unbalanced due to some traumatic event (Berson, 2002). These difficulties may affect students' level of concentration, reasoning, memory, and/or the ability to academic skills (Berson & Baggerly, 2009). However, educators can work to encourage students' positive adaptation despite their adverse experiences (Luthar, Cicchetti, & Becker, 2000). For example, teachers can implement instructional strategies, such as peer tutoring, to foster resilience in students (Smokowski, 1998). The challenges and/or traumatic situations experienced by students presents an opportunity for teachers to introduce developmental strategies and/or interventions that empower students with problem solving skills and build on their strengths and interests (Berson &Baggerly, 2009). Therefore, it is important to explore instructional strategies elementary school mathematics teachers working with students with EBD perceived to be helpful in improving students' performance in mathematics using a resiliency perspective.

Chapter 3: Methodology

Mathematics is a difficult academic area for students with Emotional and/or Behavioural Disorders (EBD; Templeton, Neel, & Blood, 2008), since the difficulties students experience tends to persist and increase over time between the ages of 9 to 14 years (Bouck, Kulkarni, & Johnson, 2011; Cihak & Bowlin, 2009; Greenbaum et al., 1996; Jitendra et al., 2010; Nelson, Benner, Lane, & Smith 2004). The mathematics performance of students with Emotional and/or Behavioural Disorders is typically lower than that of their typically achieving peers without disabilities (Hodge et al., 2006). These deficits in mathematics are purported to increase as the students progress in school (Hodge et al., 2006). The purpose of this study was to explore instructional strategies elementary school mathematics teachers working with students with EBD perceived to be helpful in improving students' performance in mathematics using a resiliency perspective (i.e., the ability to positively adapt despite experiencing significant adversity; Luthar, Cicchetti, & Becker, 2000). Specifically, the research question that guided this research study was:

1. What are elementary school mathematics teachers' thoughts and experiences related to the instructional strategies they perceive to be helpful in: engaging students with EBD in the teaching and learning process, improving their mathematics performance, and helping to better manage students' disruptive behaviours in the classroom?

3.1 Rational for Qualitative Research

Qualitative research assumes that the meaning of a phenomenon is socially constructed by individuals during their interaction with the world or reality (Merriam, 2002). There also exists a tendency for these constructions and interpretations to change over time (Merriam, 2002). A basic interpretive qualitative approach is used in qualitative research to understand individuals' experiences and their interactions with their social world as well as their interpretations of such experiences (Merriam, 2002). This approach posits that social reality is constructed differently by different individuals as they build their own understanding of the world through experiences and maturation (Gall, Gall, & Borg, 2007; Merriam, 2002).

The researcher was the primary instrument for data collection and data analysis and the final write-up of this qualitative inquiry (Merriam, 2002). The final write up is descriptive in nature; words are used to convey what the researcher learned about this study (Merriam, 2002).

In this study, the experiences of elementary school mathematics teachers of students with EBD were gathered through individual interviews. The basic interpretive qualitative approach helped the researcher to understand the underlying meaning of experiences of mathematics teachers of students with EBD as they used evidence-based instructional strategies. These evidence-based instructional strategies could improve students' academic performance in mathematics, and also improve students' behaviour during instruction (Niesyn, 2009). This is based on the assumption that social reality is constructed differently by the individuals who participate in the study (Gall, Gall, & Borg, 2007; Merriam, 2002). Likewise, in this study, mathematics teachers of students with EBD constructed different meanings to their interactions and experiences with their students as they used the different instructional strategies during instruction at a particular point in time and in a particular context (Merriam, 2002).

3.2 Participant Selection and Recruitment

The target population for the study was elementary school teachers of students with EBD who were teaching mathematics. Upon University of Saskatchewan Ethics Board Approval (Behavioural Research Ethics # 14-05), purposeful sampling was used to select three participants in central Saskatchewan who were elementary mathematics teachers, taught students with EBD in their integrated classrooms, and were interested in participating in the study. That is, participants were selected who were knowledgeable about the phenomenon under study and were willing to participate fully in this study (Morse & Richards, 2002). The researcher was able to spend time with each participant and capture explanations of their experiences, attitudes, feelings and definitions of the teaching and learning situations in terms that were meaningful to them (Van Den Hoonaard, 2012).

An advertisement was placed *The Saskatchewan Bulletin* (see Appendix A) to invite Saskatchewan Teachers' Federation (STF) members who taught elementary school mathematics to students with EBD to participate in the study (STF, 2014). The Bulletin is a regular newspaper that discusses topics of interest to teachers and their professional (STF, n.d.). This is published ten times during the school year and has a circulation of approximately 23,000 copies which are distributed to educators throughout Canada. The bulletin is available free of charge, and therefore likely to be read by majority of teachers (STF, n.d.). Study advertisements were also sent by electronic mail (e-mail) to invite teachers who were postgraduate or graduate

students at the University of Saskatchewan during the recruitment period to participate in the study (see Appendix B).

3.3 Data Generation

Each individual interested in participating in the study who contacted the researcher was screened for eligibility through a telephone conversation and an email with the researcher before the interview process began. Specifically, in order to participate in this study potential participants needed to: (1) have taught mathematics in an elementary school environment; (2) have taught students with EBD; (3) and be available for in person interviews with the researcher. Once participants were deemed to meet the eligibility criteria to participate in this study, individual interviews were set up for the three individuals who contacted the researcher to participate in this study. Interview sessions were held at either a publically accessible restaurant, or in private meeting rooms at the College of Education. Two interview sessions, an initial interview and a follow-up interview, were held with each participant. Each interview was approximately 45 minutes in duration. All of the interviews were digitally recorded.

Prior to beginning the initial interview session, the researcher reviewed the participant information sheet and consent form with each participant (see Appendix C). Once each participant signed the consent form, the researcher then shared the written definition of emotional and/or behavioural disorder (IDEA, 2004) being used to define the disorder in this study with each interviewee. This conversation ensured the participant and the researcher were in agreement as to the specific students the researcher was wanting to discuss. In-depth semi-structured interviews were then used to explore the participants' experiences working with students with emotional and behavioural difficulties and disorders (Gall, Gall, & Borg, 2007; see Appendix D). The initial interview session enabled the researcher to pose questions to each participant relevant to collecting data related to the posed research questions (e.g., instructional strategies used in teaching mathematics to elementary school students). Follow-up interviews allowed the participants to review the interview transcript, and add, change, or delete portions of the transcript with which they did not feel comfortable. Participants were also asked to provide any needed clarification from the first interview (e.g., clarify vague statements; Van Den Hoonaard, 2012). The interviews sessions were discontinued when no new data emerged from participants (i.e., data saturation; Van Den Hoonarard, 2012). Once the participant clarified

unclear statements, and was satisfied with the content of the transcript, he/she signed the data and transcript release form (see Appendix E).

Field notes were written during the interview sessions. Three types of field notes were recorded: the transcript file, personal file, and analytical file (Ajjawi & Higgs, 2007). The transcript file contained the raw data from the interviews, whereas the personal file was the protocol analysis (detailed chronological account) of participants' experiences and any reflective notes on the study (Ajjawi & Higgs, 2007; Gall, Gall, & Borg, 2007). Data from the personal file allowed the researcher to contextualize conversations "as context can provide deeper meaning for analysis" rather than simply relying on a contextual verbal recording (Van Den Hoonarard, 2012, p. 91). The analytical file examined in detail, ideas that emerged in regards to the research question as the study progressed (Ajjawi & Higgs, 2007).

In addition to interviews, peer reviewed research journals were studied to examine the types of instructional strategies available to teachers and that have been shown by research to effectively engage students with EBD in the teaching and learning process. Document analysis also allowed for the examination of findings and the contradictions and conclusions of other research works on the topic under study (e.g., Statistics Canada, 1983, 1999; Stevens & Lingo, 2005).

