SUPPORTING TEACHERS WORKING WITH STUDENTS WITH LEARNING DISABILITIES IN THE INCLUSIVE CLASSROOM

by

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ABSTRACT

Introduction: Teachers have reported lacking the training and knowledge to support students with learning disabilities (LDs), thus the *Accessible Strategies Supporting Inclusion for Students by Teachers (ASSIST)* has been developed to support teachers in their work with students with LDs. This hybrid implementation-effectiveness study employed the RE-AIM framework to address research questions on the implementation, effectiveness, satisfaction of the *ASSIST for Learning Disabilities (LD)* program, and the effects of COVID-19 on implementation. ***Method***: Data was collected from Canadian general classroom teachers using a mixed-methods approach. ***Analysis***: Descriptive statistics, computer-generated statistics, paired-sample *t*-tests, and content analyses were used. ***Results***: After completing the program, teachers' attitudes and beliefs about students with LD significantly improved and teachers were highly satisfied with *ASSIST for LD*. *ASSIST for LD* was able to reach a wide array of teachers, was implemented with fair fidelity, but COVID-19 proved to be a major limitation to implementation. ***Conclusions***: It is hoped that the results of this study encourage the use of *ASSIST* among teachers to support them in their work with students with LD.

LIST OF ABBREVIATIONS

Learning Disability/Disabilities: LD(s)

Intelligence Quotient: IQ

Discrepancy Model: DM

Intellectual Developmental Disorder: IDD

Response to Intervention: RTI

Processing Strengths and Weaknesses: PSW

Diagnostic and Statistical Manual of Mental Disorders: DSM

Evidence-Based Practices: EBP

Accessible Strategies Supporting Inclusion for Students by Teachers (for Learning Disabilities): ASSIST (for LD)

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CHAPTER ONE

LITERATURE REVIEW

Introduction

This first chapter is a broad review of topics relevant to learning disabilities. To begin, a brief review of the North American historical context of learning disabilities (LDs) is provided to demonstrate the various contributions that have resulted in the modern understanding of learning disabilities. Then, approaches to identifying learning disabilities, as well as diagnostic criteria, are compared. The etiology, prevalence, and impact of learning disabilities in and outside of the inclusive classroom are also discussed. Then, evidence-based practices (EBPs) and general teachers' knowledge and training on EBPs for Learning Disability (LD) are reviewed. Finally, we introduce the program, *Accessible Strategies Supporting Inclusion for Students by Teachers* (*ASSIST*), the importance of implementation research, and the implementation and effectiveness of *ASSIST for LD* among Canadian classroom teachers.

North American Historical Context of Learning Disability

This section discusses the medical, psychological, legal, and advocacy influences to the current understanding of LDs. This section focuses largely on the historical context in the United States of America, but also notes Canada's historical context. Early medical influences noted unexpected learning difficulties, while the field of psychology continued to research approaches for identifying children with these learning difficulties. This section also discusses the legal approaches to identifying LD in the United States and Canada. Advocacy groups in the United States led to federal legislature defining and designating LD as a disability which meant that those with LDs were entitled to rights, protections, and services. Meanwhile, in Canada, advocacy groups have also contributed to defining LD, but approaches to identifying LD are

ultimately determined by individual school boards, districts, or, as is the case in Nova Scotia, regional centres for education. For consistency we will henceforth use the term school boards.

Medical Influence

In the 19th century, medical professionals began observing individuals who had unexpected difficulties learning or performing academic skills (e.g., reading), and postulated the causes of such difficulties. Franz Joseph Gall (March 9, 1758 – August 22, 1828), a German neuroanatomist, and Adolph Kussmaul (February 22, 1822 – May 28, 1902), a German physician, observed such learning difficulties. Gall noted patients who could not speak but could produce writing (Fletcher et al., 2007). Kussmaul coined the term "word blindness" referring to a patient who was unable to read but maintained all other cognitive abilities (Alnaim, 2016; Fletcher et al., 2007). Thus, both Gall and Kussmaul noted patients who had difficulties with one skill despite having the ability to perform other skills. This began the concept of *unexpected difficulties* which would later permeate the conceptualization of LD.

The work of Karl Wernicke (May 15, 1848 – June 15, 1905), a German physician, and Pierre Paul Broca (June 28, 1824 – July 9, 1880), a French physician, contributed to the understanding of intraindividual differences in cognition by observing that difficulties with expressive and receptive language were linked to localized brain areas (Fletcher et al., 2007). This early work first established the foundation of inter- and intra-individual differences of cognitive abilities despite having other cognitive faculties intact. Later, in the 1920s, Samuel Orton (October 15, 1879 – November 17, 1948), an American physician, focused his work on reading difficulties. His work helped stimulate learning difficulty research and contributed to modern day reading interventions and instruction (i.e., the Orton-Gillingham approach) (Fletcher

et al., 2007). These early medical influences contributed to the burgeoning research about unexpected and localized learning difficulties in the field of psychology.

Psychological Influence

United States of America Historical Context. Marion Monroe (1898 – 1983), a child psychologist, was a contemporary of Orton's. Both Monroe and Orton contributed to the first approach to identifying LDs which became known as the Discrepancy Model (DM). Monroe, drawing from the concept of *unexpected difficulties,* first put forth (in 1932) the concept of identifying a difference between the actual and the expected achievement of students which became conceptualized as *unexpected underachievement* among students with learning difficulties (Alnaim, 2016). Orton contributed to Monroe's work by creating detailed records of children who had reading difficulties but had average IQ (Alnaim, 2016). Later, in 1963, Samuel Kirk (September 1, 1904 – July 21, 1996), an American psychologist, coined the term *learning disabilities* at a meeting discussing the problems children with handicaps face (Fletcher et al., 2007). Thus, Kirk provided a term for professionals and advocates to use to categorize people with learning difficulties, and Monroe and Orton led to the widespread adoption of DM as an approach for identifying LDs. These contributions, and the fact that previous definitions lacked clear inclusion criteria, led to the U.S. Office of Education including the DM into guidelines for identification procedures for LD in 1977 (Fletcher et al., 2007).

Canadian Historical Context. During the 1950s in Canada, Edward Levinson (February 9, 1925 – July 10, 2019), a psychiatrist, had noticed a number of children who had significant learning difficulties despite having average intelligence. His work led to the establishment of the Montréal Children's Hospital Learning Centre in 1960, first bringing awareness of LD to Canada (Stegemann, 2016). As this awareness grew, advocacy work began in the 1960s and 1970s,

which then led to the establishment of the Learning Disabilities Association of Canada (LDAC) in 1962 by a group of parent advocates (Stegemann, 2016). LDAC published its own LD definition by 1981, which does not explicitly require the identification of an IQ-discrepancy but does require that the student is of average intelligence.

Legal and Advocacy Influence

In the United States, as the field of psychology continued to research LDs, legislation was developed to designate LD as a disability. By 1968, LD was formally designated as a disability, entitling those diagnosed with LD to civil rights, protections, and special services in the United States (Fletcher et al., 2007). In Canada, there is no federal legislation about the identification or provision of services for those with LD. These issues are addressed at the provincial level of education. In both the United States, and arguably in Canada as well, advocacy groups played a larger role than science in establishing LD as a recognized disability (Fletcher et al., 2007). However, the advocacy work, legislation, scientific research all worked together to advocate for the identification of and treatment for LDs.

By 2004, the United States reauthorized the Individuals with Disabilities Act (IDEA), altering the 1977 U.S. Office of Education regulations. Specifically, these alterations no longer required school boards to use IQ tests to identify students who require special education services (Fletcher et al., 2007). Also of importance is that IDEA 2004 regulated that LDs should not be identified without evidence that the student has received appropriate instruction (Fletcher et al., 2007). This leads to the discussion of the various approaches to identifying and diagnosing LD and how they compare.

Early medical observations noted individuals with unexpected learning difficulties, leading to a conceptualization of ability-achievement differences among individuals. These

medical observations influenced psychological research queries into approaches for the identification of these unexpected learning difficulties and led to the coining of the term learning disability. Advocacy groups had influence in both the United States and Canada. In the United States, federal legislature for the identification and provision of services was established, while advocacy groups in Canada have contributed to definitions of LD and approaches for identification, but no federal legislature.

Approaches to Identifying Learning Disabilities

There is a lack of consensus about the best approach to identifying LD, causing inconsistencies in diagnosing LD (Fletcher et al., 1992; Fletcher et al., 2013). The main approaches to identifying LD are the Discrepancy Model (DM), Response to Intervention (RTI), and Processing Strengths and Weakness (PSW). This section will discuss each approach and their similarities and differences.

Discrepancy Model (DM)

As discussed in the historical context section, early work in the field of LDs led to an emphasis on identifying an *unexpected underachievement* among individuals with LD. This emphasis of the unexpected underachievement laid the foundation for the use of the DM. Overall, the DM is defined by an ability-achievement gap, where the persons academic achievement is at least two standard deviations below that of a measure of cognitive intelligence, typically a measure of IQ. Thus, the DM requires a discrepancy between a measure of IQ (ability) and their academic achievement (Stegemann, 2016). The DM requires the use of standardized tests to quantify cognitive ability and academic achievement.

Traditionally, to meet criteria for LD based on the DM, an individual's IQ could be no less than one standard deviation below the mean (i.e., a standard score of 85). This differentiated

LD from Intellectual Developmental Disorder (IDD), which requires that an individual demonstrate deficits in intellectual functions, in addition to deficits in adaptive functioning, which are quantified as scores at or below 2 standard deviations (i.e., a standard score of 70 or less) (American Psychiatric Association, 2022). This meant that individuals with IQs between 70 and 85 often were not considered to meet diagnostic criteria for LD or IDD and were sometimes labelled as slow learners (Fletcher et al., 1992). Slow learners were thought to be an independent and separate group from individuals with LD who had average to high-average IQs (Ihori & Olvera, 2015; Maehler & Schuchardt, 2011; Siegel, 1989). It was also believed that slow learners were less likely to benefit from intervention compared to those with LD (Siegel, 1989). However, these theories did not stand the test of time.

Fletcher et al., (1992) compared five groups of students, including comparisons between students meeting criteria for diagnosis of LD using DM methods, and children who were low achieving in academics. Significant differences but with small effect sizes were found between the low achieving students and those who met a diagnostic DM method of LD on measures of neurpsychological tests (e.g., verbal fluency, tactual performance, trail making). The small effect sizes called into question the utility of differentiating students with academic deficits using the DM. Maehler & Schuchardt (2011) also compared groups of students with learning difficulties with higher IQs to students with learning difficulties and lower IQs, and found no significant differences on measures of working memory. Siegel (1989) also argued that the assumption that children with learning difficulties but do not meet DM are different and less likely to respond to intervention compared to children who would meet a diagnosis of LD using the DM are faulty and alternative approaches should be used.

To address this issue of students with lower IQs possibly being undiagnosed when in need of instructional support, some clinicians transitioned to using a broad range of ability-achievement gaps, which allowed for IQ to be one to two standard deviations above achievement in the academic area that was affected. Others began to use regression procedures to control for any correlation between the IQ and achievement standardized tests. In this case, the cut off range of one to two standard errors of measurement has been used to define a discrepancy. Still, other states began to employ grade-level deviations or expectancy formulas (Fletcher et al., 1992).

Response to Intervention (RTI)

As previously mentioned, the 2004 update of the Individuals with Disabilities Education Act (IDEA, 2004), provided recommendations for identifying LD in response to criticism of the DM. These recommendations and regulations stated that states could no longer require the use of the DM and instead must permit the use of processes to determine if students respond to evidence-based intervention. Thus, the approach known as Response to Intervention (RTI) was introduced (Zumeta et al., 2014). In this method a tiered system is employed. Numbers of tiers can vary depending on the system but traditionally there are three tiers. Tier one involves general classroom instruction, tier two involves small group and explicit instruction, and tier three involves individual and intensive intervention.

Response to Intervention involves screening students at the beginning of school entry for learning difficulties. Students who appear to be meeting developmental and academic expectations continue receiving general classroom instruction. However, if the student does not meet academic expectations, students are provided tier two instruction, progress is monitored periodically, and if they improve in their performance they return to tier one instruction. If they continue to have learning difficulties they are then provided with tier three instruction. If after

receiving tier three support, the individual is still struggling to learn, they may be identified as having an LD (Fletcher et al., 2007). Thus, RTI aims to emphasize early identification of learning difficulties through screening and monitoring of students academic achievement levels (Ihori & Olvera, 2015).

Similar to the use of the DM, considerations need to be made when implementing RTI. There is variability in how school systems implement the components of RTI, including how they screen and monitor students progress and how students are determined to not be meeting academic expectations. Concerns have also been expressed about RTI's position that cognitive assessments are not necessary to identify LD. The concern is that by not requiring cognitive assessment, RTI deemphasizes the understanding of possible underlying learning processes related to LD (Ihori & Olvera, 2015).

Processing Strengths and Weaknesses (PSW)

This approach is based on the theory that cognitive processes are associated with the specific learning difficulties an individual may be experiencing and that, because LD represents a heterogenous group of disorders, there is variability in the strengths and weaknesses of an individual's cognitive processing skills (Fletcher et al., 2007). The literature supports the correlation of some cognitive processes and academic skills, but some cognitive processes have stronger empirical support linking them to specific academic skills compared to others. For example, the strongest empirically supported relationship is between the cognitive process phonological awareness and the academic skill of word reading. Rapid automatized naming (RAN) has also been found to be a strong predictor of later word reading skill among children and across languages (Landerl et al., 2019; Melby-Lervåg et al., 2012). Visual-spatial processing, and attention have also been found to be correlated to math skills (Rubinsten & Henik, 2009).

More generally, processing speed has been found to be a cognitive process that plausibly accounts for variance and comorbidity among reading LD, math LD, and ADHD (Willcut et al., 2019). Working memory also generally appears to be related to all areas of learning (Pullen, 2016; Rubinsten & Henik, 2009). Processing Strengths and Weakness aims to identify individuals with LD using a battery of assessments to measure these various cognitive processes and academic achievement. If there is a pattern of variability whereby a student demonstrates strengths in some cognitive processes, weaknesses in other cognitive processes, and the cognitive processing weaknesses can be logically linked to the areas of academic underachievement the individual would likely be identified as having a LD.

Similar to the other approaches, there are concerns about PSW's reliability and validity. There is limited empirical support for PSW approaches and the research that does exist demonstrated limited agreement between PSW approaches. This lack of agreement has been caused by the differences in measurement approaches across PSW approaches making the identification of LD inconsistent (Ihori & Olvera, 2015).

Similarities and Differences Among Approaches

Processing Strengths and Weaknesses and DM share more similarities compared to RTI. Both PSW and DM perform an assessment at one time point and look for unexpected underachievement by comparing the cognitive tests and the achievement tests. They are distinct from each other in that DM operationalizes unexpected underachievement using a measure of IQ and comparing that score to the individual's achievement scores. PSW, however, focuses less on combining measures of cognitive processes for a measure of IQ and rather examines measures of cognitive processes separately (Fletcher et al., 2007). Both PSW and DM aim to understand the cognitive processes related to learning difficulties, however, they also share limitations in

reliability, validity, and empirical support (Fletcher et al., 2007). Response to Intervention differs from the two in that this approach involves progress monitoring by assessing achievement at regular time intervals to assess for failure to meet academic expectations. If an individual is failing to meet expectations after receiving intensive instruction, they could be identified as having an LD (Fletcher et al., 2007). As such, RTI aims to promote early identification of learning difficulties. RTI has been limited by ambiguous operational definitions of below expectation. As discussed, all three approaches offer a way to identify learning difficulties but face limitations unique and shared limitations. A shared limitation is variability among the implementation of these methods.

Diagnostic Criteria for Learning Disability in Canada

Learning Disability has been given different labels depending on the criteria used. Advocacy groups, like LDAC, use the term LD, whereas the *Diagnostic and Statistical Manual of Mental Disorders – fifth edition – text revision* (DSM-5-TR; American Psychiatric Association, 2022) uses the term Specific Learning Disability (SLD). For consistency, this paper will use the term Learning Disability.

DSM-5-TR Criteria

The DSM-5-TR states four main criteria to diagnose SLD. The first criterion is the individual has difficulties learning and using academic skills as evidenced in at least one of six areas (i.e.., word reading; understanding text; spelling; written expression; mastering number sense, number facts, calculations; mathematical reasoning) despite the provision of interventions that target the difficulties. The second criterion is that the affected academic skills are substantially and quantifiably below those expected for the individuals chronological age and cause significant functional impairment. To be quantified, academic skills need to be measured

using standardized achievement measures in addition to a comprehensive clinical assessment. The third criterion states that the learning difficulties should have begun in school-aged years but may not be fully manifested until greater demands in the academic areas are beyond the individual's capacities. The fourth, and final, criterion states that the learning difficulties are not better accounted for by IDD, visual or auditory impairment, other mental or neurological disorders, psychosocial adversity, limited language proficiency, or inadequate instruction (American Psychiatric Association, 2022).

In this definition of LD, there is no recommendation or requirement to identify a difference between the individual's IQ and academic achievement. Rather, the criteria imply that assessing IQ would only be necessary to rule out a diagnosis of IDD. The DSM-5-TR criteria also emphasize the use of the RTI approach by including the exclusion of inadequate instruction as a cause of the learning difficulties in both the first and last criterion.

LDAC Criteria

The Learning Disabilities Association of Canada defines learning disabilities as disorders that affect "the acquisition, organization, retention, understanding or use of verbal or nonverbal information," and "learning in individuals who otherwise demonstrate at least average abilities essential for thinking and/or reasoning" (LDAC, 2015, Official Definition of Learning Disabilities). At least average abilities essential for thinking and/or reasoning, is interpreted as requiring a measure of IQ to be at least average. Similar to the DSM-5-TR, this criterion helps differentiate LD from IDD.

The LDAC definition also states that deficits in cognitive processes (e.g., phonological processing, language processing, memory, and attention), are logically linked to difficulties in academic skills, including oral language, reading, written expression, and mathematics. LD is

further suggested by a presentation of academic underachievement or average achievement that is maintained with exceeding amounts of effort and/or instructional support (LDAC, 2015). LDAC (2015) states that LDs affect academic skills including oral language (e.g., listening, speaking, understanding), reading (e.g., decoding, phonetic knowledge, word recognition, comprehension), written language (e.g., spelling and written expression); and mathematics (e.g., computation, problem solving).

Similarities and Differences of DSM-5-TR and LDAC

Similar to the approaches for defining LD, the DSM-5-TR diagnostic criteria and LDAC approach for identifying LD have similarities and differences. Both identify that an individual must have some sort of difficulty with learning that is affecting their achievement. Both require some type of standardized measurement of academic achievement to be able to quantify underachievement. The most prominent difference is that the LDAC approach states that it is necessary to assess an individual's cognitive processes and/or use a measurement of IQ, where the DSM-5-TR does not require a measure of cognitive processes or IQ for the identification of LD.

This paper will use the LDAC (2015) definition of LD. The detailed criteria allows for specific guidance on assessment and intervention planning. Further, the emphasis on cognitive processes allows for deeper understanding of how a student learns and how to target intervention towards remediating the cognitive process deficits. The LDAC definition is also the most used definition among school psychologists in Canada (D'Intino, 2017).

Etiology, Prevalence, and Impact of LD

As discussed, there are similarities and differences among the approaches and diagnostic criteria for LD. What they all share is that LD is demonstrated by the presence of unexpected

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academic underachievement due to a difficulty with learning. The identification of LD has led to research on its etiology, prevalence, and impact. As a heterogeneous disorder, the exact etiology, presentation, and impairment will vary across individuals. While the differences in approaches make it difficult to know exact rates, the literature shows LD to be a prevalent and impairing disorder.

Etiology

Due to their genetic, epigenetic (i.e., how our DNA is expressed), and neurobiological causes, LDs are classified as neurodevelopmental disorders within the DSM-5-TR (American Psychiatric Association, 2022; Khodeir et al., 2020). Research further suggests that LD is caused by the interaction of genetic (i.e., DNA), environmental (e.g., home, school), and neurobiological (i.e., brain-based) factors. Familial risk studies have supported the genetic risk factor for LD, showing that children of parents with LD are at an elevated risk for later development of LD (Snowling & Melby-Lervåg, 2016). Examples of environmental factors include minor brain injury, which may worsen LD symptoms (Monei & Pedro, 2017), and limited exposure to reading material, which can contribute to the development of LD where reading is affected. Neurobiological implications have been made, linking specific brain areas to LD. Specifically, areas of the brain such as the temporal and frontal lobes, Wernicke's and Broca's areas, and the intraparietal sulcus have been linked to reading and math learning disabilities (Monei & Pedro, 2017; Pullen, 2016). These neurobiological implications lend support to the association between cognitive processes and difficulties with learning that were previously discussed (Grigorenko et al., 2020).

Prevalence

As already mentioned, the varying definitions and diagnostic criteria of LD lead to variance in reported prevalence rates (Morsanyi et al., 2018). Across studies, it has been reported that 5% to 15% of school-aged children are diagnosed with an LD in the areas of math, reading, and/or writing (American Psychiatric Association, 2022). Based on data from a 2017 Canadian Survey on Disability, 3.9% of people aged 15 years and older have been diagnosed with an LD. On the 2006 Participation and Activity Limitation Survey (PALS) done by Statistics Canada, 3.2% of Canadian children have a learning disability, and of all the children who report having a disability, half report having a learning disability (LDAC, 2017). Additionally, it is relatively common that a student with a learning disability in one academic area will also show deficits in another area. Most common is the comorbidity of learning disabilities in both reading and mathematics (Morsanyi et al., 2018; Willcutt et al., 2019), so much so that some have estimated a comorbidity rate between 40% to 60% (Willcutt et al., 2019).

Impact

Learning Disability is one of the most prevalent disorders affecting school aged youth and is associated with increased risk for other emotional and behavioral difficulties. The severity and impairment of LD varies among individuals and may change over the course of an individual's lifetime. LDs may first present in the early years of a student's education but may only fully manifest later in the student's education as academic demands increase (American Psychiatric Association, 2022; LDAC, 2015). Regardless of how LDs present in an individual, LDs are lifelong. Therefore, LDs continue to cause impairments beyond school-aged years and into other areas in life (LDAC, 2015). One study found that difficulties in numerical skills, like

number processing and calculation fluency, have been shown to have a negative effect on self-esteem and professional careers in addition to school performance (Kucian & von Aster, 2015).

Learning disabilities put students at risk for other mental health disorders. Studies have found that kindergarten to grade 12 students (Nelson & Harwood, 2011a, 2011b) with LDs were at an elevated risk for other mental health disorders such as anxiety (Donolato et al., 2022; Nelson & Harwood, 2011a), depression (Donolato et al., 2022 Haft et al., 2019; Nelson & Harwood, 2011b), emotional distress, low self-esteem, and poorer interpersonal relationships (Haft et al., 2019). Learning disabilities also often cooccur with other mental health disorders. Khodeir et al., (2020) found that ADHD was the most common comorbid psychiatric disorder with LD (12.3%-82.3%), with anxiety (24.64%-28.8%) and depression (8.8%-10.8%) being the second and third most common comorbid disorders. Conduct Disorder (0.8%-3%) and Oppositional Defiant Disorder (7.8%) were also found to be commonly comorbid with LD but less so compared to ADHD, anxiety, and depression.

To reduce the impact of LD and resulting impairments on individuals, early identification and intervention is essential (Khodeir et al., 2020). The current research aims to provide tools to help promote early identification and remediation and adaptation strategies to help reduce or prevent LDs and their associated impact.

Inclusive Classrooms and LD Intervention

Advocates for those with LD have fought for individuals with LD to have access to both general education and specialized instruction and services to promote their inclusion and success (Stegemann, 2016). In 1975, The U.S. government recognized children with learning disabilities as being eligible to receive special education services under IDEA. As such, students with LD gained the right to specialized instruction to meet their unique learning needs (Cook & Rao,

2018; IDEA, 2004). While there is no similar federal legislation in Canada, advocacy groups have fought for policies that aim to ensure children with LDs have access to appropriate education, services, and supports for their learning.

The right to education and movement to access general education for persons with disabilities has introduced the concept of the inclusive classroom. In Canada, education policy is determined provincially and by individual school boards. As such, each province has a slightly different description of their principles and definitions of inclusive education. Nova Scotia's Department of Education and Early Childhood Development policy outlines principles of inclusive classrooms that state that all students have the right to access full day instruction and a common learning environment (e.g., the classroom; Nova Scotia Department of Education and Early Childhood Development, 2020). Overall, most policies highlight that inclusive classrooms aim to provide high-quality and equitable education that is culturally responsive (Ministry of Education, 2013; Nova Scotia Department of Education and Early Childhood Development, 2020). The general goal of inclusive classroom policy is to ensure factors like race and socio-economic status do not prevent students from being provided high-quality education and that educational materials represent all students. However, the policy also includes making sure factors like disability, including LD, do not prevent students from receiving high-quality and equitable education. This means that students with LDs are provided the right to learn alongside typically developing children with proper supports in place.

In addition to providing students with disabilities the right to inclusive education, the Inclusive Education Policy for Nova Scotia provided key directives for the implementation of inclusive education across schools (Nova Scotia Department of Education and Early Childhood Development, 2020). One of the key directives was the employment of the Multi-Tiered Systems

of Supports (MTSS). MTSS is an integrated approach to meeting the learning needs of all students (Nova Scotia Public School Program, 2019). The use of MTSS aims to be congruent with the EBPs that will be discussed in the next section.

While inclusive classrooms are important for the support of students with different learning needs, the implementation of inclusive classrooms puts the onus on teachers to be able identify students learning needs and use strategies to support those needs. This includes teachers being able to identify students who may need to be referred for assessment and to differentiate instruction, or seek support to differentiate instruction, for students diagnosed with LD. However, there are many barriers, such as training and education, that prevent teachers from being able to confidently support students with LD using EBPs (Froese-Germain & Riel, 2013; Lyon et al., 2001; Male, 2003; Male & May, 1997). The next section will further operationalize EBPs and discuss some barriers that teachers face when implementing EBPs.

Operationalizing EBP

Before discussing what practices have been found to be evidenced-based, it is worth spending some time demystifying and clarifying some of the language between science and practice. Practices, instruction, and intervention can either be classified as best practice, research-based, or evidence-based. Best practices are defined as practices that are informed by theory or professional expertise but may not have a research base or support to provide evidence of effectiveness. Research-based practices have some support from research but may be limited by the quality or quantity of research support available. Lastly, evidence-based practices are defined as practices that have extensive, high-quality, and systematic research support (Leko et al., 2019). Resources such as What Works Clearing House (WWC; https://ies.ed.gov/ncee/wwc/) can help teachers identify which instructional programs or strategies have the most evidence support.

Of note, these EBPs need to be implemented with fidelity to ensure improvements in outcomes of interest (Cook & Rao, 2018).

EBP and Accessible Strategies Supporting Inclusion for Students by Teachers (*ASSIST*)

While it is always recommended that professionals use evidence-based practices with fidelity, teachers may be limited by cost, resources, or time that evidence-based practices may require. In these cases, it is best to make an informed decision on how to combine evidence-based, research-based, and best practices to meet the needs of their students (Cook & Rao, 2018; Leko et al., 2019). As such, *ASSIST* is a useful tool for teachers as it streamlines evidence-based practices known to support students with LD to teachers for their use and mutual benefit. *ASSIST* also acknowledges the balance between the use of evidence-based practices and teachers making informed decisions on how to provide individualized instruction based on factors such as setting, context, and the student's strengths and weaknesses. By working through the program, the teacher is led to focus on a specific academic outcome (e.g., word recognition), then identify the appropriate evidence-based intervention or practice (e.g., phonological awareness instruction), and apply remediation and/or adaptations (e.g., peer support) to support student.

EBP for LD

Evidence-based practice includes remediation and adaptation strategies. Remediation involves providing explicit, targeted instruction to address academic area(s) and cognitive processing skill(s) related to a student's LD. Examples of remediation include providing phonological awareness instruction into the curriculum of a student with a reading LD. Adaptations, sometimes referred to as accommodations, are strategies used to allow students with disabilities a way to complete similar coursework as their peers and demonstrate mastery of a concept (Ontario Human Rights Commission, 2022). The what, when, where, and how of

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instruction are considered adaptations. Teachers can adapt what is taught, how it is taught, how students demonstrate their learning, and adapt the setting (where and when) in which material is taught or students demonstrate learning (Otukile-Mongwaketse et al., 2016). Examples of common adaptations include preferential seating, extended time on tests, assistive technology, and having questions on assignments or exams read aloud to the student (Zeng, et al., 2018).

The key characteristics of EBP, whether applied to remediation or adaptations, are explicit, systematic, and intensive instruction (Monei & Pedro, 2017). Explicit means that instruction and explanations of learning concepts are clear. Explicit also emphasizes modelling of skills and concepts by teachers. Systematic means that instruction is sequenced so that the concepts and skills build on each other. This is also sometimes referred to as scaffolding instruction (Reid, 2019). Finally, intensive refers to the combination of frequency, duration, and setting (e.g., group, individual) of instruction to maximize practice and mastery of skills.

There are many different types of remediation programs and adaptation strategies that include these key characteristics. No one single remediation program or adaptation strategy will meet the needs of every student with LD (Morsanyi et al., 2018). Therefore, another key component to EBP is individualization, sometimes referred to as individualized teaching methods, where these remediation and adaptations are purposefully selected to best address the need of the individual student (Bolic Baric et al., 2016).

EBP for Literacy (Reading, Spelling, and Writing)

Evidence-based practice for literacy can be broken down into EBP for reading and writing. Government groups in both the United States and Canada have published reports on how students learn early literacy skills. The United States established the National Reading Panel, which published a report in April, 2000, which stated that reading instruction should focus on

phonics and phonological awareness in kindergarten through grade 2, and transition to focusing on fluency, vocabulary, and comprehension by grade 3 through 12. In Canada, the Ontario Human Rights Commission held a public inquiry to the human rights issues affecting students with reading disabilities. The inquiry report supports that, beginning in kindergarten, explicit instruction in phonemic awareness and phonics should be taught to build foundational word-reading skills. They also concluded that by Grade 2, students should begin to receive explicit instruction on more advanced knowledge and skills to support word-reading accuracy and speed (Ontario Human Rights Commission, 2022).

These conclusions from both the National Reading Panel and the Ontario Human Rights Commission have significant implications in the remediation of reading. These findings underscore that phonemic awareness and phonological awareness are the foundation of good word-reading. Phonological awareness has been found to be the strongest cognitive predictor of reading difficulties, and while higher-order skills such as vocabulary are more correlated with reading comprehension compared to decoding, lower and higher-level reading skills are closely related (Landi, 2010). Therefore, without the foundation of phonological awareness for good word-reading, higher order skills will continue to be an area of difficulty for students and impact all other areas of reading including reading comprehension (Willcut et al., 2019). Taken together, these findings indicate that if a student is struggling with reading fluency in grades 3 and above, intervention instruction should continue to incorporate phonics and phonological awareness in addition to opportunities for reading practice and reading comprehension interventions.

In addition to these general guidelines noted above, there are specific strategies that have been identified to help specific areas of reading. As mentioned for word reading, the focus of intervention should be phonological processing and awareness. For text reading fluency, the

most effective strategy is repeated reading of appropriate text until students demonstrate mastery before moving on to more challenging text (Stevens et al., 2017). For reading comprehension, implicit and explicit vocabulary development, explicit comprehension strategies, and repeated exposure are cited strategies (Cook & Rao, 2018; Jitendra & Gajira, 2011; Kim et al., 2012; McKenna et al., 2015; NICHD, 2000). Explicit reading comprehension strategies include identifying structure of text, self-monitoring, summarizing text, questioning, and learning activities to assist the reader with processing the information in text (McKenna et al., 2015).

Spelling skill has been found to be closely related to reading. As such, reading instruction and spelling instruction have been found to mutually benefit each other (Graham & Santangelo, 2014; Willcut et al., 2019). Therefore, there is a large overlap between the strategies that can benefit spelling skill and reading. These include phonological awareness, letter knowledge, and phonics. Visuals of key words (e.g., posters), mnemonics for non-phonetic words (i.e., tricks to remember irregularly spelled words), and paired spelling (e.g., spelling with teacher, peer, or parent) are additional tools that have been found to benefit students struggling with spelling (Reid, 2019, ch. 4). Wanzek et al., (2006), found in their synthesis review of spelling interventions that systematic study and word practice produced the highest rates of spelling improvements.

Evidence-based practices for general writing instruction include making sure students have a functional pencil grip and the instruction of efficient and correct letter formation, as these are foundational skills for later writing abilities (Graham et al., 2009, ch. 6; Harris & Graham, 2013). When students move towards written expression, it is EBP to state clear expectations about writing process and provide good models of written text (Graham et al., 2009, ch. 6). Tools like mind maps, writing frames, brainstorming, and paired-peer writing are useful in helping

students who struggle with writing (Graham et al., 2009, ch. 6; Reid, 2019). For students with LD, it is important to teach strategies for planning, revising, and editing as outlined in the Self-Regulated Strategy Development Model (SRSD; Harris & Graham, 2013). SRSD is characterized by explicit teaching, individualized instruction, and criterion-based versus time-based learning. In the model, students are collaborators, thus active and engaged in the learning process. Thus, students are taught goal setting, self-monitoring, self-instruction, and self-reinforcement (Graham et al., 2009, ch. 6; Harris & Graham, 2013). Students with LD also benefit from being taught writing and reading together and using word processing and related software programs to support their writing (Graham et al., 2009; Harris & Graham, 2013).

EBP for Mathematics

General instruction for mathematics should start with providing conceptual understanding of numbers and math operations. Plenty of opportunity to practice is essential for establishing conceptual understanding of numbers and math operations and to establish automaticity of number facts (Reid, 2019). Then it is essential that students develop fluent computational and problem-solving skills. For these higher-order skills, explicit and systematic instruction continues to be key. Math content should be carefully and deliberately sequenced and teachers should explain and model procedural instruction. Additionally, it has been found that engaging in open discourse with students about computational sequences improves students' performance (McKenna et al., 2015; Reid, 2019). This discourse is important and useful when checking students' understanding of concepts (McKenna et al., 2015). Similar to reading and writing skills, providing visuals has been found to be an effective adaptation (Reid, 2019). For mathematics, visuals can be used to show computational sequences, fact cards, definitions of

unknown words in math problems, and meaning of math symbols (McKenna et al., 2015; Reid, 2019.