3.4 Data Analyses

Data analysis in qualitative research is simultaneous with data generation or collection (Merriam, 2002). Analyzing data while it is being collected allows the researcher to make continuous adjustments to the data along the way (Merriam, 2002). This means that the researcher can redirect data collection and "'*test*' emerging concepts, themes, and categories against subsequent data" (Merriam, 2002, p. 14). Thematic analysis was used to analyze data collected for this study using a resiliency perspective (Luthar, Cicchetti, & Becker, 2000). Thematic analysis is the process of "identifying, analyzing and reporting patterns or themes within data" (Braun & Clarke, 2006, p. 79). The thematic analysis allows the essentialist or realist method to be adopted in reporting the experiences, meanings and the reality of participants (Braun & Clarke, 2006). Data analysis for this study began with the transcription of verbal data and comparing one unit of data to another while looking for common patterns or themes across the data (Braun & Clarke, 2006). This was the stage where patterns in meaning of issues which were of potential interest in the data were noticed (Braun & Clarke, 2006).

Resiliency theory was used as a frame for generating themes from the data. Recall that resilience is a phenomenon that results "in most cases from the operation of basic human adaptational systems" (Masten, 2001, p. 227). If the systems are in good working order, development is robust in students even in the face of catastrophic life events (Masten, 2001). For example, during this process, resilient students achieve positive adaptation in a negative situation even when experiencing significant threat, adversity, or risk (Luthar, Cicchetti, & Becker, 2000). These patterns were then coded (named), refined, and adjusted as the analysis progressed (Merriam, 2002). Also, data analysis in qualitative research is an inductive approach which: (1) allows for the condensation of extensive and varied raw text data into a brief, summary format; (2) establishes clear links between the research objectives and the summary findings derived from the raw data; and (3) allows the development of a model or theory about the underlying structure of experiences which are evident in the raw data (Merriam, 2002; Thomas, 2003). Specifically, the researcher followed six steps when conducting the thematic analysis: immersion or familiarization, generating initial codes, abstraction, synthesis and theme development, illumination and illustration of phenomena, and integration and critique.

3.4.1 Immersion or familiarization. The immersion process allowed the researcher to familiarize herself with the data collected by reading over field notes and listening to audio tape recordings (Ajjawi & Higgs, 2007; Braun & Clarke, 2006). This was the stage where data were transcribed into a type-written form in order to conduct a thematic analysis (Braun & Clarke, 2006). This step also involved getting a *sense* of the data as well as organizing the data-set into texts in preparation for data coding (Ajjawi & Higgs, 2007). It was at this stage that the researcher made notes or comments or observations in the margins of the transcript (Merriam, 2002).

3.4.2 Generating initial codes. During this stage, the first-order constructs were identified. The first-order constructs refer to the ideas or experiences participants expressed in their own words during the interview sessions (Ajjawi & Higgs, 2007). At this stage, the researcher generated an initial list of ideas about the data that were meaningful to the phenomenon being studied (Ajjawi & Higgs, 2007; Braun & Clarke, 2006).

3.4.3 Abstraction. During the abstraction stage, the researcher identified second order constructs which were based on her theoretical and personal knowledge of the phenomenon under study (Ajjawi & Higgs, 2007; Braun & Clarke, 2006). For example, direct instruction has

been associated with increased academic gains for students with EBD as lessons are presented in a structured and systematic fashion (Gunter, Coutinho, & Cade, 2002; Pierce, Reid, & Epstein, 2004). The identification of the second order constructs helped in creating themes and sub-themes for the data collected (Ajjawi & Higgs, 2007).

3.4.4 Synthesis and theme development. This step enabled the list of different codes identified across the data set to be developed into potential themes (Braun & Clarke, 2006). The themes and sub-themes developed for the data collected were grouped into a smaller number of broad themes (Ajjawi & Higgs, 2007; Braun & Clarke, 2006). In addition, these themes and sub-themes were expanded and their relationships clarified by comparing themes across sub-discipline groups (Ajjawi & Higgs, 2007). Tables and colours were used to group the constructs that were relevant to the purpose of the study and to show the relationship between codes, themes and the different levels of themes (Ajjawi & Higgs, 2007; Braun & Clarke, 2006).

3.4.5 Illumination and illustration of phenomena. The researcher then linked the themes and sub-themes identified from the data set to existing peer reviewed literature (Ajjawi & Higgs, 2007). This means that lived experiences were interpreted and reconstructed into narratives using sub-themes and themes in participants own words (Ajjawi & Higgs, 2007).

3.4.6 Integration and critique. This is the stage in the data analysis process where the researcher critiqued themes based on existing literature on the phenomenon being studied and then did the final write up of the report (Braun & Clarke, 2006). Critiquing and reviewing existing literature at this stage was essential for developing key findings that could impact or increase the understanding of the phenomenon (Ajjawi & Higgs, 2007).

3.5 Trustworthiness/Validity/Reliability/Transferability

The researcher conducted interviews with teacher participants after establishing rapport with them. A good rapport was necessary as it helped the researcher to gain participants' trust, thereby increasing the rigor and trustworthiness of the research findings (Ajjawi & Higgs, 2007). Establishing a good rapport also gave the teacher participants the comfort and freedom to discuss their experiences (Ajjawi & Higgs, 2007). Therefore, data generation or collection was easier to obtain since participants were less prone to bias when talking about their teaching experiences as teachers of students with EBD while using various instructional strategies (Gall, Gall, & Borg, 2007). For example, the researcher adopted the attitude of a learner during the interview sessions to gain participants' trust and to build a good rapport. The researcher also asked

participants questions that showed her respect for their knowledge and her genuine interest in what the participants were saying (see Appendix D). This allowed participants to give expansive responses to the researcher's questions which were less prone to bias (Van Den Hoonaard, 2012).

Any research findings that can be transferred to other educational settings are seen as an important indicator of quality in any research study (Ajjawi & Higgs, 2007). For this research study, findings are not just discussed in terms of mathematics instruction but are also linked to other subject area teaching situations, in elementary classrooms with students with behaviour difficulties and/or disorders. It is also the responsibility of the researcher to describe the findings sufficiently enough so that elementary school teachers in other academic areas can judge for themselves if the instructional strategies identified in this study could be applied or adopted to other teaching and learning situations in their classrooms (Ajjawi & Higgs, 2007).

3.6 Ethical Issues

Ethical approval was obtained from the University of Saskatchewan Ethics Board to conduct this study (Behavioural Research Ethics # 14-05). Informed consent was received from participants. The study entailed no more than minimal risk to the participants. A verbal and written explanation and information were provided to all participants explaining the purpose of the research and the research process (Ajjawi & Higgs, 2007). Participants were given the chance to ask questions, and they were made aware that they could withdraw from the study at any point without any negative consequences. No power relation existed between the researcher and the participants, so there was no form of coercion on participants to take part in the research (Ajjawi & Higgs, 2007). The confidentiality of participants' names was maintained through the use of pseudonyms in reporting the findings of the study. Any specific details in the research findings that would reveal the identity of the school or participants were not reported (Ajjawi & Higgs, 2007). Once the interview was transcribed, participants were provided the opportunity to review their transcripts by adding, deleting, or altering any information as they saw fit and also to sign the transcript release form (see Appendix E).

In the subsequent chapter, the participants are described and the discovered themes presented.

Chapter 4: Results

This chapter introduces the three teachers who participated in this study and presents their thoughts and experiences related to the instructional strategies they perceived to be helpful in: engaging students with EBD in the teaching and learning process, improving their mathematics performance, and helping to better manage students' disruptive behaviours in the classroom. Participants were given pseudonyms to protect their identities and their individual privacy (i.e., confidentiality). In addition, participants' quotes were edited to protect confidentiality and increase readability. For example, repetitive and unnecessary words (e.g., yeah, you know, like) were deleted. Information gathered from participants in relation to the research questions was revealed, and resiliency theory was used as a frame for generating themes from the data (Luthar, Cicchetti, & Becker, 2000; Masten, 2001). Three themes emerged from the information gathered from participants: (1) ways of engaging students in learning; (2) from dead time to active learning; and (3) promoting positive student behaviour.

4.1 Participants

Three female elementary school teachers from three different urban school districts in central Saskatchewan who were currently teaching, or who had previously taught, mathematics to students with EBD in inclusive public school classrooms volunteered to participate in this study: April, Becky, and Cathy. April taught students with EBD as a mathematics teacher in grades three, four, and five during her 23 years of teaching. She has undergraduate degrees in the fields of both mathematics and education. Becky, a teacher for 15 years, has taught mathematics to grade four to eight students with and without EBD (i.e., all ability levels) for fourteen years. Becky is also currently an assistant principal at her school. Cathy, a teacher for seven years, has taught grades three, five, and six. She reported she has taught mathematics to students with EBD and other exceptionalities in her third and fourth years of teaching. Cathy was working on completing a post-graduate certificate in special education at the time of the interview.

Participants were interviewed by the researcher to explore the instructional strategies these teachers perceived to be helpful in engaging students, improving their performance in mathematics, and decreasing their disruptive behaviours. As participants stories were reviewed, three major themes were identified using a resiliency perspective (Luthar, Cicchetti, & Becker, 2000): ways of engaging students with EBD in learning, from dead time to active learning, and

promoting and supporting positive behaviours. These themes are discussed and linked together using meaningful participant quotes.

4.2 Theme One: Ways of Engaging Students with EBD in Learning

Participants described the importance of differentiating instruction in order to engage students with EBD in the learning process and enhance their learning and behaviour in the classroom by using strategies such as: inquiry-based teaching individually and in groups, mathematics manipulatives and technological aids, scaffolding, and modifying language models.

4.2.1 Inquiry-based teaching individually and in groups. Participants shared that all of the students with whom they have worked, including students with EBD, tend to have different learning styles. Therefore, when an instructional strategy does not meet a student's learning style or need, that student may lose focus or comprehend little of what is being taught. Activities can be used to engage students' interests and address their areas of academic strength and need. For example, Becky described using responsive stations to bring students up to grade level in her grades 4 to 8 math classes before introducing a new concept in mathematics:

> What we have been doing in our school division is something called responsive stations. They are designed to bring students up to grade level by providing them with numerous activities (videos, extra practice, websites to practice) to ensure they understand. They are used before a unit is taught to ensure everyone in the class is brought up to grade level so students may engage in grade level math.

April also described how she used an inquiry-based strategy in grades four and five to meet the learning needs of students who are hyper-active and wanted to be out of their seats most of the time. This strategy allowed students to work in small groups or with a partner to share ideas on mathematics problems. As her students moved around and talked about mathematics problems, they were also actively engaged in the teaching and learning process. April stated that:

> These kids now in the last ten years are talkers. They want to talk and they want to move so any time you can get them doing an activity that involves talking [and] sharing ideas keep[s] them engaged. Their behaviour is good and increases the learning. Working in groups or with a partner can be used at any point of a lesson, especially when the kids are getting restless – they get the chance to talk to somebody else about math and also move around.

April added that, through talking with their group members or partners, students were able to ask such problem-solving questions like "How did you come up with that answer or what do you think you would do differently? Or is there another way to solve this problem?" When she used whole-class discussions as a teaching strategy, April said:

> I would have students show their work on the board and explain to the class how he or she came up with that answer. I would also have them draw and write about how they came with their answer. I let students use manipulatives (base ten blocks, bingo chips) to help answer questions. I would also give students [a] problem-solving strategies chart to look at so they choose a strategy when solving problems, for example work backwards, use a number line, make a diagram, make a chart etc. I try to use activities that are no fail.

Becky on the other hand pulled out students in smaller groups to work one-on-one with them after whole class teaching. She described her experience in the following manner:

> … once I teach to the large group I have the small group come to a table and we work separately while everybody else is working confidently on the concept and then they feel very comfortable with that one-on-one instruction.

Cathy also had her grades three, five and six working in groups to solve mathematics problems. Among the three participants, she had the most students in her class with exceptionalities. She felt it was easier for her to teach her students in small groups than as a whole class. She said that her students:

> often have hard time working in large groups so a lot of that work would be partnered or in small groups and working together to solve a problem, and that can be really difficult with students with social communication disorders.

Cathy explained what students did in their groups or with partners:

> The program we use at our school is the *Math Makes Sense*. Each lesson is designed to start with what is called *Explore*. There might be a general question or problem that I would pose to the students and then I give them manipulatives or different graphic organizers to try and solve that problem. Once we have explored their answers and the strategies they have used, then I would go on to do direct teaching and introduce the strategies the program wants for them.

Cathy added:

> We do have a couple of pull out programs for blocks throughout the year with my teaching partner who is the other LAT [learning assistant teacher] where she may do very explicit teaching with those particular students.

4.2.2 Mathematics manipulatives and technological aids. All of the participants used mathematics manipulatives and technological aids such as computer games, smart boards, and videos to create motivating lessons or to review concepts taught in class. Participants felt technology has increased students' interest in learning and thereby has enhanced their academic performance. Participants shared that students with EBD often display off-task and disruptive behaviours during the teaching and learning process, but noted that whenever technology or manipulatives/teaching aids were used in instruction, students were ready to learn, quiet, attentive, active and engaged in the learning process. For example, participants described the benefits of using computers and specific computer programs to support student engagement and learning. April shared:

> We've got computers, so the students could go on the computers and, if I need them to review addition of four digit numbers, for example, they find a game and practice. Anytime they can go on the computer is highly engaging. There are fewer behavioural and emotional issues.

Cathy also described using computer software to supplement her math instruction, revealing that:

> We also have a computer program called the *Academy of Math*. We do see a progression in students' skills using this program, but it is hard to match the program to the part of the curriculum they are learning in the classroom because once they get on the program they have to go through the whole thing. If we can pick and choose the lessons for instance on that program that might make it easier to use. For instance, if we are doing geometry right now in the classroom and can move to geometry on the program that might make the program easier to use. There is another free online program students use at home called *Extra Math*. It is a memory recall program to help students understand basic facts – to master their times table etc. We have used these programs to some success with students that have the patience to do the programs, probably not as effective with our students with EBD.

Similarly, participants described their use of smart board technology to support student engagement and learning in their classrooms. As Becky commented:

> I have a smart board. They love that smart board. You know, with kids and technology now, anyway to get them engaged, and they can interact with it. They can't wait to be called up to use that. That has been very instrumental. I also use something called "Extra Math." It is a math website that helps them memorize their math facts. So one day we can focus only on facts and mastery of facts. The website also gives me all sorts of grading permission, graphs, their speeds etc.

In addition, Becky reported using videos to support student learning in her lessons:

> I use YouTube videos of teachers that have recorded what they have done in their classrooms. I will show the videos because sometimes they [students] get sick of me too. So I like to mix it up a little bit.

Participants also described the benefits of using mathematics manipulatives to support student engagement and learning. For example, Cathy shared that she uses a lot of mathematics manipulatives in her class to help students understand mathematics lessons in concrete terms:

> When I was teaching math, I used a lot of math manipulatives e.g. blocks, counters, grips three dimensional objects etc. so what you are trying to do is create the opportunity for them to understand the concept using their hands and coming to understand that concept in concrete terms and then you move from there to show them how to do it in more abstract forms or how to put it down on paper.