EBP for General Learning and Academic Skill Development

It has been established through the review of EBPs for each academic area that all students benefit from explicit, systematic, and intensive instruction (Graham & Santangelo, 2014; McKenna et al., 2015; Pullen, 2016). There are other general teaching practices that are considered EBPs. These include keeping sentences short, using familiar words, and restricting technical words (e.g., "acute," "symmetry") when providing definitions and examples (Reid, 2019). Modelling, immediate corrective feedback, and sufficient time to practice are also important and effective EBPs for general classroom instruction (McKenna et al., 2015; Monei & Pedro, 2017; Pullen, 2016; Reid, 2019; Wanzek et al., 2006). Modelling is an important aspect of explicit instruction because students need to see the correct use of strategies and skills. Immediate corrective feedback prevents students from practicing improper or incorrect skills and allows for self-correction (Williams et al., 2017). It is important for the corrective feedback to be immediate so that students do not spend any time solidifying any incorrect strategies to memory. Finally, sufficient practice of correct academic skills and strategies produces fluency as the skill becomes automatic for the student.

Research also provides evidence to the effect of group size on the efficacy of instruction or intervention for students who are struggling in academic areas. Research generally states that small group sizes (e.g., two to six students; Bolic Baric et al., 2016; Monei & Pedro, 2017; Walker & Stevens, 2017; Williams et al., 2017) and one-on-one instruction are most effective compared to large group or whole classroom instruction. However, research has not been able to demonstrate a significant difference between small group and one-on-one instruction. Therefore,

if a student is struggling with an academic area, it is EBP to provide small group instruction for the student. MTSS incorporates this EBP well. It is structured so that if a student is not progressing with classroom instruction, they are placed into tier two which utilizes small group instruction, or tier three instruction which may be smaller groups or individual instruction (Nova Scotia Public School Program, 2019).

Other behavioral strategies have been shown to be effective as well. In particular, reward programs, also known as token economies, are effective in addressing behavioral and academic challenges that are common in LD. Reward programs use positive reinforcement to maintain or increase a desired behavior, such as completing schoolwork (Kazdin, 1981; Pappas et al., 2010). To implement a reward program, teachers reward students when they engage in a desired behavior (such as completed homework), thus reinforcing the targeted behavior. Token economies allow teachers to give students generalized conditioned reinforcers, such as a chip, and once the student has a certain amount of chips, the student is allowed to choose a higher valued reward (e.g., extra time at recess, toy). This process is explicitly discussed between the student and teacher so that the student knows when they will receive the higher value reward. As such, teachers and students work together towards a behavioral or academic goal.

Teachers' Training and Knowledge of LD and EBP

Given the impact of LD on students' academic, mental health, and quality of life outcomes, effective early intervention is critically important to improve those outcomes (Froese-Germain & Riel, 2013). Teachers play an important role in the process of early intervention and preventing negative outcomes among students with LD. Early intervention requires that teachers are prepared to recognize and instruct different learning needs. Teachers need to have proper knowledge and understanding about students with LD and how LD affects student outcomes to

be able to recognize when students are struggling with learning. Additionally, a lack of understanding and knowledge can lead to negative teacher attitudes, such as deficit thinking, in relation to LD. Deficit thinking is when blame for learning difficulties is placed on students' internal traits rather than external factors outside of the child's control (Valencia, 2010). This deficit thinking can negatively affect students' self-esteem, motivation, and increase failure expectations, because it communicates to them that failure is attributed internally, and any successes are attributed to external factors (Woodcock & Vialle, 2011). In other words, they get the message that they are destined to fail and if they do succeed, it was not because they put in good effort or worked hard. However, when teachers have more positive attitudes, these improve student outcomes.

Despite the importance of teachers' having adequate knowledge and training in LD, studies have generally shown that teachers lack this knowledge and feel underprepared to instruct their students with learning difficulties. One study compared teachers from three western countries (Italy, Spain, and United States), and found that generally teachers reported being well informed about LD and the issues facing students diagnosed with LD but that they still reported requiring assistance to support those students (Cornoldi et al., 2018). Another study provided a survey to mathematics teachers in the United States and found that only a quarter of the teachers reported thinking that their teaching programs prepared them for teaching students with an LD in mathematics (DeSimone & Parmar, 2006). In Canada, a survey showed that teachers reported that they believed they lacked the training necessary to identify students who may need referrals and deliver EBP instruction (Froese-Germain & Riel, 2013). It was also reported that teachers did not receive professional development after their formal education on mental health issues, including LD (Froese-Germain & Riel, 2013).

A further example of the inadequate training teachers receive to support students was evidenced in the Ontario Human Rights Commission (2022) executive summary titled *Right to Read.* This executive summary discussed the results of an inquiry into the state of reading curriculum in Ontario, Canada. Their findings demonstrated that teacher education and professional development failed to provide teachers with the knowledge to understand how skilled reading ability develops and how to teach reading using direct, explicit, and systematic instruction. They also noted that teachers were provided little training in evidence-based early screening, reading interventions, and how to identify struggling readers. This executive summary underscored the larger epidemic across Canada where teachers were not being given the support and training needed to support students.

This gap in teacher training in EBPs for children with LDs needs to be addressed given the strong evidence for the influence teachers have on student outcomes. As previously mentioned, teacher attitudes influence student outcomes. Research has also shown that interventions can be effective when provided by general classroom and special education teachers (Kim et al., 2012; Stevens et al., 2017). However, for teachers to be effective in providing intervention instruction, they need to adhere to the instructional practices with fidelity (Kim et al., 2012; Lein et al., 2020). For teachers to be able to implement EBPs with fidelity, they need to be provided thorough training in EBPs. This would allow teachers to provide practical and emotional support to their students, resulting in a positive effect on students' academic outcomes (Bolic Baric et al., 2016).

Teachers' have reported holding the belief that students with LD deserve every opportunity to learn in the general classroom and feeling responsible to modify general classroom instruction to meet students' needs. They also reported believing that they have the

ability to support their students with LD emotionally, mentally, and academically when given adequate support (DeSimone & Parmar, 2006). However, barriers hinder teachers' success in implementing EBPs for students with LD and need adequate training and resources to implement EBPs with fidelity. *ASSIST* aims to support teachers' in these roles.

Accessible Strategies Supporting Inclusion for Students by Teachers (*ASSIST*)

Accessible Strategies Supporting the Inclusion of Students by Teachers, previously named Teacher Help*,* is an eLearning program that has been developed by Dr. Penny Corkum for over a decade with her colleagues and trainees. *ASSIST* was developed to provide teachers with a structured and partially self-directed way to gain psychoeducation and evidence-based intervention strategies for neurodevelopmental disorders (NDD). There are three modules for *ASSIST*, one for Attention-Deficit/Hyperactivity-Disorder (ADHD), Autism Spectrum Disorder (ASD), and LDs. Each of these modules consists of six sessions. The first session provides psychoeducation about the disorder, the second session introduces the teacher to a framework for interventions relevant to the specific diagnosis, the third through fifth sessions presents EBP and allows the teacher to put together a support plan upon which they can build, and the sixth session allows for time to adapt the plan and begin transitioning for continued implementation (see Table 1).

ASSIST has many strengths. It was developed with the needs of teachers, students, and the inclusive classroom in mind. It is comprehensive and sets a collaborative tone, emphasizing the teacher-student-parent relationship and communication. *ASSIST* overcomes many implementation barriers by being time-flexible and accessible as an online program. Another strength of *ASSIST* is that is has undergone several stages of testing.

ASSIST was first found to be an effective web-based intervention in a pilot study, demonstrating that teachers' attitudes, knowledge, and competence were positively affected after completing the six sessions (Barnett et al., 2012). A randomized-control trial (RCT) study was also conducted for *ASSIST for ADHD* (Corkum et al., 2019). The results from this RCT showed that after completing all six sessions of *ASSIST for ADHD,* teacher reports of students' core ADHD symptoms and impairment were significantly reduced in the classroom. Teachers also reported high satisfaction with and acceptability of the program, meaning they found the program to be accessible, feasible, well presented, collaborative, and effective. Further RCT studies were pursued for the other two modules of *ASSIST* but were not possible due challenges with implementation within the school systems. A smaller ($N = 55$) pre-post cohort study was completed and the results are still in progress but so far show that teachers were generally satisfied with the program and found it helpful in meeting the needs of their students with NDDs. *ASSIST* has also undergone usability testing for all three modules (Ali et al., 2021; Parker et al., 2020).

Parker et al., (2020) examined the usability of the LD module in *ASSIST* among a sample of LD specialists (e.g., school psychologists, clinical psychologists, resource teachers). The participants ($N = 18$) of this study completed all six sessions of *ASSIST for LD* and, on average, reported that the program was usable, useful, desirable, valuable, accessible, accurate, and credible. An overall satisfaction rating of 4.37 out of 5 was reported, indicating participants were *very* or *extremely satisfied* with the program. Most participants (79.83%) indicated that no changes were necessary, and 19.74% reported minor changes needed. Only two participants indicated that major changes were needed, which included removing information on role of psychologists, adding more practical examples, and information on the relationship between

cognitive processes and specific areas of academics. Overall, this study indicated that *ASSIST for LD* was a useful and appropriate eLearning program and provided useful feedback regarding improvements that were made to the program.

The research on *ASSIST* supports its efficacy for student and teacher outcomes. The current research expands on the support for *ASSIST* by understanding the implementation of *ASSIST,* including the barriers and facilitators of teachers' use of the strategies and practices taught throughout the program.

Implementation Research and Frameworks

Only about half of EBPs are ever implemented in a widespread way. On average, it takes about 17 years for EBPs to be incorporated into practice, and by this time, the research may be out of date (Bauer et al., 2015). Implementation research addresses how to translate science into practice and helps develop strategies to systematically improve the adoption of EBPs to practice (Bakken & Rutland, 2009; Bauer et al., 2015; Eccles & Mittman, 2006). Implementation research is necessary for the advancement of science as it develops and tests methods that would promote widespread implementation of programs that are sustained across a diverse population of people and settings (Damschroder, 2020). The goal of implementation research is to improve the quality and effectiveness of services and care (e.g., education) by streamlining EBPs into everyday practice, thus reducing the time it takes for EBPs to be adopted by those who would benefit (Bauer et al., 2015; Eccles & Mittman, 2006). Implementation research focuses on the rate and quality of EBPs and what are the facilitators or barriers of implementation. Without implementation research, knowledge from research accumulates without being effectively applied to real-world environments (Bauer et al., 2015).

Many factors influence why implementation fails. These include but are not limited to cost, time demands, lack of leadership, competing demands, lack of knowledge, skills and resources needed for implementation (Bakken & Ruland, 2009; Bauer et al., 2015). All these factors affect teachers' ability to implement practices and strategies. Teachers have competing demands, such as providing specialized instruction to one student while still needing to instruct a whole classroom. They have principals and parents to report to, reports to write, lesson plans to create, and more. As discussed, they also report being inadequately prepared in their training to support students with learning needs. Therefore, completing implementation research about teachers' use of *ASSIST* will help provide an understanding of these barriers and facilitators of teachers' use of EBPs with students with LD.

Theories, models, and frameworks all help guide implementation research. While these terms are sometimes used interchangeably, they do have distinctions which impact their use. Theories are analytical approaches to ground research. Models tend to intentionally simplify a phenomenon or a specific aspect of the phenomenon. Frameworks provide a structure with descriptive categories and discuss a relationship between those categories and how they relate to a phenomenon (Bauer et al., 2015; Nilsen, 2015). As mentioned, one of the goals of implementation research is to assess facilitators and barriers to EBPs and frameworks provide a way to analyze and categorize these facilitators and barriers (Bauer et al., 2015). Based on these definitions, the researchers of this study chose to use a framework, because the implementation research being done needed a structure to be able to understand how the many facets of the *ASSIST* program influenced where, how, why, and by whom, the program was used.

Nilsen (2015) further discussed five categories of theories, models, and frameworks: process models, determinant frameworks, classic theories, implementation theories, and

evaluation frameworks. Process models are intended to guide planning. Determinate frameworks tend to explore what implementation factors influence implementation outcomes and tend to be more prescriptive (e.g., Consolidated Framework for Implementation Research [CFIR]). CFIR is a comprehensive framework including five domains and many more constructs that are predicted to influence implementation (Damschroder et al., 2009; Kirk et al., 2015). CFIR has been used in a breadth of research, in a variety of settings, and methodologies. however, it has rarely been used to reflect on its contribution to the implementation of interventions (Kirk et al., 2015). In addition, while it is comprehensive, the wide scope of variables predicted to influence implementation make it a complex framework to use to evaluate *ASSIST*.

Other behavior models could have been considered as well since the implementation of practice highly depends on the behavior change of individuals (Michie et al., 2011). Two behavior change models include the Behavior Change Wheel (Michie et al., 2011) and the Internet Intervention Model (Ritterband et al., 2009). Both share strengths such as being comprehensive and linked to relevant behavior and motivation theories and models. Ritterband et al., (2009) present a strong framework to consider since it specifically addressed internet-based intervention implementation and is useful for evaluating implementation. However, there were limitations that prevented us from using these two frameworks. The Behavior Change Wheel seemed to be a determinate framework that predicts what aspects of motivation influenced uptake of behavior change. The Behavior Change Wheel largely focused on uptake and lacked assessment or maintenance of an intervention. A limitation to using the Internet Intervention Model is that it has not been widely applied yet. This made it difficult to support its generalizability. Both the Behavior Change Wheel and the Internet Intervention Model are very comprehensive with many factors and variables to consider. However, the large number of

factors and variables made them both difficult to apply to evaluating implementation of an intervention.

After considering the different types of frameworks (e.g., determinate versus evaluation) and some proposed frameworks, evaluation frameworks were determined to be the more fitting type of framework for the current research because our goal is to assess the implementation of *ASSIST* rather than explore any predictive variables or outcomes. Evaluation frameworks provide categories of implementation outcomes and a method for assessing implementation efforts (Damschroder, 2020; Nilsen, 2015). While the Internet Intervention Model could be considered an evaluation framework, RE-AIM is also an evaluation framework (Nilsen, 2015). RE-AIM was ultimately chosen as the framework to analyze *ASSIST* for a variety of reasons. First, RE-AIM is the most used framework in implementation research having been cited in 430 publications (Harden et al., 2018; Holtrop et al., 2018). Secondly, RE-AIM is structured but still allows for flexibility in how the categories are applied across disciplines and settings. This flexibility allowed us to adapt it to best assess *ASSIST.* Third, it is detailed enough to provide a comprehensive evaluation of the external validity and barriers and facilitators of implementation of *ASSIST* without being too broad or too narrow in scope. Lastly, RE-AIM has been found to be successful in evaluating implementation in many settings, including schools and mental health settings (Gaglio et al., 2013; Kessler et al., 2013). This was important to consider since *ASSIST* specifically targets teachers, education, and mental health outcomes.

RE-AIM translates science into practice through assessing the external validity or effectiveness of an intervention (Bakken & Ruland, 2009). The five dimensions (Reach, Effectiveness, Adoption, Implementation, and Maintenance) of the RE-AIM framework guides the development of programs by providing clarification about barriers to the application of

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programs (Gaglio et al., 2013). Among its strengths, RE-AIM is designed to assist in multi-level steps of implementation including planning, conducting, evaluating, and reporting (Bakken & Ruland, 2009). It answers the ultimate use question: which complex intervention, administered by who, under what conditions, in what settings, and for whom is the intervention effective; what are the outcomes, at what cost, and in which circumstances (Holtrop et al., 2018). RE-AIM assesses wide-spread implementation of systems based and social-ecological thinking, and community-based, public health interventions (Glasgow et al., 1999). As such, it was determined to be the best-fitting framework for the evaluation of *ASSIST*, an online program designed for teachers in the inclusive classroom.

Evaluating *ASSIST* with the RE-AIM Framework

RE-AIM assesses implementation by examining five dimensions of implementation of an intervention. These five dimensions are Reach, Effectiveness, Adoption, Implementation, and Maintenance of the program (Glasgow et al., 1999; Kwan et al., 2019). For this study, each dimension was defined as the following: Reach is defined as the absolute number, proportion, and representativeness of individuals who are willing to participate in a given initiative. Efficacy or Effectiveness is defined as the impact of an intervention on outcomes, including potential negative effects, quality of life, and economic outcomes. Adoption is defined as the absolute number, proportion, and representativeness of intervention agents who are willing to initiate a program. Implementation is defined as the intervention agents' fidelity to the various elements of an intervention's protocol. This includes consistency of delivery as intended and the time and cost of the intervention. Finally, Maintenance is defined as the long-term effects of a program on outcomes six or more months after the most recent intervention contact (Glasgow et al., 1999; Kwan et al., 2019). Reach and Effectiveness are generally applied on the individual level,

meaning they focus on who the program was given to and who it helped. Adoption and Implementation are generally applied on the staff level or across multiple settings. In other words, who provided the intervention and in what settings. Maintenance is generally applied on both the individual and setting level, looking at whether the program has a long-term use for the individual and how the program is institutionalized (Holtrop et al., 2021). The goal for an intervention is for it to be found effective among all five dimensions of RE-AIM (Kessler et al., 2013).