April supported the use of mathematics manipulatives, stating:

> Students use manipulatives, e.g. base ten blocks, bingo chips, to help them answer questions. Also, connect math to the world around them so that they can see the validity of it in their own eye. They also review concepts by playing math games like card and board games.

Becky also shared she used mathematics manipulatives to enhance students' learning:

> I use manipulatives … I have a smart board … I have mini white boards that all the kids have access to and I'll just ask them some review questions. They feel really comfortable using the white board, for whatever reason just for the fact that they can erase when it is wrong and they can kind of hide themselves in that and feel successful. I can see quickly who remembers from the day before, I will have them put up their white board and then I can check it really quickly. I have also used the *Dylan William ABCDTF Cards*. These are flip cards that are on key rings that the students can flip to provide me with answers to

either multiple choice questions or true/false questions. This is designed to provide me with a quick assessment on what the students understand about the concept we are currently learning.

However, Cathy pointed out her frustrations when students used manipulatives, stating:

> … specifically in teaching math, the problems that I would often encounter with them [students] is their inability to use the manipulatives in a way that works and connects to the lesson … I find that frustrating because you know they could get distracted or if they didn't totally understand what they were supposed to be doing then they might get frustrated and they may throw them or they may just not use the manipulatives appropriately.

4.2.3 Scaffolding. Participants shared they have found students with EBD to have difficulty managing their behaviour during independent seatwork. Therefore, they have used scaffolding or breaking challenging or detailed concepts and comments into smaller tasks or components to support student understanding and mastery. For example, participants reported they have used supportive instructional strategies such as: modelling, guided practice, breaking lessons into more manageable instructional chunks, providing immediate corrective feedback as they worked in small groups or one-on-one with students, and giving fewer assignments or individual versus class assignments to decrease student stress. As Becky explained:

> I break lessons up into small chunks so that the kids can feel successful quickly; otherwise, they don't buy into the lesson. If they don't feel successful, they shut down. I build lessons in small chunks, and I guide them along the way. Also, while breaking things up into smaller chunks as I've mentioned, I have seen so many students who, when I first started teaching them, were not interested in math and did not care and were very quick to tell me that and then as you work away at it and showing those small successes then they build that confidence and once the confidence is built then they are capable of way more …

April also shared her experiences scaffolding instruction and giving fewer questions to students:

> You will always have kids in the class that have behaviour issues and kids that have Attention Deficit Disorder with hyper activity where they are always talking out or moving or other extremes where they sit and stare in space. Make sure they understand the assignment and you check in on them half way during the assignment to see how they

> are doing. Give them fewer questions so they don't feel overwhelmed. I find that if you give them fewer questions they are more willing to start on it right away. If you give them a whole work sheet, that is just busy work – and boring for them.

4.2.4. Modifying language models. Participants pointed out that students with EBD typically also demonstrate difficulties understanding and using language. These difficulties make it challenging for students with EBD to show what they know and can do in mathematics when the questions that test their mathematics skills also assess their English language skills. They believed language plays an important part in students' abilities to gain the conceptual understanding needed to make sense of abstract symbols in mathematics. Therefore, participants emphasized the importance of modifying the language they use with students with EBD particularly when they are presenting information and posing mathematics questions (i.e., rewording mathematics questions to make them simple and easy for students to grasp). For example, Becky shared:

> We had a new resource called the *Nelson Math Resource*. Our school division wanted us to exclusively use that resource. It is very language based and what we found through the years in our computation scores in our *CAT* [*Canadian Achievement Test*] Testing and all the different forms of assessments we have been using is that computation is really lacking, so as a school division they realized that in the last three years or so that resource wasn't helping the computation part.

Becky went on to describe what she did differently with her students:

> I have done it differently in taking a lot of the language out because kids get hang up on it. If you are not a good reader then how can you sort through all of the text to find out what you have to do when you just want to do the math part of things? So I have changed the language and how I have instructed, I do include word walls for math.

April, on the other hand, asked other students to help their peers to complete assignments:

> I get a better response when students help other students. When a student gets done and knows the lesson, I will say, "go teach it to your friend," because the language I use will not be the same a kid will use to talk to another kid.

Cathy pointed out that:

> Students with any type of language delay, difficulty processing verbal instruction, memory difficulties, difficulties planning and sequencing etc… can benefit from the use

> of visual supports that reduce their dependence on using their memory, or understanding and keeping track of verbal instructions …

In summary, participants identified four general instructional strategies they have used in classroom to support the engagement and learning of students with EBD. Participants seemed to use identical strategies in teaching, which they modified to meet the learning needs of their students. The next theme relates to the impact of these strategies on the mathematics skills of students with EBD.

4.3 Theme Two: From Dead Time to Active Learning

Dead time is the period when students are disengaged in the teaching and learning process (Evertson, Sanford, & Emmer, 1981; George Lucas Educational Foundation, 2015), while *active learning* is the period when students are "thoroughly and thoughtfully engaged with each other or with the teacher" during the teaching and learning process (George Lucas Educational Foundation, 2015, p. 1). Students are not passive learners during active learning. They are mentally, emotionally, socially and physically involved in the learning process to make their own decisions on what they learn (Coban & Dubaz, 2011).

Participants described the impact of using differentiated instruction and instructional strategies that support students' engagement and learning on the mathematics performance of students of EBD. For example, April described how using instructional strategies improved her students' math skills:

> Yes, my students are doing better in math because of the strategies I use. When I first started teaching I didn't do [strategies] that as much. It was paper and pencil – here is the page and it has 20 questions. As time goes on we realized it wasn't working, so you start changing what you are doing and some come by experience, some come by reading books and some come by going to workshops and hearing what is the latest.

Becky also witnessed student improvement in mathematics when using instructional strategies to address students' learning needs:

> Yes, definitely. And I think with small progressions like I said they have that confidence and as soon as they have the confidence they are successful. I have kids doing things with Pythagorean Theorem that last year I couldn't even get them to sit down to do an assignment. It is not anything that I had expected so I think just the confidence building has been the key.

Cathy had similar experiences to April and Becky, stating:

> Yes, I would say that it has. I think the biggest impact that it had is on their social success. When socially expected behaviours are happening in the classroom then the academics will often follow and often what we find is if we can get the emotion and behaviour under control, we find that students know more than what we thought they did or we can find out that maybe there is something else also that is in the way of their success and we are in a better position to support their academic success. It gives us a more accurate assessment of their academic achievement, they may be at grade level but when the behaviours are there and the work production isn't happening, they are representing as though they are struggling academically, so yes I would say that they are progressing but if they are not progressing then there is often something that they've missed along the way and we have better sense of how to intervene to bridge some of those gaps.

To summarize, all participants indicated that they experienced success when they used instructional strategies that could be adapted to meet their students' needs when teaching mathematics. Specifically, participants reported students: were actively engaged in the learning process, had higher rates of assignment completion, were more confident, knew more than what teachers thought they knew, and were engaged in higher level mathematics activities when instructional strategies that met students' needs were used. The final theme relates to the effect of supportive instructional strategies on the behaviour of students with EBD in the teaching and learning environment.

4.4 Theme Three: Promoting Positive Student Behaviour

While reflecting on the impact of instructional strategies on students' behaviour during the teaching and learning process, the participants provided examples and descriptions about the positive effects of the use of instructional strategies on students' behaviours in the classroom. For example, April said:

> Using the strategies I have mentioned help reduce off-task behaviours. For example, working with a partner or using a computer program help the child that is a daydreamer or has math anxiety or is hyperactive. The strategies work because the students are more involved in the math activities, are more cooperative and show more enjoyment when doing math.

Becky's experience was similar to April's. She described the positive results of using instructional strategies that could be adapted to meet students' needs on their behaviour:

> So, in regards to reducing students' disruptions, I am seeing fewer and fewer. I would attribute that to the success that they are feeling and the confidence that they are feeling. I am not saying that there aren't disruptive behaviours, definitely there are, but somehow I can get them back on task. I would just say that the small successes have been the key.

All participants shared that their students were more successful, confident, and completed mathematics assignments when the instructional strategies identified in this study were used in the teaching and learning process. They felt their students with EBD were better behaved and exhibited fewer off task and disruptive behaviours when instructional strategies were used to actively engage and support them in the teaching and learning process.

A topic only one participant felt also needed to be considered was the use of medication as part of a comprehensive treatment plan for students with emotional and/or behavioural disorders.

4.5 An Additional Consideration: Students and Medication

Cathy felt it was important to consider the role medication plays in the lives of students with emotional and/or behavioural disorders. She reported that some of her students were on medication for oppositional defiance disorder, attention deficit disorder and attention deficit hyperactive disorder. They were medicated both at school and at home. Cathy was concerned about the breakdown in communication among teachers, parents and the medical professionals regarding the students and their prescribed medication. Cathy described a student's experience with a new medication:

> … then we have a little person [student] come to school who has an absolutely terrible, terrible day and if we had just known that he had been starting his medication we would have been sure that he was getting his snacks throughout the day, we would have been sure that he got a chance to talk about what he or she is experiencing … sometimes we do sensory or art breaks for young students, we would have kept an eye on him and not just left him out there on his own with this whole new brain and a whole new way of being in your body.

Cathy was frustrated that there were times when doctors put students on medications and then asked families not to disclose this information to the school to see if the school would notice any

difference in the child's behaviour. Cathy felt teachers would like to know when a student is on a new medication so that child is monitored closely. Cathy went on to describe the importance of consultation:

> … I find that a little bit frustrating. I've worked with students who've been diagnosed with serious mental health conditions without any consultation with the school, and sometimes that diagnosis was not consistent with what was observed at school.

Cathy stated students will have to adjust to how their brains function on the new medication as well as adjust to the emotions that came with it, for example, the student will have to learn how to regulate their appetite and also learn to manage the change in how they perceived stimuli. It was at this point that students became aware of the deficits they did not notice before they were on medication. She described why students on new medication need to be monitored:

> … a lot of people feel that attention deficit disorder is over diagnosed and I don't believe in over diagnosis, I believe in misdiagnosis. If you have ADD and you respond well to the medication in terms of treatment … you still need to be taught strategies, you will still need to learn and understand how your brain works, you still need visual strategies and support and scaffolding to be successful with that condition …

Cathy also added that there seemed to be the perception that teachers want to over diagnose students or want to have students over medicated. There were certain students Cathy pointed out who would not benefit from medication as that would not be an effective treatment for that particular disorder, for instance autism, but if that student with autism also has extreme anxiety or attention deficit hyperactive disorder, medication might be part of the treatment plan for the student. Cathy thought medication could also be a very important intervention or treatment plan for some students with EBD. Cathy described the effects of medication:

> Often it's easy to tell when he is on his medication or off of their medication, and you can also tell when the diagnosis is appropriate and when the diagnosis is probably a little bit off base. We have a little guy [student] who takes a lot of meds [medication] right now and there is no way that that small body on that much medication should continue to struggle the way that he does and that is frustrating because we have no recourse, especially when you are working with the family who maybe … they themselves are dealing with mental health conditions or they don't have the knowledge or the resources to be able to advocate or they don't understand … they're just doing what they're being

> told and you see a student who on that amount of medication should not continue to have all of these things going on for him … so you're questioning diagnosis or you're questioning the dosage or you have a student who may be so tuned up on medication that he is so focused, there is no joy in his life.

Cathy expressed concern medication can be misused and ignored when planning a comprehensive treatment plan for students with behaviour difficulties and disorders. She felt a comprehensive treatment plan for students with emotional and/or behavioural disorders should be considered by the planning team (i.e., parents, teachers, medical professionals like the family physician) which may include the use of medication.

4.6 Summary

Participants shared their thoughts and experiences related to the instructional strategies they used in the teaching and learning process, and their perceived effects on students' learning and behaviour. Three themes emerged from participants' interviews. The first theme was termed *ways of engaging students with EBD in learning*. Participants described the importance of differentiating instruction in order to engage students with EBD in the learning process and enhance their learning and behaviour in the classroom by using strategies such as: inquiry-based teaching individually and in groups, mathematics manipulatives and technological aids, scaffolding, and modifying language models. Participants seemed to use identical strategies in teaching, and they put a personal touch to the strategies to meet the learning needs of their students. Though participants identified similar instructional strategies, they each described how they personalized strategies to fit the specific learning needs of their students. The second theme was *from dead time to active learning*. Participants shared how their students progressed and demonstrated improved academic performance when supportive instructional strategies were used (e.g., students with EBD were more confident when they realized they were successful in solving math problems). The third and final theme was termed *promoting positive student behaviour*. Participants shared how using instructional strategies to meet the learning needs of students with EBD can support students in being less disruptive and more engaged in the teaching and learning process. In addition, one participant felt a comprehensive treatment plan for students with emotional and/or behavioural disorders should be considered by the planning team (i.e., parents, teachers, medical professionals like the family physician), which may include the use of medication.

The next and final chapter discusses this study's findings in relation to existing literature, the practical implications of the findings, the limitations and strengths of the current study, and areas for future research.

Chapter 5: Discussion

The purpose of this study was to explore instructional strategies elementary school mathematics teachers working with students with EBD perceived to be helpful in improving students' performance in mathematics using a resiliency perspective (i.e., the ability to positively adapt despite experiencing significant adversity; Luthar, Cicchetti, & Becker, 2000). An interpretive qualitative approach was used in this study to understand the experiences of three mathematics teachers of students with EBD as they engaged their students in the learning process while using evidence-based instructional strategies to improve students' academic performance in mathematics and their behaviour during instruction (Niesyn, 2009). This chapter reviews and summarizes the main findings of the study, and extends the findings to related literature in the areas of mathematics instructional strategies that best support students with EBD. Implications for educators, the strengths and limitations of the current study, and areas for future research are also outlined.

5.1 Summary of Findings

Participants were from three different urban school districts in central Saskatchewan. Although the participants came from different school systems, the instructional strategies they used and their teaching experiences were quite similar. The goal of the study was to understand the experiences of the teachers who used evidence-based instructional strategies to improve students' academic performance in mathematics and their behaviour during instruction. April, Becky and Cathy described their teaching experiences during an in-depth interview.

The first theme was termed *ways of engaging students with EBD in learning*. Participants described the importance of differentiating instruction in order to engage students with EBD in the learning process and enhance their learning and behaviour in the classroom by using strategies such as: inquiry-based teaching individually and in groups, mathematics manipulatives and technological aids, scaffolding, and modifying language models. For instance the inquiry based teaching worked well with April's students with EBD since her students were always looking for opportunities to move around in class and talk with peers. The strategy helped in channeling the habit of getting out of their seats and talking with peers to good use when students got together to talk about mathematics. This strategy not only promoted the learning of mathematics, but it also helped in eliminating some of the behavioural and emotional issues students exhibited in class. Another example is Becky modifying the wording in

mathematics problems so her students could easily solve problems without sorting through texts to find out what was required of them. However, Cathy explained her frustration when her students were unable to use manipulatives in a way that worked or connected them to the lesson. Becky emphasized the importance of differentiating instruction and adapting strategies used in her class because her students with EBD had different academic strengths and areas of need. These students needed extra academic help so as they could be brought up to grade level in mathematics. She called this extra time given to students "responsive stations."