Reach, Adoption, Implementation, and Maintenance all contribute to answer whether *ASSIST* was implemented by classroom teachers in the manner that it was designed to be implemented. Effectiveness aims to assess the clinical effectiveness of *ASSIST* for teachers. Ideally, Effectiveness would aim to assess clinical effectiveness of *ASSIST* as measured by student outcomes, however, we did not have ethical approval from school boards to do so, thus we had to approach teachers directly and could not collect data on students. RE-AIM is best evaluated using quantitative and qualitative methods across all five dimensions (Holtrop et al., 2018), so the current study employs a mixed-methods approach by collecting both qualitative and quantitative data on the Effectiveness, Implementation, and Maintenance dimensions to gain an in-depth understanding of factors influencing the implementation of *ASSIST* among teachers.

Table 1

ASSIST session content

Session 1	Session 2	Session 3	Session 4	Session 5	Session 6
Overview of disorder	Intervention framework	Understanding your student	Further development of the intervention plan: a focus on core symptoms	Associated characteristics	Modifying the support plan
Self-Care	Developing a support plan	Strategies for core symptoms		Adding interventions	Transition planning
The team approach	Home-school communication	Implementing a plan		Special topics	Further needs

CHAPTER TWO

SUPPORTING TEACHERS WORKING WITH STUDENTS WITH LEARNING
DISABILITIES IN THE INCLUSIVE CLASSROOM

Learning Disability (LD) is part of the group of disorders listed in the *Diagnostic and Statistical Manual of Mental Disorders – Fifth Edition- Text Revision* (DSM-5-TR) as neurodevelopmental disorders (NDDs; American Psychiatric Association, 2022). LDs are reported to occur among 5 to 15% of school-age children (American Psychiatric Association, 2022). LDs are lifelong but can change in their presentation over the course of an individual's lifetime (LDAC, 2015). Everyday functioning is often impaired among children with LD in addition to putting these children at a greater risk for other psychological, behavioral, and social difficulties (American Psychiatric Association, 2022; Pullen, 2016). The DSM-5-TR and the Learning Disability Association of Canada (LDAC) provide different definitions and diagnostic criteria for LD, making prevalence rates difficult to confirm. The current study operationalizes LD based on the LDAC definition.

Principles of inclusive classrooms state that all students have the right to access full day instruction in a common learning environment (e.g., the classroom). Further, inclusive classrooms aim to provide high-quality and equitable education that is culturally responsive (Nova Scotia Department of Education and Early Childhood Development, 2020). Thus, inclusive classrooms allow students with LD to learn alongside their same-aged peers but with proper supports in place. While inclusive classrooms aim to prevent some of the negative effects of LD, they put the onus on teachers to provide, or seek support to provide, instruction to students diagnosed with LD. However, teachers have reported supporting students with LD as a primary concern and that they lack the knowledge and training to effectively support students with LD (Froese-Germain & Riel, 2013).

Barriers exist that prevent teachers from being able to confidently support students with LD by using evidence-based practices (EBPs; Froese-Germain & Riel, 2013; Lyon et al., 2001; Male, 2003; Male & May, 1997). Inadequate staff training in addition to lack of funding, coordinated services between school and community, time, referral options, and supportive leadership, as well as mental health (including LD) not being a priority in schools were some of the barriers mentioned in literature and endorsed by teachers. To overcome these barriers, teachers need to be provided access to adequate training (Froese-Germain & Riel, 2013; Lyon et al., 2001; Merle et al., 2022).

Research has demonstrated that EBPs for students with LD include remediation (e.g., phonics instruction) and adaptation strategies (e.g., assistive technology), which are delivered in an explicit, systematic, and intensive manner (Monei & Pedro, 2017). Explicit means the instruction is clear, systematic means the concepts build on each other beginning with simple concepts and building to more complex concepts, and intensive refers to the dose of the instruction (e.g., time and small group instruction). Given the prevalence of LD among students and teachers reporting a lack of training, and yet a desire for training, in supporting students with LD, there is a need to support teachers by providing them with opportunities to learn about LD and EBPs that support students with LD.

To fill this gap of research and practice, an eLearning program, *Accessible Strategies Supporting Inclusion for Students by Teachers* (*ASSIST*), has been developed by Dr. Penny Corkum with her colleagues and trainees for over the past decade. *ASSIST* was developed to provide teachers with a self-directed way to gain psychoeducation about NDDs, including how to include EBPs into their educational practices. There are three modules teachers can choose from, one each for Attention-Deficit/Hyperactivity Disorder (ADHD), Autism Spectrum Disorder

(ASD), and LD. Each of these modules include six sessions that follow the same general structure, but the content is unique to the module. The LD module's first session provides psychoeducation about LD, the second session introduces the teacher to a framework for interventions relevant to LD (focusing on remediation and adapatation), the third through fifth sessions allow the teacher to put together a support plan that they build on over these sessions, and the sixth session focuses on adapting the plan and beginning transition planning for continued implementation (see Table 1).

The LD module has undergone extensive usability testing. Parker et al., (2020) examined the usability of the LD module of *ASSIST* among a sample (N = 18) of LD specialists (i.e., resource teachers, itinerant LD teachers, school psychologists, clinical psychologists, learning centre teachers, and a principal). The participants of this study completed all six sessions of *ASSIST for LD* and, on average, reported that the program was usable, useful, desirable, valuable, accessible, accurate, and credible. An overall satisfaction rating of 4.37 out of 5 was reported, indicating participants were *very* or *extremely satisfied* with the program. Most participants (79.83%) indicated that no changes were necessary, and 19.74% reported only minor changes needed. Only two participants indicated that major changes were needed, which included adding more practical examples, and information on the relationship between cognitive processes and specific areas of academics. This study indicated that *ASSIST for LD* was a useful and appropriate eLearning program and the feedback was used to make changes to the program. An RCT study was pursued for the LD module of *ASSIST* but this was not possible due to challenges with implementation within the school systems. Therefore, a smaller (N = 55) pre-post cohort study was completed; the preliminary results indicated that teachers were generally satisfied with the program and found it helpful in meeting the needs of their students with NDDs. In order to

ensure that *ASSIST for LD* is in fact evidence-based and appropriate for use in the educational context, further research on the effectiveness and implementation of the program is needed.

The current study is a hybrid implementation-effectiveness study of the *ASSIST for LD* program among grades 1 to 12 general classroom teachers. Implementation research is necessary as it identifies the facilitators or barriers of implementing a program. Without implementation research, knowledge builds up without being used effectively (Bauer et al., 2015). It was also important to examine the effectiveness of *ASSIST for LD* to determine the clinical usefulness of the program. Thus, the current study aims to understand the barriers and facilitators to implementation of the *ASSIST for LD* program and how effective the *ASSIST for LD* program was for general classroom teachers working with students with LD.

There are various frameworks used to guide implementation research (e.g., Consolidated Framework for implementation Research [CFIR], Behavior Change Wheel). This study employed the RE-AIM framework due to its comprehensive scope, wide application including in school and mental health settings, and flexibility in applying the components of the framework. It is also compatible with a variety of methodologies and EBPs. The RE-AIM Framework is structured in a way that allows for focused data collection on various dimensions of implementation and the interaction between the dimensions. These dimensions include examining the Reach, Effectiveness, Adoption, Implementation, and Maintenance of programs (Glasgow et al., 1999; Holtrop et al., 2021; Kwan et al., 2019). This approach reflects the complexity of the real-life application of programs (Glasgow et al., 1999). The RE-AIM framework also helps guide development of programs by providing clarification about barriers to the implementation of programs (Gaglio et al., 2013).

This paper has four primary research questions: (1) Is *ASSIST for LD* implemented by classroom teachers in the manner that it was designed to be implemented? (2) What is the clinical effectiveness of *ASSIST for LD*? (3) How was teachers' overall satisfaction? (4) How did COVID-19 affect effectiveness and implementation? The first two research questions will be answered using the RE-AIM Framework. Table 2 summarizes the overarching research questions, the components of RE-AIM used to answer the questions, the secondary research questions for the corresponding RE-AIM component, the corresponding measures, and the variables from the measures used to answer the research questions. The secondary research questions are as follows:

- Reach asks (1) How did the recruitment methods work to reach and engage potential participants? (2) Did the recruitment methods result in a diverse and representative sample of teachers?

- Adoption asks (1) What proportion of teachers utilized (enrolled in) *ASSIST for LD*? (2) What was adherence like to *ASSIST for LD*?

- Implementation asks (1) What was the extent to which teachers utilized the strategies within the program? (2) What facilitated and impeded the implementation of the strategies presented in the module?

- Maintenance asks (1) Do teachers report continuing to use the strategies at the 6-month follow-up?

- Effectiveness, which includes secondary research questions: (1) What were the positive impacts of the program on proximal factors (i.e., teacher's attitudes and beliefs, and behavior and instruction management strategies)? (2) What were the positive impacts of

the program on distal factors (i.e., teacher distress and well-being)? (3) Were there any negative impacts of the program?

The third and fourth research questions are independent of the RE-AIM framework, but allow for a more nuanced understanding of teachers' view of the program by including satisfaction data, as well as the context in which the study was conducted (i.e., during the global COVID-19 pandemic).

Method

Participants

Classroom teachers were recruited via a variety of online methods and self-selected which of the three modules (LD, ADHD, or ASD) they would complete. Teachers who selected the LD module and who met the inclusion criteria (i.e., living and teaching in Canada, teaching in a regular classroom setting, and teaching grade 1 through 12) were included in the current study. Teachers were excluded if they were not comfortable completing the program in English, if they did not have a student with LD in their classroom, if they previously participated in an *ASSIST* study, and if they planned to be on a leave of absence during the school year. The program was intended for the teacher to focus on one student, but the strategies recommended in the program could be generalized to other students. As such, the teacher was asked to complete the program with one particular student. Demographics about the teacher participants reported included province, age, sex, ethnic or cultural heritage, level of education, community setting, years of teaching, and grades taught.

Measures

All questionnaires were delivered online via REDCap (Research Electronic Data Capture; Harris et al., 2019; Harris et al., 2009) hosted at Dalhousie University in Halifax, Nova Scotia.

All pre- and post-intervention questionnaires were provided to teachers regardless of how many sessions were completed or implemented unless otherwise specified. Refer to Appendix A to reference the measures and Table 2 to reference the measures with the corresponding research question and variables used.

Screening Questionnaire (Pre-Intervention)

The Screening Questionnaire (Appendix A) was developed by Dr. Corkum and her research team and included questions to make sure the teachers met inclusion criteria to participate in the study. If teachers did not meet eligibility, they were sent a thank you message and contact information for the research coordinator in case they had any questions. This questionnaire also provided demographic information on the provinces represented among the sample.

Participant Characteristic Questionnaire (Pre-Intervention)

This questionnaire was developed by Dr. Corkum and her research team and modified for the current study (Appendix A). Portions of this questionnaire were used to collect information about the teachers' age, sex, ethnic or cultural heritage, teachers' level of education, community setting, years of teaching, and grades taught. This questionnaire also collected information about how participants heard about *ASSIST*. This demographic information helped answer the Reach component of *ASSIST* by assessing the representativeness of the teachers who participated in the study, in addition to, which recruitment methods were effective.

Teacher Attitudes and Beliefs Questionnaire (Pre- and Post-Intervention)

The Teacher Attitudes and Beliefs Questionnaire (Kos, 2008) was adapted by Dr. Corkum for the purposes of the current study (Appendix A). This questionnaire collected quantitative data on teachers' beliefs and attitudes toward LD and included 18 questions that

comprised four factors: lack of control (e.g., "You cannot expect as much from a student with LD as you can from other students"), negative classroom effects (e.g., "I would feel frustrated having to teach a student with LD"), diagnostic legitimacy (e.g., "LD is a valid diagnosis"), and perceived competence (e.g., "I have the ability to effectively manage students with LD"). Teachers were asked to respond to the questions using a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). A total score (range of 18–90) for the entire questionnaire (which is a sum of the four factors) and the scores on the separate factors (lack of control: range from 6–30; negative classroom effects: range from 5–25; diagnostic legitimacy: range from 4–20; perceived competence: range from 3–15) will be analyzed to examine the Effectiveness component of the RE-AIM framework.

Instructional and Behavior Management Approaches Survey (IBMAS; Pre- and Post-Intervention; Martinussen et al., 2011)

The questionnaire collected quantitative data about how frequently teachers used evidence-based instructional adaptations (e.g., "Chunking assignments into smaller sections," "Providing written instructions/step by step delivery," "Shortening assignments."), instructional strategies (e.g., "Preferential seating," "More Immediate and frequent feedback"), and behavioral management (e.g., "Implementing positive behavior support plans," "Functional behavior assessment") approaches over the last month. There were a total of 36 items and participants had to respond using a 5-point Likert scale from 1 (*rarely*) to 5 (*most of the time*). A total score ranging from 36 to 180, and behavioral and academic subscale scores ranging from 18 to 90 were derived from this questionnaire at both time-points. The total score and the subscale scores were used to analyze the Effectiveness component of the RE-AIM framework.

Distress Thermometer (Pre- and Post-Intervention)

This questionnaire was adapted from the National Comprehensive Cancer Network (NCCN, 2019) and Ownby (2019). Participants were shown an image of a thermometer and asked to rate their own level of distress related to their teaching role. The thermometer displayed a range from 0 (*no distress*) to 10 (*extreme distress*). This item was used to analyze the Effectiveness component of the RE-AIM framework.

Subjective Well-Being (Teacher; Pre- and Post-Intervention)

This questionnaire was adapted from Statistics Canada (2016). The questionnaire collected qualitative and quantitative information about teachers' perceived level of satisfaction in their teaching role. Teachers rated their satisfaction on a 10-point Likert scale of 0 (*very dissatisfied*) to 10 (*very satisfied*). This item was used to analyze the Effectiveness component of the RE-AIM framework.

Implementation Questionnaire (Post-Intervention)

This questionnaire was developed by Dr. Corkum for the current study (Appendix A). It was administered at post-intervention only to participants who finished at least one session and addressed the implementation of the strategies. Participants were first asked if they were currently using any strategies from the *ASSIST for LD* program, to specify which ones, and how often they used them. Items two through thirteen collected qualitative data, where participants entered their responses in an open-text box. Items (e.g., "What made the *ASSIST* [easy/hard] to use and why?" "Please share any ways *ASSIST* has had any unintended negative impacts.") were used from this questionnaire to analyze the Effectiveness and Implementation components of the RE-AIM framework.

Computer-Generated User Statistics

Computer-generated user statistics provided data on the total number of access codes distributed, which measured Reach. Computer-generated statistics also provided data on enrollment to *ASSIST for LD,* and the number of sessions completed. This data measured Adoption.

Teacher Satisfaction Questionnaire (Post-Intervention)

This questionnaire was developed by Dr. Corkum and modified for the current study (Appendix A). This 19-item questionnaire assessed teacher's overall satisfaction with the program. Qualitative (i.e., open text boxes) and quantitative (i.e., percentages, Likert scales) items were used. The Likert scales of 1 (*strongly disagree*) to 5 (*strongly agree*) and 6 (*not applicable*). Items that were not applicable to the participants were not included in analysis, leaving a range of 13 to 65 for a total score. Individual items were also analyzed. All items were used to answer our third primary research question: how was teacher's overall satisfaction?

COVID-19 Impact & Status Update Questionnaire (Post-Intervention)

This questionnaire was developed by Dr. Corkum for the current study (Appendix A). This 9-item questionnaire collected information about the degree of impact the COVID-19 pandemic and restriction measures had on the teacher's ability to review and implement the content of the *ASSIST* program. Quantitative items (i.e., percentage, Likert scales) asking about any changes to teaching locations, percentage of time teaching online, and how much the pandemic affected their teaching. Individual items from this questionnaire were used to answer our fourth primary research question: how did COVID-19 affect effectiveness and implementation?

6-Month Follow-Up Questionnaire (Post-Intervention)

This questionnaire was developed by Dr. Corkum for the current study (Appendix A). Participants received this questionnaire six months after they received access to the *ASSIST* program. Teachers provided qualitative and quantitative data on whether they completed the *ASSIST for LD* program and whether they continued to use strategies that they learned from the program. Specific items from this questionnaire were used to analyze the Maintenance component of the RE-AIM framework.

Procedures

This research was funded by Kids Brain Health Network and received ethical clearance from the IWK Health Centre Research Ethics Board in Halifax, Nova Scotia. Further ethical clearance was received from Mount Saint Vincent University for the use of extant data. Participants were recruited through a variety of methods, including social media, search engines, and email. The social media sites, Facebook (https://www.facebook.com/ASSISTforteachers/) and LinkedIn (https://www.linkedin.com/company/assistforteachers), were primarily used to recruit participants through the use of advertisements. Google ads and electronic teacher magazine ads were also purchased for recruitment purposes. These advertisements had a button to click which would direct teachers to the *ASSIST* homepage (www.assistforteachers.ca). From the homepage, teachers could review basic information about the program and current study. If teachers decided they were interested in participating, they were directed to click a link which took them to REDCap (Research Electronic Data Capture; Harris et al., 2019; Harris et al., 2009) where they completed the Screening Questionnaire to confirm eligibility. From there, they were directed to the Teacher Consent Form, also through REDCap.

After providing consent, the participants were sent an email containing an invitation to complete the pre-intervention questionnaires. All questionnaires were administered and completed via REDCap. Once the pre-intervention questionnaires were completed, the participant was sent an email containing their personal login information for *ASSIST*. All email correspondence contained the research team's email in case the participant had questions or concerns. The teacher was then able to work through the six sessions of *ASSIST*. The sessions were delivered on a weekly basis, mandating a week delay before beginning the next session. Each online session was estimated to take about one hour. The goal was to have participants complete one session a week for a total of six weeks, but eight weeks were provided as a buffer for teachers to complete all the sessions. If the participants completed at least one session of *ASSIST*, they received an email invitation to complete the post-intervention questionnaires. Three reminder emails were sent if the participants did not complete the post-intervention questionnaires. All participants were entered into a draw for the possibility of winning one of three Amazon gift cards valued at either $100, $75, or $50 as compensation for their time and effort.

Data Analysis

Quantitative Analysis

Quantitative data were analyzed using IBM SPSS software (Version 27). Data collected at one time point was analyzed using descriptive statistics. Data collected at pre- and post-time points were tested for normality using the Shapiro-Wilk test of normality. The Shapiro-Wilk test of normality was appropriate because the sample size of this study at post-intervention was less than 50 participants. See Table 6 for results for the Shapiro-Wilk tests of normality. If there was no evidence of non-normality ($p > .05$), then the assumption of normality was considered met

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and a paired samples *t*-test was completed to compare the means at pre- and post-intervention. If the assumption of normality was not met ($p < .05$), the Wilcoxon Signed Ranks non-parametric test was completed in place of the paired samples *t*-test.

Qualitative Analysis

Content analyses were completed for the qualitative variables for the Effectiveness, Implementation, and Maintenance components of RE-AIM. Our content analysis procedure followed that proposed by Hsieh and Shannon (2005). This involved first becoming familiar with the qualitative data and its content and then determining initial codes and searching for common themes. These themes were reviewed, named, and defined. This resulted in the production of meaningful themes. This procedure encourages quantifying the themes identified, however, our qualitative results were too concise to be quantified in the same manner. Therefore, the Hsieh and Shannon (2005) procedure was modified where we followed four stages: (1) familiarization with the data and its contents; (2) search for common themes; (3) review of discovered themes; and (4) creation of qualitative summaries.

Results

This section is organized based on the primary research questions and the associated RE-AIM component research questions that are relevant to the first two research questions. As such, the RE-AIM components are not in the order following this acronym. Also, this organization does not provide a chronological account of participant attrition. Thus, refer to Figure 1 in Appendix A to see how participant attrition affected our analysis across pre-, post-, and follow-up time points. The sample size for each question is noted in the respective sections below.

Research Question 1: Is *ASSIST for LD* Implemented by Classroom Teachers in the Manner it was Designed to be Implemented?

Reach

How did Recruitment Methods Work to Reach and Engage Potential Participants?

Recruitment for all three modules of *ASSIST* was completed between March 1, 2021 and April 27, 2021. Post-intervention data was collected in July 2021 and follow-up data was collected between January and February 2022. Computer generated user statistics revealed that during this time, 1371 people visited the website. Of those, 341 consented to participate in the study and, finally, 273 individuals completed the Pre-Intervention Questionnaires to determine their eligibility, leading to 261 *ASSIST* accounts being opened. Of the consented participants, 102 participants enrolled in the *ASSIST for LD* module.

The study utilized various methods for recruitment including social media, podcasts, search engines, email, and print. Participants had to select all methods through which they heard about *ASSIST* through on the Participant Questionnaire. These responses indicated that 75.5% ($n = 77$) of participants were recruited via email, 19.6% ($n = 20$) through social media (e.g., YouTube, Facebook, LinkedIn, Instagram), 3.9% ($n = 4$) reported Google, and none reported using print as their mode of recruitment.

Did Recruitment Methods Result in a Diverse and Representative Sample of Teachers?

There was attrition of 11 participants from consent to starting the questionnaires, leaving 91 participants who completed the participant demographics measures. Teachers ($n = 91$) participating in this study were between the ages 26 and 63 years ($M = 42.59$ years, SD $= 9.22$). The sample of participants was predominantly female ($n = 82;$ 90.1%), with only 8 male participants (8.8%)*,* and one participant (1.1%) selected "other". The sample was also

predominantly White (*n* = 72*, 79.1%). Other ethnicities represented included Black (*n* = 3; 3.3%), South Asian (*n* = 5; 5.5%), Filipino (*n* = 2; 2.2%), Aboriginal (*n* = 1; 1.1%), Chinese (*n* = 1; 1.1%), Arab (*n* = 1; 1.1%), and South East Asian (*n* = 1; 1.1%). Some participants preferred not to respond (*n* = 4; 4.4%) or selected other (*n* = 1; 1.1%).

All ten Canadian provinces and one territory were represented. Twenty-eight percent (*n* = 29; 28.4%) of teachers were from Nova Scotia, 18.6% (*n* = 19) from British Columbia, 17.6% (*n* = 18) from Ontario, 10.8% (*n* = 11) from Prince Edward Island, 6.9% (*n* = 7) from Alberta, 4.9% (n=5) from Nunavut; 3.9% (*n* = 4) from Quebec, 2.9% (*n* = 3) from Manitoba, 2.9% (*n* = 3) Saskatchewan, 2% (*n* = 2) from New Brunswick, and 1% (*n* = 1) from Newfoundland.

Teachers represented various communities and grade levels. Twenty-seven percent (*n* = 25) reported teaching in a rural area, 26.4% (*n* = 24) reported working in a city with a population under 500,000 people, 23.1% (*n* = 21) reported working in a town, and 23.1% (*n* = 21) reported working in a city with a population over 500,000 people. Teachers who participated taught grades 1 through 11. Eleven percent of teachers taught grade 1 (*n* = 10), 6.6% (*n* = 6) taught grade 2, 9.9% (*n* = 9) taught grade 3, 6.6% (*n* = 6) taught grade 4, 9.9% (*n* = 9) taught grade five, 8.8% (*n* = 8) taught grade six, 11% (*n* = 10) taught grade 7, 4.4% (*n* = 4) taught grade 8, 7.7% (*n* = 7) taught grade 9, 3.3% (*n* = 3) taught grade 10, 5.5% (*n* = 5) taught grade 11, none taught grade 12, and 15.4% (*n* = 14) selected other.

Regarding training, 48.4% (*n* = 44) of teachers who participated reported having a bachelor's degree as their highest level of education, 45.1% (*n* = 41) reported having a master's degree, 4.4% (*n* = 4) reported having a doctorate in education (EdD), and 2.2% (*n* = 2) reported other (e.g., college, graduate degree). Teachers reported a range of teaching experience from 1 to 30 years (*M* = 14.07, SD = 8.01).

Adoption

What Proportion of Teachers Utilized the Intervention (i.e., logged onto *ASSIST*)?
Descriptive statistics analyzing the computer-generated statistics on number of participants who enrolled in *ASSIST for LD* and the number of sessions completed by teachers. Of the 102 teachers who consented and the 91 who then completed the demographic questionnaire, $n = 69$ (67.6%) teachers enrolled in *ASSIST for LD*.

What was Adherence Like to the *ASSIST for LD* Module? Descriptive statistics analyzing the computer-generated user statistics of number of sessions completed showed that of the 69 participants who ever enrolled, 30.4% ($n = 21$) did not complete any sessions, 20.3% ($n = 14$) completed one session, 10.1% ($n = 7$) completed two sessions, 7.2% ($n = 5$) completed three sessions, 4.3% ($n = 3$) completed four sessions, 5.8% ($n = 4$) completed five sessions, and 21.7% ($n = 15$) completed all six sessions. These results showed that attrition was a challenge for this study but there was a final sample of 15 teachers who completed all six sessions included in *ASSIST for LD*.

Implementation

What was the Extent to Which Teachers Utilized the Strategies Within the Program?
Thirty-four teachers completed the three items used to address how teachers used the strategies from the program. Participants appeared to report a mean response of 3.62 ($SD = 1.23$) of a total possible rating of 5 (*very carefully*), indicating they were careful in reviewing the sessions. Furthermore, teachers reported trying to use 44% of the strategies ($M = 43.76$, $SD = 31.13$), and given the large amount of strategies provided, this was a promising amount of strategies attempted to be used by teachers. Finally, teachers reported a mean score of 3.47 ($SD = 2.06$) out of a possible total rating of 7 (*very successful*), indicating that, regarding how successful they

thought they were at following the session plans, majority of teachers did not feel either unsuccesful or very successful.

Two items were used to address the use of the strategies learned from *ASSIST for LD* immediately after the completion of the sessions. Twenty-four participants responded to the first item, and 18 participants responded to the second item. The first item asked whether teachers were currently using any of the strategies provided in the *ASSIST for LD* program in the classroom. Of the 24 that responded to this item, 12.5% ($n = 3$) indicated this question was not applicable (N/A) to them. Four percent ($n = 1$; 4.2%) indicated that they were using most of the strategies, 58.3% ($n = 14$) reported using some of the strategies, 12.5% ($n = 3$) reported using a few strategies, and 12.5% ($n = 3$) reported using none of the strategies. The second item asked how often teachers were currently using the strategies they learned from *ASSIST for LD*. Of the 18 teachers that responded, 33.3% ($n = 6$) indicated that they were using the strategies at least every day, 27.8% ($n = 5$) responded that they were using the strategies about four days per week, another 33.3% ($n = 6$) responded that they were using the strategies only two or three days per week, and 5.6% ($n = 1$) reported that they were using the strategies rarely or about one day per week. These results showed that most participants were using some of the strategies and were using them for the majority of the week.

What Facilitated and Impeded the Implementation of the Strategies Presented in the Module? There were 23 total participants who responded to three items on the Implementation Questionnaire which asked what made *ASSIST for LD* easy or hard to use, in addition to what changes may have helped the teachers stay more involved in the program. There was one missing response for the item asking if there were any changes to the program that would have helped the participant stay more involved in the program.

Participants responses resulted in two themes that facilitated the implementation of *ASSIST for LD.* The two themes were that the program was easily accessible and easy to follow. Specifically, the program being delivered online supported its accessibility, and the break down of information into steps and sections made *ASSIST for LD* easy to follow.

The most common barrier to implementation was the time commitment of the program and length of sessions. Participants shared comments stating that the program, "required a significant time commitment," that the sessions and/or program was "longer to review and complete," and that it "takes [a] long time in one sitting and sometimes feels boring." The week-long wait period between sessions was also reported to impede implementation (e.g., "7 day wait period between modules [sessions]," "When you could only access the sessions one-week apart," "Timed release of information").

The last item addressing this question asked if participants had suggestions for changes to the program that would have helped facilitate the implementation of *ASSIST for LD.* Similar to factors that impeded implementation, participants noted that they would have changed the timing of the sessions, either making the sessions shorter, or increasing the time between sessions or loosening deadlines (i.e., "Longer time frame to complete sessions at the beginning. Longer time frame to implement the strategies. Any new strategies should take a minimum of two weeks to implement before you can note a change. Each session in this program required feedback after only 1 week of implementation. This isn't long enough to know if something is effective with students," "Have shorter sections," "Looser deadlines," "During very busy weeks it was difficult to complete my weekly session"). Additionally, participants appeared to want the program to be more interactive (e.g., "Some accountability to enter plan or strategy to try the following week,

"More reminders or feedback options, "Prompts to assess the specific strategies used while going through the program," "More interactive").

Maintenance

Do Teachers Report Continuing to use the Strategies at the 6-Month Follow-Up? Three items were used from the 6-Month Follow-Up Questionnaire to address this question. The first item asked whether participants were still using any strategies from *ASSIST for LD* six months after the program. Of the 13 participants who completed this item, 7.7% ($n = 1$) reported continuing to use most of the strategies, 15.4% ($n = 2$) reported using some of the strategies, 38.5% ($n = 5$) reported using a few of the strategies, and 38.5% ($n = 5$) reported that they were not using any strategies. The second item asked those who indicated they were using the strategies at follow-up to indicate how often they were using the strategies from *ASSIST for LD*. Of the eight people who responded to this question, no one reported using the strategies every day, 25% ($n = 2$) reported using the strategies about four days per week, 37.5% ($n = 3$) reported using the strategies about two to three days per week, and 37.5% ($n = 3$) reported only using the strategies about one day per week. Finally, the third item used asked what was the likelihood that the participants would continue to use the strategies learned in *ASSIST for LD* in the future with other students. Of the eight participants who responded to this question, 37.5% ($n = 3$) reported that it was highly likely, 37.5% ($n = 3$) reported that they were just likely to continue to use the strategies, 25% ($n = 2$) reported being somewhat likely, and none of the participants reported being not likely to continue to use the strategies, that the item was not applicable, or that they did not start the program. Thus, the majority of participants who reached the follow-up measure indicated that they were using most, some, or a few strategies, for two to four days of the week, and that they would be likely to continue to use the strategies.

When asked which parts of *ASSIST for LD* they were continuing to use, 26% (*n* = 6) of the original 23 participants who provided qualitative responses. Most responses mentioned still using the strategies discussed in the program (i.e., "Working with colleagues to ensure that students understand their particular learning challenges and are able to engage meaningfully in learning activities designed specifically for them"), including the academic strategies (i.e., "I am still using strategies for working with students and providing instruction to them in different ways") and behavioral strategies (i.e., "motivators and positive reinforcement").

Research Question 2: What is the Clinical Effectiveness of *ASSIST for LD*?

Effectiveness

Are There Positive Impacts of the Program on Proximal Factors Including Teachers' Attitudes and Beliefs and EBP? Thirty-three (*n* = 33) participants completed the Teachers Attitudes and Beliefs Questionnaire at both the pre- and post-time points. There was a significant difference, indicating an improvement in teacher attitudes and beliefs, between the total pre- (*M* = 40.52, *SD* = 7.94) and post- (*M* = 37.24, *SD* = 8.92) mean scores with a medium effect size (*t*(32) = 2.77, *p* = .01, *d* = 0.48, 95% CI [0.12, 0.84]). Mean scores for each subscale were also compared.

When separately analyzed based on the subscales, significant differences were found for all subscales except for Negative Classroom Effects pre- (*M* = 10.64, *SD* = 3.67) and post- (*M* = 10.58, *SD* = 4.25) scores (*t*(32) = 0.11, *p* = .91, *d* = 0.02, 95% CI [-0.32, 0.36]). There was a significant decrease between Lack of Control pre- (*M* = 13.18, *SD* = 3.63) and post- (*M* = 12.24, *SD* = 2.82) scores, with a small to medium effect size (*t*(32) = 2.10, *p* = .04, *d* = 0.37, 95% CI [0.01, 0.72]). Diagnostic Legitimacy also had a significant decrease between pre- (*M* = 8.00, *SD* = 2.06) and post- (*M* = 7.30, *SD* = 2.04) scores with a small to medium effect size (*t*(32) = 2.08,

p = .05, *d* = 0.36, 95% CI [0.01, 0.71]). Lastly, there was a significant decrease between pre- (*M* = 8.70, *SD* = 2.44) and post- (*M* = 7.12, *SD* = 2.69) Perceived Competence scores with a large effect size (*t*(32) = 3.80, *p* < .001, *d* = 0.66, 95% CI [0.28, 1.03]). Overall, these findings showed that teachers attitudes and beliefs improved, indicating that they saw students as less willful regarding their behavior, were more likely to view LD as a legitimate diagnosis, and saw themselves as more competent to instruct students with LD. However, attitudes and beliefs about the perceived difficulty to instruct students with LD did not improve or worsen.

To assess changes in use of EBPs, thirty-two participants completed the IBMAS questionnaire at both the pre- and post- time points. For the total score, there were no significant differences between the mean scores at the pre- (*M* = 123.07, *SD* = 18.14), and post- (*M* = 124.87, *SD* = 20.77) time points (*t*(31) = -0.54, *p* = 0.59, *d* = -0.10, 95% CI [-0.44, 0.25]). Additionally, there were no significant differences for the Behavioral subscale between pre- (*M* = 60.33, *SD* = 8.77) and post- (*M* = 60.75, *SD* = 10.32) intervention (*t*(31) = -0.22, *p* = 0.83, *d* = -0.04, 95% CI [-0.39, 0.31]) or the Academic subscale between pre- (*M* = 62.74, *SD* = 11.34) and post- (*M* = 64.12, *SD* = 11.71) intervention (*t*(31) = -0.77, *p* = 0.45, *d* = -0.14, 95% CI [-0.48, 0.21]) subscales. These results indicated that teachers use of EBPs neither increased nor decreased significantly while using *ASSIST for LD*.

Are There Positive Impacts of the Program on Distal Factors Including Teacher Distress and Well-Being? Participants were asked to rate their levels of distress and subjective well-being on a scale from 0 to 10. For distress, 0 indicated no distress and 10 indicated extreme distress, whereas for subjective well-being, 0 indicated very dissatisfied and 10 indicated very satisfied. There were no significant differences between pre- (*M* = 4.78, *SD* = 2.15) and post- (*M* = 5.18, *SD* = 1.91) scores on the Distress Thermometer (*Z* = -.93, *p* = .352) or the pre- (*M* = 6.98,

SD = 2.10) and post- (*M* = 6.58, *SD* = 2.19) scores on the Subjective Well-Being measure (*Z* = -.229, *p* = .819). Again, these results indicated teachers' stress and well-being neither improved nor worsened over the course of teachers participation in the study.