The second theme was termed *from dead time to active learning*. *Dead time* is the period when students are disengaged in the teaching and learning process (George Lucas Educational Foundation, 2015) for example, a student who is reluctant to participate in a class activity. On the other hand, during *active learning,* students are "thoroughly and thoughtfully engaged with each other or with the teacher" during the teaching and learning process (George Lucas Educational Foundation, 2015, p. 1). This theme focused on the impact of identified instructional strategies on students' mathematics acquisition and maintenance of skills. The three participants experienced success with their students when the instruction strategies were in place. Participants perceived students to perform better in mathematics and progress in their acquisition of mathematics skills. The participants agreed that their students were more active and engaged in the learning process when the appropriate instructional strategies were used. Their students' assignment completion was high. Students' confidence was built as they became successful in solving math problems. Becky, for instance mentioned that her students started doing higher level mathematics by "doing things with Pythagorean Theorem that last year I couldn't even get them to sit down to do an assignment." Cathy also said her students seemed to know more than what she thought they knew about specific mathematics areas when their emotion and behaviour were under control.

The third theme was termed *promoting positive student behaviour.* This theme focused on the impact of the strategies on students with EBD behaviour. A commonality among participants was that they noticed their students exhibited fewer behavioural issues in class. Students were more involved in the learning process. For example, Becky explained she was saw less disruptive behaviour in her students and attributed that to the success and confidence students had in solving math problems when using an instructional strategy that met their

learning needs. She was able to easily get students back on task whenever there were any disruptive behaviour issues.

Participants' thoughts and experiences related to the instructional strategies they used in the teaching and learning process, and their perceived effects on students' learning and behaviour, can now be discussed in line with existing literature.

5.2 Integration of Findings within Existing Literature

The primary goal of this study was to explore instructional strategies elementary school mathematics teachers of students with EBD perceived to be helpful in improving students' performance in mathematics. Three main themes were derived from participants' interviews which can be linked to existing research literature in the areas of: instructional strategies used in classrooms with students with EBD, the impact of the strategies on students' mathematics acquisition and maintenance of skills learnt, and the impact of these strategies on promoting positive student behaviour.

5.2.1 Instructional strategies used in class with students with EBD. An instructional strategy is defined in the current study as teaching that is measured by learning gains (International Center for Leadership in Education Incorporated, 2000). Learning gains can be achieved when instructional strategies are combined with teachers' expertise leading to more learning and higher academic achievement for students with EBD (International Center for Leadership in Education Incorporated, 2000). Teaching students with EBD could be the most daunting task.

In the current study, all three participants identified inquiry-based teaching as an instructional strategy they used in class. Inquiry-based teaching approach is a student-centred instructional strategy that involves students solving problems in groups (Cole, & Wasburn-Moses, 2010). Participants reported that this strategy has worked well supporting students in mathematics skill acquisition and maintenance. For example, April mentioned that this strategy allowed her students to ask partners thought provoking questions like "How did you come up with that answer," or "What do you think you would do differently," or "Is there another way to solve this problem?" According to existing literature, inquiry-based teaching allows students to be flexible and resourceful problem solvers (Lack, Swars, & Meyers, 2014; Marshall, Horton, Igo, & Switzer, 2007; Marshall & Horton, 2011). It also promotes student motivation and develops active engagers in mathematical thinking in the classroom (Cole, & Wesburn-Moses,

2010). Inquiry-based teaching helps "students make, refine and explore conjectures on the basis of evidence and the use of a variety of reasoning and proof techniques to confirm or disprove those conjectures" (Cole & Wesburn-Moses, 2010, p. 15). This information is congruent with the current study's findings, since all participants reported that anytime an activity involved talking and sharing ideas were used in teaching, students felt successful and confident. Participants reported that students were engaged in the learning process, learning increased, and their behaviour was under check (e.g., less disruptive behaviours were observed). Thus, the current study further supports inquiry based teaching as promoting student motivation and actively engaging students with EBD in mathematical thinking in the classroom.

Participants in the current study also noted that breaking lessons into chunks helped their students more quickly to experience success. For example, Becky reported she built her lessons in small chunks and guided her students along the way. April also mentioned giving her students fewer questions so they did not feel overwhelmed. She realized that giving fewer questions to students, students were more willing to start on it right away. However, April cautioned that giving a whole work sheet student to work on was always boring to them. Studies show that 70% of the school day is spent completing independent seatwork, and that students of EBD find it difficult managing their behaviour during independent seat work due to their off-task behaviour (Niesyn, 2009). Participants in the current study supported helping students with EBD be on-task by giving students learning materials in smaller portions or in shorter assignments so they are better able to concentrate and complete classwork. Existing research supports the thoughts and experiences of this study's participants in that students with EBD have been found to be less stressed out when they complete smaller or shorter assignments (Niesyn, 2009). Achieving success fosters the development of self-esteem and promotes success in students with EBD (Maggin, et al., 2011). For example, Becky indicated that as her students showed small successes in mathematics, students' confidence was built and they became capable of doing much more.

Participants in the current study also talked about the importance of using mathematics manipulatives and technological aids in the classroom to support student engagement and learning. For example, April shared how her students reviewed concepts by playing mathematics games online or playing card or board games. She has also used technology to connect her students to mathematics and the world around them. Becky also pointed out that her

students felt comfortable and successful when using the smart board, while Cathy used mathematics manipulatives to create the opportunity for her students to understand mathematics concepts in concrete terms before moving on to introduce more abstract mathematical terms. Thus, the current study further support the ideas of integrating mathematics manipulatives and technological aids into lessons to enhance instructional presentation in order to increase student motivation in the learning of mathematics (Billingsley, Scheuermann, & Webber, 2009). However, Cathy found it difficult to match technology properly with the lessons being taught in class. Although integration of technology into lessons has been found to enhance instructional presentation and to increase student motivation in learning mathematics, there is limited research support for its use with students with learning and/or behavioural difficulties or disorders (e.g., Billingsley, Scheuermann, & Webber, 2009; Bouck, Okolo, & Courtad, 2007).

Participants in the present study spoke at length about modifying the language models used when teaching mathematics. For example, Becky modified the language she used when posing mathematics questions because she realized her students often got hung up in solving mathematics problems when they had to sort through difficult texts to find out what they were to do. This was especially evident if the students were poor readers. Becky also reported modifying language in the texts she used to support students development of mathematical concepts. The modification of mathematics texts is supported in the literature. For example, Vukovic and Lesaux (2013) explored the linguistic basis of mathematics in a diverse sample of children from first to fourth grades. Their results suggested that language ability is not directly involved in "learning how to manipulate quantities and execute algorithms but is involved in how children learn to make meaning of mathematical content" (Vukovic & Lesaux, 2013, p. 239). April also shared that she got better responses from her students when they tutored one another. She explained her students used language each other would understand. Modifying language models not only gives student tutors the opportunity to construct their own meaning of a problem, but also gives tutees the opportunity for guided practice (Niesyn, 2009; Spencer, 2006). Text modification in mathematics helps students with EBD in enhancing their problem-solving skills. This also promotes their understanding of mathematics problems thereby enabling them to maintain the skills they have learnt.

5.2.2 Impact of strategies on students' acquisition and maintenance of math. Participants believed instructional strategies used with students with EBD impact their acquisition and maintenance of mathematics skills. For example, Becky's students were able to solve problems involving the Pythagorean Theorem that they were unable to do a year ago. However, Cathy noted that the biggest impact this had on her students was their social success. She clarified that, when socially expected behaviours were happening in the classroom, academic progress followed. These findings agree with research that suggests a link between the use of the right instructional strategy and the learning of mathematics (Wehby, Lane, & Falk, 2003; Stevens & Lingo, 2005). Researchers found out that the use of inappropriate strategies is the aversive antecedent to students' avoiding tasks (Wehby, Lane, & Falk, 2003; Stevens & Lingo, 2005). Thus, it may be the case that for students of EBD to be able to acquire the skills needed for doing higher level mathematics, teachers need to use strategies that meet the learning needs of their students (Maggin et al., 2011). Research showed many appropriate behaviours displayed by students with EBD in the classroom are the result of some type of academic instruction by the teacher (Wehby, Symons, & Shores, 1995).

5.2.3 Impact of strategies on students with EBD behaviour. All participants reported when the right instructional strategy was in place they observed a reduction in students' disruptions and off- task behaviours because students experienced success and confidence in solving mathematics problems. Becky summed up this point, believing that students' small successes have been the key in keeping students behaviours in check (Niesyn, 2009). Existing research has shown students with EBD have displayed a number of undesirable emotions and behaviours in and out of class (Abrams, 2005; Council for Exceptional Children, 2011; U.S. Department of Education, 2004; Wehby, Symons, & Shores, 1995). In the present study, participants identified a somewhat more pronounced relationship between the use of the appropriate instructional strategies and positive student behaviours regardless of the background of the student.

5.2.4. Students and medication. It was only one participant, Cathy, who mentioned the role medication plays in the lives of these students. This teacher felt there was a perception that teachers want to over diagnose students or want to have students over medicated. Cathy believed not all students would benefit from medication since it would not be an effective treatment for all psychiatric disorders. However, she believed medication could be a very important intervention

or treatment plan for some students with EBD. A decision such as this would need to be a team decision involving the child's physician, parents, and teachers (Mattison, Reundberg-Rivera, & Michel, 2014; Ryan, Reid, & Ellis, 2008). Even though physicians are responsible for monitoring the effectiveness of medication on students, they cannot monitor these effects within the classroom; thus physicians must learn to rely on feedbacks from teachers regarding students' behaviour and learning (Ryan, Reid, & Ellis, 2008).

5.3 Implications for Educators

The comments made by the participants in this study suggest that students of EBD are capable of learning and acquiring mathematics skills if the instructional strategies that meet their needs are used. It is the task of educators of students with EBD to find instructional strategies that meet the particular needs of their students. For instance, April said her students were always looking for the opportunity to move around and talk in class. Due to this, she channeled that energy into getting her students move around and work with partners or in groups as they discussed and shared ideas on mathematics. Cathy was surprised by how much her students knew in mathematics when the appropriate strategies were used. Becky's students were able to solve higher order mathematics problems when the strategies she used met the needs of her students. Therefore, teachers of students with EBD have the responsibility to find the strategies that work for their students as students with EBD have the ability to understand, learn and achieve academic success. Secondly students behaved better and there was less distraction during instruction when the instructional strategies that met their needs were used. For instance, Cathy observed that when socially expected behaviours were happening in the classroom then the academics followed.

5.4 Strengths of the Current Study

This study provides insight into the experiences of teachers of students with EBD in the classroom as they use various instructional strategies. It helps educators understand that one instructional strategy does not meet the needs of every student, especially students with EBD. This study informs educators and all stakeholders to take into consideration the specific needs of their students before deciding on an instructional strategy for instruction. It also informs educators that the right instruction strategy can help to bring out the best behaviour of these students, thereby helping them to actively engage in school work and achieve academic success. Students and parents will be encouraged knowing that there are specific and useful instructional

strategies for students that could help promote positive student behaviours so students are not always out of class due to disciplinary issues.

5.5 Limitations of the Current Study

One limitation of this study involves the use of self-report data. Participants were interviewed to explore the instructional strategies they perceived to be helpful in engaging students, improving their performance in mathematics, and decreasing their disruptive behaviours. In self-report, participants may have inaccurate recall of information or they may not be truthful in reporting their experiences. This inaccuracy or deception on the part of participants may affect the creditability of their reports (Haeffel & Howard, 2010). Thus, follow-up interviews were used in this study to enable participants to clarify and/or add new information to what they said at the initial interview meetings. Supplementing self-report data with observational data can help to check and verify the information participants provide using self-report (Haeffel & Howard, 2010).

A concern that arose during the interviews, but not necessarily a limitation of this study, was that most of the teachers interviewed found the term EBD too strong in labelling their students. In the United States of America the Individual with Disabilities Education Act has a common definition for EBD (Dworet & Kimberly, 2007); however, Canada has a variety of definitions. For instance, New Brunswick, Nunavut, Northwest Territories and Yukon do not have any provincial or territorial law, rule, or regulation in defining EBD" (Dworet & Kimberly, 2007). Prince Edward Island and Saskatchewan however "defer their definition to clinical diagnostic information provided by medical personnel rather than developing an educational definition" (Dworet & Kimberly, 2007, p. 36). Alberta, Nova Scotia, Ontario and Quebec on the other hand have a single level definition for EBD while British Columbia, Manitoba, Newfoundland and Labrador based their definition on the severity of the disorder (Dworet & Kimberly, 2007). Developing a common definition for EBD in Canada would be useful in properly identifying students with behaviour and/or emotional disorders.

5.6 Implications for Future Research

Students of EBD are capable of achieving academic success and making good behaviour choices if they are under the right instructional atmosphere. There is a need for further research to be done in exploring instructional strategies for students with EBD taking into consideration their specific needs while taking instruction in a specialized environment, for example, a self-

contained classroom which is equipped with the resources students may require. Because of the unique characteristics of students with EBD, including conduct and attention problems, it is important to determine if the integration of technology into their lessons will enhance instructional presentation and student motivation. Future investigation of a nationally recognized definition of EBD in Canada will make it effective and efficient in properly identifying students with this disorder. Future research should aim at involving educational assistants as participants because these professionals also spend some time assisting students with EBD with their academics. Also, there is the need to find better ways for teachers, parents and medical professionals to collaborate if medication is going to be part of the treatment plan for students. Finally, even though self-report is widely used in qualitative research, it is also criticized as a method of data collection because of the potential credibility problems (i.e., participant inaccuracies and errors). Therefore, future studies using self-report should supplement self-report data with other data collection methods such as observation.

5.7 Conclusion

In summary, the findings of this study support the use of instructional strategies to improve mathematics academic performance of students with EBD and improve their behaviour in the classroom. Participants found the described instructional strategies as the ones that best meet the individual needs of the students with EBD. These strategies could calm students' disruptive behaviours and help them settle down and engage in the learning process. Medication could also be part of the intervention plan for students with EBD. Teachers and physicians are becoming increasingly aware of psychotropic medications available to treat specific psychiatric disorders in students which can complement students' "frontline behavioural and academic interventions" (Mattison, Rundberg-Rivera, & Michel, 2014, p. 347). The findings from this present research supported students with EBD can feel more confident and successful, become more proficient in mathematics, and use more positive behaviours, when instructional strategies are used that meet students' learning needs.

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APPENDIX A
CALL TO PARTICIPATE

Department of Educational Psychology and Special Education
University of Saskatchewan

PARTICIPANTS NEEDED FOR
RESEARCH IN SPECIAL EDUCATION

We are looking for volunteers (especially elementary school teachers) to take part in a study of Instructional Strategies for Teaching Mathematics to students with Emotional and/or Behavioural Disorders (EBD)

As a participant in this study, you would be asked to discuss during an in-depth interview your experience teaching math to students with EBD using identified instructional strategies

Your participation would involve two (2) sessions,
each of which is approximately (45) minutes

In appreciation for your time, you will receive
an electronic copy of my research report

For more information about this study, or to volunteer for this study, please contact:

Mary-Ann Dogoe
(Department of Educational Psychology and Special Education)
at
Email: laureen.mcintyre@usask.ca

This study has been reviewed by, and received approval through, the Research Ethics Office, University of Saskatchewan

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APPENDIX B
EMAIL TO PARTICIPANTS

Date:

Sender' Address:

Dear Teachers:

Date:

Sender' Address:

Dear Teachers:

I am interested in interviewing elementary school mathematics teachers and hearing about your experiences. Specifically, I am interested in hearing about the various instructional strategies you have used that have boosted the academic and social lives of your students with emotional and/or behavioural disorders (EBD). Your participation would involve two (2) interview sessions, each of which is approximately (45) minutes.