Were There any Negative Impacts of the Program? There were 23 total respondents for the item on the Implementation Questionnaire which asked about any unintended negative impacts the *ASSIST for LD* program may have had. Of these responses, 13 explicitly reported no negative impacts. The most common response mentioned was the time commitment (e.g., "I just don't feel I have had time to implement everything yet," "Some sessions were very long," "I didn't get to complete the program). Consequently, participants noted feeling bad that they were unable to complete the program (e.g., "I felt guilty for not continuing with the sessions!"). One person noted an important change targeting the inclusivity of the program, stating, "I was really uncomfortable that you did not acknowledge the Indigenous territory where you are living."

Research Question 3: What was Teacher's Overall Satisfaction?

Twenty-nine participants completed the Teacher Satisfaction Questionnaire. The highest score possible on this questionnaire was 65. The mean score was 52.80 (*SD* = 8.22) indicating a good rate (81%) of teacher satisfaction. By looking at the individual items, teachers responses indicated that teachers found that *ASSIST for LD* was easy to use and understand, and adaptable to their student and classroom. This also indicated that teachers found the delivery of the program to be flexible, and accessible. Teachers reported learning new things from *ASSIST for LD,* that they could apply what they learned to future students, and that the program encouraged collaboration between the teachers, students, and caregivers. All teachers except one reported that they would recommend *ASSIST for LD* to other teachers. See Table 7 for all the mean scores for each item on the Teacher Satisfaction Questionnaire.

Research Question 4: How did COVID-19 Affect Effectiveness and Implementation?

A total of 34 participants responded to at least some of the COVID-19 Impact & Status Update Questionnaire. Sixteen participants responded to the question asking if teachers had to change teaching locations during the COVID-19 pandemic. Fifty-three percent reported that they did not have to change teaching locations while 47% reported that they did. Sixteen participants also responded to the question about what percentage of time they spent teaching online during the study. On average, these teachers spent of 56% of the time teaching online. When asked if the program was adaptable for online teaching, the mean score was 2.13 ($n = 16$, $SD = 1.09$), which indicated that most teachers thought that only some of the program was adaptable. Finally, when asked overall how much the COVID-19 pandemic has affected their teaching during the course of the study, on a scale of 0 (*not at all*) to 4 (*a lot*), the mean score was 3.26 ($SD = 1.50$), indicating that COVID-19 affected their teaching a fair amount.

Discussion

Canadian teachers have reported lacking the knowledge and training to support students with LD in the inclusive classroom setting (Froese-Germain & Riel, 2013). *ASSIST for LD* was developed to help support teachers in their work with students with LD. The current study evaluated the implementation, effectiveness, and teacher satisfaction with this program, as well as the context in which the study was administered (during the COVID-19 pandemic). Many results from the current study support the use of *ASSIST for LD* among teachers. First, *ASSIST for LD* was found to be effective in improving proximal factors including teachers' attitudes and beliefs towards LD, specifically improving on factors of lack of control, diagnostic legitimacy, and perceived competence to instruct students with LD. Participants further reported being highly satisfied with *ASSIST for LD* and being likely to recommend it to other teachers. The

results in the Reach, Adoption, and Implementation domains indicated that there were some

challenges effecting engagement in the program, with the impacts of the COVID-19 pandemic

seeming to be a major limiting factor related to these challenges.

Research Question 1: Is *ASSIST for LD* Implemented by Classroom Teachers in the

Manner it was Designed to be Implemented?

Reach

Recruitment methods were able to reach a representative, but not necessarily a diverse

sample of teachers based on age (Statista Research Department, 2022), sex, and ethnicity

(Statistics Canada, 2014). While the sample was not necessarily diverse, this was more indicative

of the lack of diversity in the field of education, as it is a female and white dominated field

(Carter Andrews et al., 2019; Ryan et al., 2009). In a National Household Survey done in 2011, it

was reported that 84% of all elementary and kindergarten teachers in Canada were women

(Statistics Canada, 2014). This study's sample had mixed representativness of provinces teachers

worked in. In Canada, the largest number of teachers are represented by Ontario (159,572 of

409,593; Statistics Canada, 2022), whereas Ontario teachers were only the third largest group in

the current sample. Additionally, Nova Scotia represented the largest portion of this study's

sample of teachers, whereas in Canada, only 2.42% of the total population of teachers are

represented by Nova Scotia (Statistics Canada, 2022). However, the current sample of teachers

was more representative for provinces such as Newfoundland, New Brunswick, Manitoba, and

Saskatchewan when compared to the proportion of teachers per province reported by Statistics

Canada (Statistics Canada, 2022). So, while not consistently representative, the current study

sample did appear to be diverse based on provinces represented, as all provinces and one

territory were represented. It was more difficult to deteremine the representativeness of the

current sample across the variables of level of education, years of teaching, community setting, and grades taught as there are limited sources discussing Canadian statistics on these variables. However, there was representation of different levels of education, years of teaching, community setting, and grades taught which may allow for the sample to be considered diverse.

In terms of which recruitment methods were most effective in reaching teachers, email and social media were the most effective methods. This finding may be useful for future research when deciding which methods to employ to recruit participants.

Adoption

Attrition was a limitation in this study, with 102 participants having consented, 91 completing demographic questionnaires, 69 enrolling, 14 completing at least one session, 15 completing all six sessions, and 13 completing follow-up questionnaires. The attrition could be linked to many factors, including teacher stress and burnout. Teachers are overworked and experience burnout (Babb et al., 2022; Gray et al., 2017; Kim et al., 2022), leaving them with little time or motivation to be able to complete professional development activities like the *ASSIST* program. Additionally, COVID-19 has only contributed to teacher stress as teachers have faced uncertainty about the ever changing policies, new demands, and have had to plan for possible next steps. They faced practical challenges with how to communicate with students and how to engage students, especially students who may be at risk for learning difficulties (Kim et al., 2022). Teachers have also expressed feeling overwhelmed by being notified consistently about professional development opportunities, such that schools had to shift focus onto self-care for teachers (Kim et al., 2022). This suggests that some teachers may have felt more overwhelmed with the idea of completing a professional development task, like *ASSIST for LD,* during the COVID-19 pandemic.

Implementation

Participants did report lower levels of success following the session plans ($M = 3.47$ out of a possible 7). However, teachers who did engage in the program reported carefully reviewing the sessions and implementing approximately 44% of the strategies presented within the sessions. When considering the large quantity of strategies discussed within the sessions, 44% is an encouraging result. Additionally, most teachers reported either using some or a few of the strategies either every day or often. This indicated that the teachers who were able to follow the program were able to use some of the strategies with relative consistency. This result showed that while it may have been difficult to find the time to complete the program, the content within the program seemed to be useful and applicable to teachers' practices. Additionally, teachers reported that the program being online made it easily accessible, which appeared to help the reports of success. However, teachers also reported that having to wait a week between sessions and the length of sessions contributed to the lower rates of success when following the sessions.

Many factors can influence the implementation of strategies and programs by teachers. Seedorf (2014) also found that teachers' lack of time, among other factors, hindered the implementation of the Response to Intervention (RTI) model of instruction. Teachers' time is limited and valued, so having a tool that can be accessed on their own time and making sure sessions are shorter may be most beneficial for rates of success in following the *ASSIST for LD* program. Klug et al., (2018) found that teachers were less successful at implementing strategies that may have required more effort and expertise (e.g., providing feedback, planning student support) compared to general assessment strategies (e.g., making classroom observations more systematic). They reasoned that teachers may need more training to support their self-efficacy to implement certain strategies. A similar rationale may be applied to the current findings, as it is

also possible that certain strategies built into the *ASSIST for LD* program were easier to implement compared to others.

Maintenance

While there were only 13 participants who completed the 6-month follow-up measure, most participants reported continued use of the strategies, and most reported using the strategies at least two to three days a week. The qualitative results showed that teachers continued to use a mixture of the academic and behavioral strategies that were presented within the sessions. Teachers appeared to benefit from these different types of strategies. It was positive to see that teachers continued to apply the strategies consistently, as literature shows that intensive instruction, which involves providing adequate time for EBPs, is necessary for effective instruction (Pullen, 2016).

Research Question 2: What is the Clinical Effectiveness of *ASSIST for LD*?

Effectiveness

Results showed that after completing the sessions, teachers' attitudes and beliefs about lack of control, diagnostic legitimacy, and perceived competence were significantly more positive. This indicated three things. First, that teachers viewed students with LD as less willful regarding their behavior (e.g., did not attribute poor academic performance to lack of effort). Second, teachers were more likely to view LD as a legitimate diagnosis. Finally, teachers were more likely to see themselves as competent to instruct students with LD. These are important findings in that when teachers have more positive views about their students with LD, this helps improve student outcomes by helping the students have more positive beliefs about themselves and their ability to have future success (Woodcock & Vialle, 2011). Additionally, given that teachers have reported experiencing lack of preparation to instruct their students with LD

(Froese-Germain & Riel, 2013), these findings suggest *ASSSIST for LD* can be a useful tool to supplement teacher training to improve competence to instruct students with LD.

The results failed to reach significance for negative classroom effects which was a factor aiming to measure teachers' beliefs about whether they found it difficult to teach students with LD, and whether those students were perceived as disruptive to the class. It is possible that not being in the classroom due to COVID-19 limited the ability to see significant differences on this measure.

Results failed to show any significant differences on the measure of instructional and behaviour management practices, distress, and subjective well-being. With regard to the instructional and behavior management practices result, the results may have been limited due to the sensitivity and specificity of the measures. When this study was first implemented, the focus was on the ADHD module. Thus, the IBMAS measure, which was used for instructional and behaviour management practices, was selected but upon reflection, it may reflect effective practices for ADHD more so than for LD (e.g., preferential seating, selective ignoring, assistance during transitions). Therefore, it is possible that the IBMAS measure was not specific or sensitive enough towards effective practices for LD to note a significant change. Another possible explanation is the timed release of the sessions. The qualitative data indicated that participants did not feel there was sufficient time to implement the strategies, which may have limited the ability to see significant changes in teacher practices. Lastly, the smaller sample size is another limitation, making it difficult to observe a significant difference. It was unclear why there were no significant findings on the distal factors of distress and subjective well-being. It could be possible, again, that COVID-19 played a role in the stability of the high distress and

low subjective well-being scores, and an indicator of overall teacher stress and burnout (Babb et al., 2022).

Most teachers reported that there were no negative impacts and there were no reports of negative impacts of the program in relation to the students they were working with. This indicated that the program had a generally positive or neutral effect on teachers and their students. Teachers reported feeling badly for not finishing the program as a negative impact. One reason for this, and an additional negative impact, was that some teachers found the program long and time consuming. However, the positive implication of these responses was that teachers did want to complete the program but that time demands limited them from being able to do so.

One participant noted there was no inclusion of a land acknowledgement resulting in feelings of discomfort. While it was only one person who mentioned this, this comment was significant in its effect and is important to take note of and implement into the program.

Research Question 3: What was Teacher's Overall Satisfaction of *ASSIST for LD*?

Overall, teacher satisfaction was high. Teachers rated all items highly, including items such as the program being adaptable to other students, easy to understand, flexible, and accessible. The program was successful in encouraging collaboration and teachers were likely to recommend the program to other teachers. It was encouraging to see that through measuring satisfaction, *ASSIST for LD* was shown to be a resource that not only helped improve teachers' attitudes and beliefs, but that was also liked by teachers. This will hopefully lead to teachers to continue to use *ASSIST for LD* and for it to be attractive to other teachers.

Research Question 4: How did the COVID-19 Pandemic Impact Implementation and Effectiveness?

The COVID-19 pandemic has impacted all aspects of life during the past few years, and this study was no exception. This program was designed with in-person classroom education as

the standard but ended up being implemented during the height of the pandemic when many teachers had to move to online instruction and faced new and challenging demands. Many of the strategies that have been shown to be effective with students with LD have been in the context of in-person instruction. Therefore, it was not surprising that teacher responses suggested that the program was not very adaptable to online teaching during the pandemic. The findings showed that a fair amount of teachers also reported that the pandemic affected their teaching, which is consistent with other research (Kim et al., 2022). Behavior change, such as implementing new strategies is affected by capability, motivation, and opportunity, in a broad sense. Opportunity includes all factors outside of the individual that prompt or inhibit a behavior change (Michie et al., 2011). COVID-19, then, is an event that limited the opportunity teachers had to implement *ASSIST for LD* and use the strategies to change their teaching practices. Not only was COVID-19 likely to influence the Implementation domain of RE-AIM but also Reach, Effectiveness, Adoption, and Maintenance.

Strengths and Limitations

The strengths of this study include the use of a mixed-methods approach to collect and analyze data. The qualitative data enriched the quantitative data by hearing from teachers about their experiences firsthand. As well, the implementation-effectiveness approach to the current study allowed for not only the examination of the facilitators and barriers to the implementation of *ASSIST for LD,* but also whether teachers found it useful and effective. Another strength to this study was the use of the RE-AIM framework as it provided guidance to examine many dimensions of implementation, allowing for a richer understanding of the strengths and limitations of how teachers implemented the strategies in *ASSIST for LD*. The breakdown of the RE-AIM dimensions also allows for future research to better focus on improving the weaker areas of implementation of *ASSIST for LD.*

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A primary limitation to this study was the inability to collect student data. This restricted the current understanding of the clinical effectiveness of *ASSIST for LD*. While research has supported *ASSIST for ADHD* having a positive effect on student outcomes (Corkum et al., 2019), it would have strengthened this study to use an RCT design that included data on student symptomology and academic performance after the implementation of *ASSIST for LD*.

As mentioned earlier, some of the measures such as the IBMAS, may not have been specific or sensitive enough to detect statistical changes in instructional behaviors. This also applied to the other author-made measures which have unknown psychometrics of validity and reliability. Lastly, as already mentioned, conducting this study during COVID-19 was a significant limitation to this study. COVID-19 added stress to an already stressful job through switches to online teaching and other factors (Kim et al., 2022). Thus, conducting the study during COVID-19 confounded the results across the domains of the RE-AIM framework, but particularly within Adoption and Effectiveness.

Future Research

The current study provided encouraging results, showing that teachers were satisfied with *ASSIST for LD,* and that *ASSIST for LD* was effective in improving certain teacher attitudes and beliefs about students with LD. It would be advantageous to conduct this study again during a time when the rates of COVID-19 are lower and in-person education is the norm. This would hopefully allow for a clearer understanding of the effects of *ASSIST for LD* on the classroom environment and classroom instruction. Future research on *ASSIST for LD* should also use alternative measures for classroom practices that are more sensitive and specific to LD. Lastly, future research should be done on the cost effectiveness of intervention to determine the cost

benefit analysis for schools and teachers to implement *ASSIST*. Future marketing research will contribute to answering this.

Clinical Implications

The current study provided promising results for the effectiveness of *ASSIST for LD* as a tool to help support teachers. Teachers have reported feeling inadequately prepared to instruct students with LD, despite it being a primary concern (Froese-Germain & Riel, 2013). *ASSIST for LD* helped improve teachers' attitudes, beliefs, and competence when working with students with LD. As an online program, it was demonstrated to be easily accessible, which allowed for it to reach teachers from across Canada and allowed teachers flexibility to complete the sessions. While there were limitations with Adoption and Effectiveness, largely due to COVID-19, teachers also reported to be satisfied with the program. As such, *ASSIST for LD* can be a relatively quick (6–8 weeks) program available to teachers to support them in their work with students with LD.

These findings also have applications to the professional relationships between teachers and school psychologists. School psychologists are the mental health experts within the school systems and provide support to teachers through consultation when working with students with academic and behavioral needs (King et al., 2022). However, school psychologists also are faced with being overworked and have limited time for other professional activities aside from psychoeducational assessment (King et al., 2022; Corkum et al., 2007). *ASSIST for LD* could reduce the time required by school psychologists to train teachers in EBPs. However, school psychologists can still remain available to support the learning teachers receive through *ASSIST for LD*. As such, *ASSIST for LD* can be a useful recommendation that school psychologists can refer teachers to for psychoeducation and instructional recommendations.

Conclusion

      This study was a hybrid implementation-effectiveness study on the *ASSIST for LD* program. By using the RE-AIM framework, we examined the Reach, Effectiveness, Adoption, Implementation, and Maintenance of *ASSIST for LD* and generally found that the program was able to reach teachers from an array of backgrounds. While the study limitations effected the scope of the findings, the results provided support that despite these limitations, teachers implemented a good proportion of strategies and were very satisfied with the program. Results from this study supported the effectiveness of *ASSIST for LD* in that it positively changed teachers' attitudes and beliefs regarding their students with LD and their own competence to instruct students with LD. While the collection of student outcomes was not possible, it was also promising that teachers did not report any negative impacts of the program in relation to their students. It is hoped that with this research, in addition to the future research suggested, *ASSIST for LD* can be a widely applied tool to equip teachers to support their students with LD.