In case you want to participate in the study a consent form is attached for your signature. Note that by signing the consent form does not mean you are bound to participate in the study; in fact you can withdraw your consent anytime during the study with no repercussions or negative consequences.

If you are interested in participating, or would like to learn more about this study, please contact me by email at mmd031@mail.usask.ca.

Yours sincerely

Mary-Ann Dogoe

This project was reviewed on ethical grounds by the U of S Behavioural Research Ethics Board. Any questions regarding your rights as a participant may be addressed to the Research Ethics Office toll free at 1-888-966-2975 or ethics.office@usask.ca.

APPENDIX C
EMAIL TO PARTICIPANTS

PARTICIPANT INFORMATION SHEET AND CONSENT FORM

Project Title: Exploring Mathematics Instructional Strategies Working for Students with Emotional and/or Behavioural Disorders

Researcher: Mary-Ann Dogoe
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Phone Number: 419-279-8303
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Supervisor: Dr. Laureen McIntyre
College of Education
University of Saskatchewan, Saskatoon
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Email Address: laureen.mcintyre@usask.ca

Purpose(s) and Objective(s) of the Research: The purpose of the study is to investigate the instructional strategies that elementary mathematics teachers of students with Emotional and/or Behavioural Disorders perceive to be helpful in improving students' academic performance in mathematics and social achievement in the general or self-contained classroom. The objective of the study is to expand teachers' knowledge on the scientifically or evidence based instructional strategies available in mathematics for teaching students with EBD in elementary level grades.

Procedures: The target population for the study is elementary school grade teachers of EBD from schools in and around Saskatoon and teachers who are current students of the University of Saskatchewan and are in the College of Education. Participants will be interviewed on the instructional strategies they use in teaching mathematics to elementary school students with EBD. The interview sessions may last between 45 to an hour and this may be digitally recorded. Interviews will be held in one of the classrooms at the College of Education at the University of Saskatchewan. The interview room number will be communicated to the interviewees at a later date. Participants also have the opportunity of choosing any location convenient to them; such location chosen by participants should be an environment conducive for conducting an interview.

Potential Risks: There are no known or anticipated risks to you by participating in this research.

The possible benefits of the study: Findings from this study could be generalized to other teaching situations, not only in mathematics, but any other elementary grade EBD classrooms in schools in and around Saskatoon though these benefits are not guaranteed.

Participation: Participation in this study is voluntary. Participants are encouraged to share their experiences as math teachers of students with EBD and also talk about the instructional strategies used in classrooms to help students learn mathematical concepts and principles. Participants could include or leave out topics they do not feel comfortable talking about during interview sessions.

Withdrawal from the study: Participants can withdraw from the study at any point in time without any negative consequences to them if participants do not feel comfortable going on with the interview or the study. If you withdraw from the research project at any time, any data that you have contributed will be destroyed at your request. Participants could either verbally withdraw or provide a written withdrawal letter or send an email to this effect. However, participants' right to withdraw data from the study will apply until September 30, 2014 (i.e., before results have been disseminated or data has been pooled, etc.). After this it is possible that some form of research dissemination will have already occurred and it may not be possible to withdraw your data. On the other hand, the researcher can withdraw a participant from the study if the participant cannot find time to interview with the researcher.

Confidentiality: Confidentiality of participants' names will be maintained through the use of pseudonyms in reporting the findings of the study. Any specific details in the research findings that would reveal the identity of the school or participants will not be reported. After your interview, and prior to the data being included in the final report, participants will be given the opportunity to review the transcript of their interview, and to add, alter, or delete information from the transcripts as they see fit. The researcher will also undertake to safeguard the confidentiality of all topics discussed during the interview sessions.

Participants will be sent portable document format (PDF) copies of the research findings at the end of the study upon request

Participant's Consent Form
There are several options for you to consider if you decide to take part in this research. You can choose all, some or none of them. Please put a check mark on the corresponding line(s) that grants me your permission to:

I agree to take part in the above study: **Yes: ___ No: ___**

I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions: **Yes: ___ No: ___**

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason: **Yes: ___ No: ___**

I grant permission to be digitally recorded/audio taped: **Yes: ___ No: ___**

I grant permission to have my organization's name to be used: **Yes: ___ No: ___**

I wish to remain anonymous, but you may refer to me by a pseudonym: **Yes: ___ No: ___**

The pseudonym I choose for myself is: _____

_____	_____	_____
Name of Participant	Date	Signature

_____	_____	_____
Name of Researcher	Date	Signature

This project was reviewed on ethical grounds by the U of S Behavioural Research Ethics Board. Any questions regarding your rights as a participant may be addressed to the Research Ethics Office toll free at 1-888-966-2975 or ethics.office@usask.ca.

APPENDIX D
Guiding Questions for Initial Interview

1. For how long have you been teaching and also teaching mathematics to students with EBD?
2. Which elementary school grades do you teach?
3. Do you teach students with EBD in an inclusive or a self-contained classroom?
4. How do you begin a day's lesson in mathematics?
5. Can you list/tell me some of the mathematics strategies you mostly use in teaching?
6. What I would like you to do now is to tell me about your experience being a mathematics teacher of students with EBD. You can begin wherever you like and include or leave out whatever you choose. I am interested in finding out about your experience using these mathematics instructional strategies you mentioned about. Could you tell me about these experiences and techniques?
7. Which strategies have worked well with your students? Why do you say/think so?
8. Would you say your students' academic performance has progressed since the usage of these strategies commenced?
9. Is there anything that particularly surprised you about your students' performance when you used these strategies?
10. Has the relationship with your students changed since you started using the strategies that worked for them?
11. What are some of the emotional and behavioural problems students exhibit in class?
12. What are some of the off-task and disruptive behaviours students show in class?
13. How have the strategies helped in reducing students' disruptive and off-task behaviours in class? How do you know?
14. What has been the most difficult aspect of your teaching career as a mathematics teacher of students with EBD?
15. Is there anything you would have done differently, knowing what you know now?
16. What are the most important things other teachers of students with EBD should know about being a mathematics teacher (or teacher of any other sort) of students with EBD?
17. Is there anything I have not asked you about that I should have?

Questions for Follow-up Interview

After looking over the shortened version of the interview and your quotations, is there anything you have thought of that you would like to add, change, or delete?
Have you had any new thoughts or ideas since our last interview?

APPENDIX E
TRANSCRIPT RELEASE FORM

UNIVERSITY OF SASKATCHEWAN

Research Ethics Boards (Behavioural and Biomedical)
TRANSCRIPT RELEASE FORM

Title: Exploring Mathematics Instructional Strategies Working for Students with Emotional and/or Behavioural Disorders

I,_____, have reviewed the complete transcript of my personal interview in this study, and have been provided with the opportunity to add, alter, and delete information from the transcript as appropriate. I acknowledge that the transcript accurately reflects what I said in my personal interview with [name of the researcher]. I hereby authorize the release of this transcript to [name of the researcher] to be used in the manner described in the Consent Form. I have received a copy of this Data/Transcript Release Form for my own records.

_____	_____
Name of Participant	Date
_____	_____
Signature of Participant	Signature of researcher