Table 1

ASSIST session content

Session 1	Session 2	Session 3	Session 4	Session 5	Session 6
Overview of disorder	Intervention framework	Understanding your student	Further development of the intervention plan: a focus on core symptoms	Associated characteristics	Modifying the support plan
Self-Care	Developing a support plan	Strategies for core symptoms		Adding interventions	Transition planning
The team approach	Home-school communication	Implementing a plan		Special topics	Further needs

Table 2

Research Questions, Measures, and Variables

Overarching Research Question	RE-AIM component	Sub-Research Questions	Measures	Variables
1. Is ASSIST for LD implemented by classroom teachers in the manner that it was designed to be implemented?	Reach	1. How did recruitment methods work to engage potential participants?	Computer-generated user statistics; number of access codes distributed	N/A
		2. Did recruitment methods result in a diverse and representative sample of teachers?	Participant Characteristic Questionnaire	1) Age 2) Sex 3) How would you best describe your ethnic or cultural heritage? 4) What is your highest level of education completed?
			Screening Questionnaire	5) How would you describe the community where you teach? [Rural/Town/City…] 6) For how long have you been teaching? 10) How did you hear about the ASSIST program? 3.a [IF YES to living in Canada] In which province/territory do you live? [Drop down menu of province and territories]
	Adoption	1. What proportion of teachers utilized the *ASSIST for LD* module?	Computer-generated user statistics; number of those who logged on	N/A
		2. What was adherence like to the *ASSIST for LD module*?	Computer-generated user statistics; number of sessions completed	N/A
	Implementation	1. What was the extent to which teachers utilized the strategies within the program?	COVID-19 Impact & Status Update Questionnaire	5) How carefully did you review the ASSIST program content for the sessions you reviewed, including the videos, text, and activities? 6) What percentage of the strategies from the ASSIST sessions you reviewed did you try to use? It is OK to estimate the percentage, we just want to know if you implemented none (0%), a few (e.g., 30%), some (e.g., 65%), or all (100%) of the strategies 7) How successful were you with following the Session Plans generated at the end of each of the 6 sessions for the sessions you completed?
			Implementation Questionnaire	1A) Are you currently using any of the strategies provided in ASSIST in the classroom? 1C) How often are you currently using strategies you learned from the ASSIST program?

		2. What facilitated and impeded the implementation of the strategies presented in the module?	Implementation Questionnaire	8) What has made the ASSIST program easy to use and why? [Open text response] 9) What has made the ASSIST program hard to use and why? 10) What changes to the program could have helped you stay more involved in the ASSIST program for the full 6-8 weeks?
	Maintenance	1. Do teachers report continuing to use the strategies at 6-months post intervention?	6-Month Follow-Up Questionnaire	2) Are you currently using any of the strategies provided in ASSIST in the classroom? 3) How often are you using strategies you learned from the ASSIST program? 4) What is the likelihood that you will continue using the strategies you learned in ASSIST in the future with other students? (i.e., in the next month, in the next 1 to 2 years?)
2. What is the clinical effectiveness of ASSIST for LD?	Effectiveness	1. What were the positive impacts of the program on proximal factors (teacher attitudes, beliefs, and use of evidence-based strategies)?	Teacher Attitude and Beliefs Questionnaire	Teacher ratings of negative statements surrounding four factors: 1) Lack of Control 2) Negative Classroom Effects 3) Diagnostic Legitimacy 4) Perceived (teacher) Competence
			Instructional and Behaviour Management Approaches Survey	Frequency ratings of usage of adaptations, strategies, and approaches (e.g., preferential seating, providing assistance during transitions, proximity control, providing positive teacher attention, using nonverbal cues to redirect)
		2. What were the positive impacts on distal factors (teacher distress and well-being)?	Distress Thermometer	1) How much of your distress is a result of COVID-19 related stressors and changes?
			Subjective Well-Being (Teacher)	1) How much of your dissatisfaction within your teaching role is a result of COVID-19 related stressors and changes?
		3. Were there any negative impacts of the program?	Implementation Questionnaire	4) Please share any ways ASSIST has had any unintended negative impacts
3. What is teacher satisfaction of ASSIST for LD?			Teacher Satisfaction Questionnaire	Teacher rating of level of agreement with statements about ASSIST (e.g., The content of the intervention was presented in a manner that was easy to understand.)
4. How did the COVID-19 pandemic impact implementation and effectiveness?			COVID-19 Impact & Status Update Questionnaire	1) Since starting in the ASSIST study, has there been any changes in your teaching location due to the COVID-19 pandemic (i.e., move to online teaching)? [Yes/No] 1.1) Thinking about the time from starting the study to now, what percentage of the time were you teaching online 1.2) Did you feel that the interventions presented in the ASSIST program were adaptable to an on-line teaching format 2) Overall, how much has the pandemic impacted your teaching from the time of starting this study until now?

Table 3

Shapiro-Wilks Normality Test Results

Measure	Shapiro-Wilks Statistic	df	Significance
TAB (Pre)	0.96	33	0.19
TAB (Post)	0.93	33	0.05
IBMAS (Pre)	0.96	32	0.22
IBMAS (Post)	0.95	32	0.12
Distress (Pre)	0.96	33	0.278
Distress (Post)	0.93	33	0.034*
Subjective Well-Being (Pre)	0.90	33	0.006*
Subjective Well-Being (Post)	0.91	33	0.007*

Note. TAB = Teacher's Attitudes and Beliefs Questionnaire. IBMAS = Instructional and Behaviour Management Approaches Survey. $N = 33$ for TAB, Distress, and Subjective Well-Being. $N = 32$ for IBMAS. * Indicates a significant finding where normality cannot be assumed.

Table 4

Teacher Satisfaction Results

Teacher Satisfaction Items	Mean Rating	Standard Deviation
Question 1: Easy to Understand	4.45	0.632
Question 2: Easily Adaptable	4.24	0.912
Question 3: Useful Feedback	3.97	1.426
Question 4: Encouraged Collaboration	4.1	1.235
Question 5: Collaborative Presentation	4.21	0.774
Question 6: Right Amount of Time to Implement	3.97	1.375
Question 7: Accessible and User-Friendly	4.03	1.052
Question 8: Useful Worksheets	4.28	0.996
Question 9: Supplemental Information was Useful	4.31	0.891
Question 10: Program Flexibility	4.34	0.814
Question 11: Learned New Things	4.31	1.228
Question 11.2: Applicable to Other Students	4.55	0.736
Question 12: Implement Interventions	3.79	1.473
Total	52.797	8.2243

Note. $N = 29$. Likert Scale of Strongly Disagree (1) to Strongly Agree (5) and Not Applicable (6). Total score possible = 65.

Figure 1

Consort chart of Sample Sizes
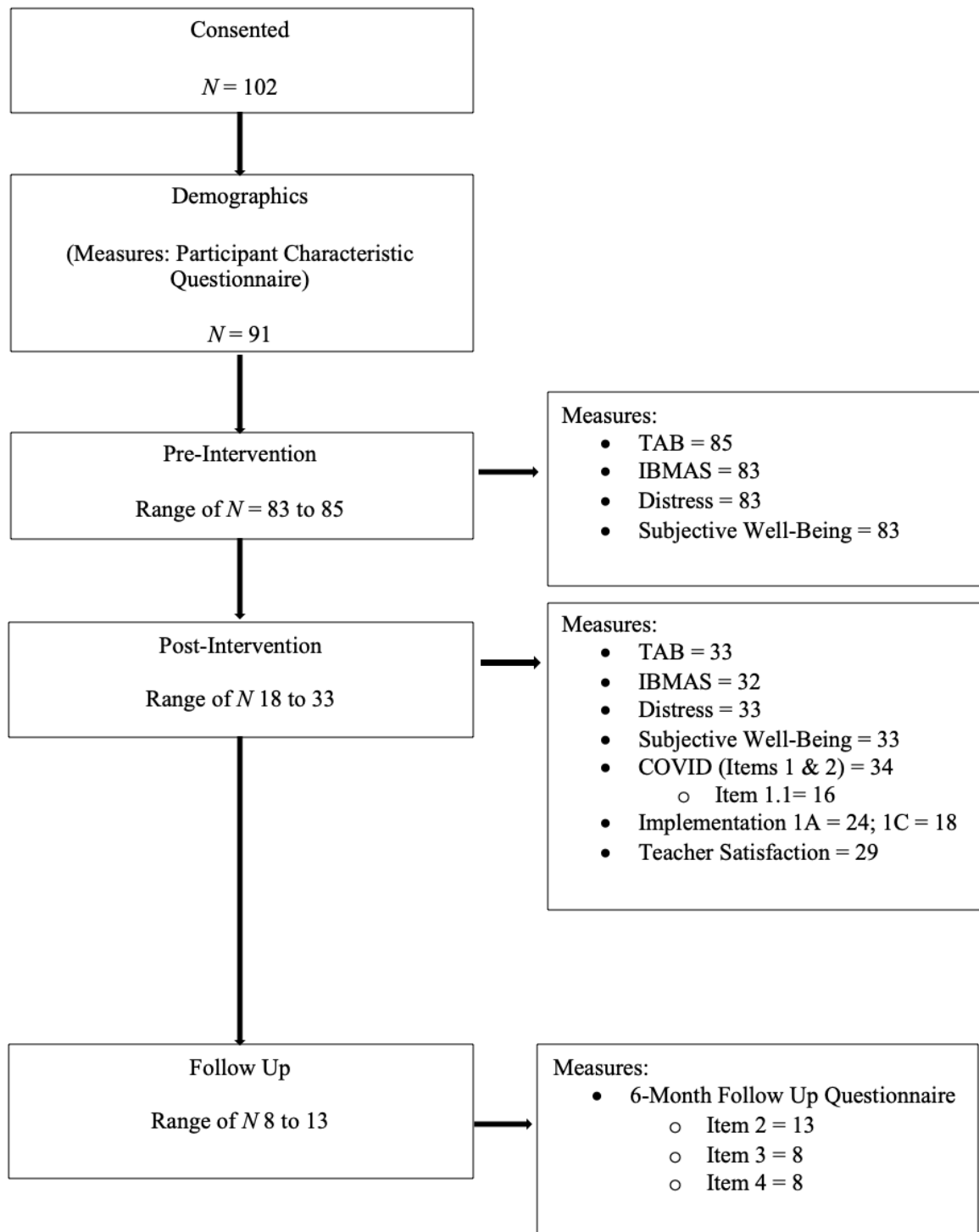
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Measures

Highlighted items included in analysis

<u>Screening Questionnaire</u>

Author made, 2021. Modified from our previous screening questionnaires from past studies.

[Pre-Intervention Measures Only]

Instructions: Thank you for your consideration to participate in the *ASSIST Sustainability and Implementation Study*. This study is evaluating the "scale out" of the *ASSIST* online program for teachers of children with one of three neurodevelopmental disorders: Attention-Deficit/Hyperactivity Disorder (ADHD), Autism Spectrum Disorder (ASD), or a Learning Disorder (LD). The first step is to make sure that this implementation study is appropriate for you to participate in. This questionnaire will take about 2 minutes to complete. If you are eligible based on this questionnaire, you will be directed to the Information and Consent Form which will provide details about the study and your research rights. If you are not eligible, you will receive an automated notification of this outcome.

[Note: Bolded responses are required to participate in the study. If no bolded response, the question is only used for description purposes and not to assess eligibility]

1. Are you currently working as a teacher in a regular mainstream classroom setting within a Canadian school? [**Yes**/No]

> [If NO] This study is designed for teachers currently working in a regular mainstream classroom setting in a Canadian school (grades 1 to 12).

2. Is English the language of instruction in your classroom. [Yes/No]

> [IF YES] Proceed to question 3.
>
> [If NO] The *ASSIST* program is currently only available in English. You can either proceed with this study but understand the information is in English, or you can leave your email address and we will let you know when we have a study being conducted with the French version of *ASSIST*.
>
> Would you like to continue (Yes/No).
>
> [IF NO] Please leave an email at which we can contact you in the future (textbox).

3. Do you live and teach in Canada? [**Yes/**No]

[If NO] This study is designed for teachers currently living and teaching in Canada.

4. Do you have a student in your class with ADHD, Autism Spectrum Disorder, or a Learning Disability that you would like to help by using the *ASSIST* program? [**Yes**/No]

[If NO] This study is designed for teachers who have a student in their classroom that they would like to help by using the *ASSIST* program.

5. What grade do you teach? [Grade Drop Down – Pre-Kindergarten; Kindergarten, **1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12**]

[If Pre-Kindergarten or Kindergarten was selected] This study is designed for teachers of grades 1 to 12.

6. Which module of *ASSIST* would you like to access:
ADHD [checkbox]
Autism Spectrum Disorder (ASD) [checkbox]
Learning Disabilities (LD) [checkbox]

7. Have you participated in a previous *ASSIST or Teacher Help* studies or reviewed the *ASSIST* or *Teacher Help* content? [Yes/**No**]

[If YES] This study is designed for teachers who have not previously participated in ASSIST or Teacher Help studies or reviewed the *ASSIST* or *Teacher Help* content.

8. Do you plan to be on a leave of absence at any time over the course of this school year? [Yes/**No**]

[If YES] This study is designed for teachers who do not plan to be on a leave of absence at any time over the course of this school year.

9. How did you hear about the *ASSIST* program? Please check all that apply.
Google Ad
Website Ad
YouTube Ad
Email
Internet search (please specify) [Textbox]
Professional/community organization (please specify) [Textbox]
Print advertisement (please specify) [Textbox]
School board (please specify) [Textbox]
Newspaper (please specify) [Textbox]
ASSIST Facebook
Facebook post
Facebook group

Facebook Live event
ASSIST LinkedIn
ASSIST Instagram
Other Facebook account or group (please specify) [Textbox]
Other LinkedIn account or group (please specify) [Textbox]
Podcast (please specify) [Textbox]
Other (please specify) [Textbox]

Message for Non-Eligibility

If the potential participant does not meet the basic inclusion criteria for the study, they will receive this message:

Thank you for your consideration to participate in the *ASSIST Sustainability and Implementation Study*. Based on your responses, you are not eligible to participate in this study. To participate you must be:

1. Currently working as a teacher in a regular classroom setting in a Canadian school (grades 1 to 12) and be able to complete the program in English.
2. Currently have one student in your classroom with ADHD, LD, or ASD who you would like to help by using this program.

If you would like to discuss further, please contact the *ASSIST* research coordinator at: assist@dal.ca

Participant Characteristics Questionnaire

Author made, 2021. Modified from our previous participant characteristics questionnaires from past studies.

[Pre-Intervention Measures Only]

Instructions: The following questions ask for some basic information about you. This will allow the research team to describe, as a group, the study sample, and assess conditions in which teachers access and implement the *ASSIST* online program. We will also ask you about how you first learned about *ASSIST* and factors that impacted your decision to join the program. This questionnaire will take approximately 5 minutes to complete.

General Information

1. Your age [drop down menu]

        Numbers for drop down menu: 21,22,23,24,25…65+

2. Your sex [dropdown menu]

        Male
        Female
        Other, please specify [text box]

3. How would you best describe your ethnic or cultural heritage? [Drop Down: White/ /Black/Aboriginal /South Asian/Chinese/Filipino/Latin-American/Arab/West Asian/South East Asian/Korean/Japanese/Other (Please Specify) [Textbox]]

4. What is your highest level of education completed? [dropdown menu]

        Bachelors (or equivalent)
        Master's
        PhD
        EdD
        Other, please specify: [text box]

5. How would you describe the community where you teach? [Rural/Town/City under 500,000 people/City over 500,000 people]

6. For how long have you been teaching? Please round up to the nearest year. [dropdown menu] years

        Numbers for years: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,… 30+

7. What grade are you currently teaching? [dropdown menu]

        Numbers for dropdown menu: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
        Other, please specify (e.g., if teaching a split class) [text box]

8. Which grade(s) have you taught in your teaching career? [dropdown menu, multiple check options]

        Elementary (1-6) [If selected 8.1 appears]
        Junior High School (7-9) [If selected 8.2 appears]
        Senior High School (10-12) [If selected 8.3 appears]

    8.1. If you taught elementary, for how many years did you do so?
    [Dropdown menu] Numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,… 30+

    8.2. If you taught junior high, for how many years did you do so?
    [Dropdown menu] Numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,… 30+

    8.3. If you taught high school, for how many years did you do so?
    [Dropdown menu] Numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,… 30+

ASSIST Program

9. Which *ASSIST* module are you planning to complete?
        ASSIST for Attention-Deficit/Hyperactivity Disorder (ADHD)
        ASSIST for Autism Spectrum Disorder (ASD)
        ASSIST for Learning Disabilities (LD)

10. How did you hear about the *ASSIST* program? Please check all that apply.
        Google Ad
        Website Ad
        YouTube Ad
        Email
        Internet search (please specify) [Textbox]
        Professional/community organization (please specify) [Textbox]
        Print advertisement (please specify) [Textbox]
        School board (please specify) [Textbox]
        Newspaper (please specify) [Textbox]
        ASSIST Facebook
Facebook post
Facebook group
Facebook Live event
        ASSIST LinkedIn
        ASSIST Instagram
        Other Facebook account or group (please specify) [Textbox]
        Other LinkedIn account or group (please specify) [Textbox]
        Podcast (please specify) [Textbox]
        Other (please specify) [Textbox]
11. What information in the advertisement for *ASSIST* caught your attention?
[Open text box]

12. What made you interested to participate in the program?

[Open text box]

13. What did you think the program could help you accomplish?
[Open text box]

14. How could we get more teachers to participate in a program like this? Please check all that apply and elaborate in the text boxes.
o Through an organization (please elaborate) [Open text box]
o School board
o Social media channels (please elaborate) [Open text box]
o Referral (please elaborate) [Open text box]
o Other (please elaborate) [Open text box]

15. What kind of information or evidence did you consider when deciding to participate in the *ASSIST* program?
[Open text box]

16. How much does knowing that this program is evidence-based (i.e., tested scientifically to demonstrate its effectiveness) weigh into your decision to use the program?
      o It does not weigh into my decision-making
      o It contributes a small amount to my decision-making, and is not one of the main factors
      o It contributes a fair amount to my decision-making, but is only one of many factors
      o It contributes a lot to my decision-making, and is a key factor
      o It is the only factor I consider in my decision-making

COVID-19 Impact & Status Update Questionnaire

Author made, 2021.

Instructions: This questionnaire asks about the degree of impact the COVID-19 pandemic and restrictive measures have had on your ability to review and implement the content of the *ASSIST* program. This questionnaire will require approximately 5 minutes to complete.

[Post-Intervention Measure Only]

1) Since starting in the *ASSIST* study, has there been any changes in your teaching location due to the COVID-19 pandemic (i.e., move to online teaching)? [Yes/No]

If Yes is selected:

1.1 Thinking about the time from starting the study to now, what percentage of the time were you teaching online? (0%, 1-10%., 11-20%, 21-30%, 31-40%, 41-50%, 51-60%, 61-70%, 71-80%, 81-90%, 91-100%)

1.2 Did you feel that the interventions presented in the *ASSIST* program were adaptable to an on-line teaching format? (0 Not at all, 1 Just a little, 2 Some, 3 A Fair Amount, 4 A Lot)

1.3 Please elaborate on any aspects of the ASSIST program you feel were more challenging to implement in an on-line teaching format than they would be in a classroom setting [Open textbox]

2) Overall, how much has the pandemic impacted your teaching from the time of starting this study until now? (0 Not at all, 1 Just a little, 2 Some, 3 A Fair Amount, 4 A Lot)

  2.1 Please elaborate on how the pandemic impacted your teaching [Open textbox]

3) How many sessions did you *review*? [pull down menu from 0 to 6]

3.1 Displays if Question 3 was answered with less than 6 sessions:

If you were **not** able to *review* the content for all 6 sessions, what were the primary barriers to being able to do so?

  a.   COVID-19 related barriers (e.g., school closures, move to online teaching)

b. Other [Textbox: Please elaborate:]

4) How many sessions were you able to *implement* the suggested strategies? [pull down menu from 0 to 6]

4.1 Displays if Question 4 was answered with less than 6 sessions:

If you were **not** able to *implement* the strategies for all 6 sessions, what were the primary barriers to being able to do so?

a. COVID-19 related barriers (e.g., school closures, move to online teaching)
b. Other [Textbox: Please elaborate:]

5) How carefully did you review the *ASSIST* program content for the sessions you reviewed, including the videos, text, and activities?

1 (Not Carefully At All), 2, 3, 4, 5 (Very Carefully)

6) What percentage of the strategies from the *ASSIST* sessions you reviewed did you try to use? It is OK to estimate the percentage, we just want to know if you implemented none (0%), a few (e.g., 30%), some (e.g., 65%), or all (100%) of the strategies.

0%, 1–20%, 21–40%, 41–60%, 61–80%, 81–99%, 100%

7) How successful were you with following the Session Plans generated at the end of each of the 6 sessions for the sessions you completed?

(Not At All)1, 2, 3, 4, 5, 6, 7 (Very Successful)

8) While you were completing *ASSIST (or if unable to complete the ASSIST program, please think of the time since you were first enrolled in the ASSIST program)*, did you receive any additional in-service/professional development training focus on special education/exceptional learners (not specific to ADHD/ASD/LD)?

o Yes [If selected 3.1 appear]
o No
o N/A (I have not started the program)

3.1. Approximately how many hours of in-service/professional development training did you complete on special education/exceptional learners during this time? [dropdown menu]

Numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,… 30+

9. While you were completing *ASSIST (or if unable to complete the ASSIST program, please think of the time since you were first enrolled in the ASSIST program)*, did you receive any additional in-service/professional development training focused specifically on ADHD/ASD/ LD)?
    a. Yes [If selected 4.1 appears]
    b. No
    c. N/A (I have not started the program)

4.1. Approximately how many hours of professional development training did you complete on ADHD/ASD/LD during this time? [dropdown menu]

Numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,… 30+

Teacher Attitudes and Beliefs Questionnaire

Author made, 2017. Adapted from:
Kos, J. (2008). What do primary teachers know, think and do about ADHD? *Australian Council for Educational Research, Teaching and Learning and Leadership*:
http://research.acer.edu.au/tll_misc/8

[Pre- and Post-Intervention Measure; This questionnaire is displayed to all participants at post-intervention regardless of how many sessions completed or implemented]

Instructions: Please indicate which answer best reflects your belief for each question, based on a scale of 1 (Strongly Disagree) to 5 (Strongly Agree).

All items are rated on the following scale:
- Strongly Disagree (1)
- Disagree (2)
- Neutral (3)
- Agree (4)
- Strongly Agree (5)

This questionnaire will take approximately 5 minutes to complete.

*Reversed coding

Factor 1: Lack of Control

ADHD	LD	ASD
You cannot expect as much from a student with ADHD as you can from other students.	You cannot expect as much from a student with LD as you can from other students.	You cannot expect as much from a student with ASD as you can from other students.
Students with ADHD could control their behaviour if they really wanted to.	Students with LD could do better academically if they really wanted to.	Students with ASD could control their behaviour if they really wanted to
Students with ADHD misbehave because they are naughty.	Students with LD misbehave because they are naughty.	Students with ASD misbehave because they are naughty.
Students with ADHD could do better if only they'd try harder.	Students with LD could do better if only they'd try harder.	Students with ASD could do better if only they'd try harder.
Students with ADHD misbehave because they don't like following rules.	Students with LD misbehave because they don't like following rules.	Students with LD misbehave because they don't like following rules.
*Managing the behaviour of students with ADHD is easy.	Managing the learning challenges of students with LD is easy.	Managing the behavioural and social challenges of students with ASD is easy.

Factor 2: Negative Classroom Effects

ADHD	LD	ASD
Having a student with ADHD in my class would disrupt my teaching.	Having a student with LD in my class would disrupt my teaching.	Having a student with ASD in my class would disrupt my teaching.
I would feel frustrated having to teach a student with ADHD.	I would feel frustrated having to teach a student with LD.	I would feel frustrated having to teach a student with ASD.
Students with ADHD should be taught by special education/specialist teachers, not classroom teachers.	Students with LD should be taught by special education/specialist teachers, not classroom teachers.	Students with ASD should be taught by special education/specialist teachers, not classroom teachers.
The extra time teachers spend with students with ADHD is at the expense of students without ADHD.	The extra time teachers spend with students with LD is at the expense of students without LD.	The extra time teachers spend with students with ASD is at the expense of students without ASD.
Other students don't learn as well as they should when there is a student with ADHD in the classroom.	Other students don't learn as well as they should when there is a student with LD in the classroom.	Other students don't learn as well as they should when there is a student with ASD in the classroom.

Factor 3: Diagnostic Legitimacy

ADHD	LD	ASD
*ADHD is a valid diagnosis.	LD is a valid diagnosis.	ASD is a valid diagnosis.
ADHD is an excuse for students to misbehave.	LD is an excuse for students to misbehave	ASD is an excuse for students to misbehave.
*ADHD results in a legitimate educational problem.	LD results in a legitimate educational problem.	ASD results in a legitimate educational problem.
ADHD is a behaviour disorder that should not be treated with medication.	LD is a behaviour disorder that should not be treated with medication.	ASD is a behaviour disorder that should not be treated with medication.

Factor 4: Perceived Competence

ADHD	LD	ASD
*I have the skills to deal with students with ADHD in my class.	I have the skills to deal with students with LD in my class.	I have the skills to deal with students with ASD in my class.
*I have the ability to effectively manage students with ADHD.	I have the ability to effectively manage students with LD.	I have the ability to effectively manage students with ASD.

I am limited in the way I manage a student with ADHD.	<mark>I am limited in the way I manage a student with LD.</mark>	I am limited in the way I manage a student with ASD.

[Pre- and Post-Intervention Measure; This questionnaire is displayed to all participants at post-intervention regardless of how many sessions completed or implemented]

Instructions: Please indicate the frequency with which you have used the various instructional adaptations, instructional strategies, and behavioural management approaches over the last [month at baseline, 6-8 weeks at post-intervention]

All items are rated on the following scale:

- Rarely (1)
- Once in a While (2)
- Occasional Use (3)
- Sometimes (4)
- Most of the Time (5)

This questionnaire requires approximately 5 minutes to complete.

1. Preferential seating 1   2   3   4   5

2. Providing assistance during transitions 1   2   3   4   5

3. Proximity control 1   2   3   4   5

4. Providing positive teacher attention 1   2   3   4   5

5. Using nonverbal cues to redirect 1   2   3   4   5

6. Frequent communication with parents 1   2   3   4   5

7. Implementing positive behavior support plans 1   2   3   4   5

8. Selective ignoring 1   2   3   4   5

9. Verbal reprimand 1   2   3   4   5

10. Providing consequences for misbehavior 1   2   3   4   5

11. Teaching appropriate behavior 1   2   3   4   5

12. Functional behavioral assessment 1   2   3   4   5

13. Self-management system (self-monitoring) 1   2   3   4   5

14. Daily report card 1   2   3   4   5

15. Behavioral contract 1   2   3   4   5

16. Time out 1   2   3   4   5

17. Response Cost 1   2   3   4   5

18. Remove student from class for misbehavior 1   2   3   4   5

19. Modifying language for instruction 1   2   3   4   5

20. Chunking assignments into smaller sections 1   2   3   4   5

21. Simplifying instructions/step by step delivery 1   2   3   4   5

22. Providing written directions as well as oral directions 1   2   3   4   5

23. More immediate and frequent feedback 1   2   3   4   5

24. Providing concrete cues/visuals 1   2   3   4   5

25. Providing explicit strategy instruction 1   2   3   4   5

26. Shortening assignments 1   2   3   4   5

27. Teaching student how to organize or plan 1   2   3   4   5

28. Highlighting key points for students 1   2   3   4   5

29. Giving student choice in assignments/tasks 1   2   3   4   5

30. Providing a study or peer tutor 1   2   3   4   5

31. Adjusting materials (color/structure) 1   2   3   4   5

32. Providing alternative formats for tests/assignments 1   2   3   4   5

33. Helping student set goals and monitor progress 1   2   3   4   5

34. Teaching student how to use assignment notebook 1   2   3   4   5

35. Providing advance organizer for content 1   2   3   4   5

36. Lowering expectations 1   2   3   4   5

Implementation Questionnaire

Author made, 2021.

1A) Are you currently using any of the strategies provided in ASSIST in the classroom? Yes, most of the strategies
        Yes, some of the strategies
        Yes, a few of the strategies
        No, none of the strategies
        No, as teaching moved to online teaching and as such I was not able to implement these strategies

1B) Which strategies from *ASSIST* are you continuing to use? [Please list the strategies you are using: Open text box]

1C) How often are you currently using strategies you learned from the ASSIST program?
- o   Always (every day)
- o   Often (4 days per week)
- o   Sometimes (2 or 3 days per week)
- o   Rarely (1 day per week)
- o   Not at all (0 days a week)

2) Describe how well you felt equipped to use the strategies in *ASSIST*? [Open text box]

3) What are some of the ways *ASSIST* had a positive impact? [Open text box]

4) Please share any ways ASSIST has had any unintended negative impacts. [Open text box]

5) What surprised you about the outcomes of the *ASSIST* program? [Open text box]

6) What has been the most helpful thing you have learned in *ASSIST* and why? [Open text response]

7)What has been the least helpful thing you have learned in *ASSIST* and why? [Open text response]

8) What has made the ASSIST program easy to use and why? [Open text response]

9) What has made the ASSIST program hard to use and why? [Open text response]

10) What changes to the program could have helped you stay more involved in the ASSIST program for the full 6-8 weeks? [Open text box]

11) Now that ASSIST is over, what challenges, if any, have you faced to continue to use the strategies in the ASSIST program? [Open text box]

12) What parts of the program helped you stay involved in ASSIST the most? Please check all that apply.

13) Is there anything else you would like to tell us about using the *ASSIST* program? [Open text response]

Distress Thermometer

Adapted from:

National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology: Distress management. Retrieved from http://www.nccn.org/professionals/physician_gls/distress.pdf. 2019.

Ownby KK. Use of the Distress Thermometer in Clinical Practice. *Journal of the advanced practitioner in oncology*, 2019;*10*(2), 175–179.

[Pre- and Post-Intervention Measure; This questionnaire is displayed to all participants at post-intervention regardless of how many sessions completed or implemented]

Instructions: Please indicate your own level of distress related to your teaching role on the visual thermometer, ranging from 0 "No distress" to 10 "Extreme distress." This questionnaire requires approximately 1 minute to complete.

SCREENING TOOLS FOR MEASURING DISTRESS

Instructions: First please circle the number (0-10) that best describes how much distress you have been experiencing in the past week including today.
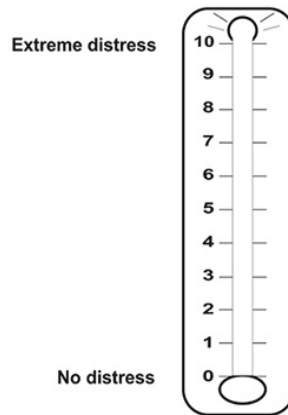
Extreme distress — 10

No distress — 0

How much of your distress is a result of COVID-19 related stressors and changes? [Drop down menu with the following options:

Nothing
Very little
Some
Quite a bit
A lot

Please explain your rating: [Open textbox]

Subjective Well-Being (Teacher)

Adapted from:

Statistics Canada. General Social Survey- Canadians at Work and Home. Retrieved from
https://www23.statcan.gc.ca/imdb/p3Instr.pl?Function=assembleInstr&lang=en&Item_Id=302913. 2016.

[Pre- and Post-Intervention Measure; This questionnaire is displayed to all participants at post-intervention regardless of how many sessions completed or implemented]

Instructions: This questionnaire is used to evaluate your perceived level of satisfaction within your teaching role. This questionnaire will take about 1 minute to complete.

Using a scale of 0 to 10 where 0 means "Very dissatisfied" and 10 means "Very satisfied", how do you feel about your teaching role as a whole right now?

0 Very dissatisfied
1 I
2 I
3 I
4 I
5 I
6 I
7 I
8 I
9 V
10 Very satisfied

Min = 0; Max = 10

How much of your dissatisfaction within your teaching role is a result of COVID-19 related stressors and changes? [Drop down menu with the following options]:

Nothing
Very little
Some
Quite a bit
A lot

Please explain your rating: [Open textbox]

How Did You Do? Questionnaire

Author made, 2017.

Note: This is an embedded questionnaire within the ASSIST online program in sessions 2 to 6.

[During *ASSIST* Sessions Only Measure]

Instructions: The following questions ask about how you did with reviewing and implementing strategies from the previous session. Please provide ratings for what you think best reflects how you did. This questionnaire takes approximately 1 minute to complete.

Question 1. How carefully did you review the previous session, including the videos, text, and activities?

> 1 (Not Carefully At All), 2, 3, 4, 5 (Very Carefully)

Question 2. What percentage of the strategies from the previous session did you try to use? It is OK to estimate the percentage, we just want to know if you implemented none (0%), a few (e.g., 30%), some (e.g., 65%), or all (100%) of the strategies.

> 0%, 1–20%, 21–40%, 41–60%, 61–80%, 81–99%, 100%

Question 3. How successful were you with following the Session Plan?

> 1 (Not At All), 2, 3, 4, 5, 6, 7 (Very Successful)

Teacher Satisfaction Questionnaire

Author made, 2021. Modified from our previous teacher satisfaction questionnaires from past studies.

[Post-Intervention Measures Only: This questionnaire is only displayed to those participants that responded that they had reviewed at least 1 session, based on Question 3 on the COVID Impact & Status Update Questionnaire]

Instructions: Based on the 6-point scale below, please indicate your level of agreement with each statement about the ASSIST program that you have participated in. We understand that not all teachers were able to review and/or implement all sessions due to the changing COVID-19 restrictions. As such, please complete the following questions reflecting on all the sessions that you were able to review and/or implement. Please only select the N/A option if you were not able to implement strategies in your classroom due to moving to online teaching as a result of COVID-19 restrictions.

All items are rated on the following scale:
- Strongly Disagree (1)
- Disagree (2)
- Neutral (3)
- Agree (4)
- Strongly Agree (5)
- Not Applicable (6)

This questionnaire requires approximately 5 minutes to complete.

1. The content of the intervention was presented in a manner that was easy to understand:

    1   2   3   4   5   6

2. The content of the intervention was easily adaptable:

    1   2   3   4   5   6   N/A

3. Completing the check-in questions at the beginning of each session of the program was easy and resulted in useful feedback:

       1   2   3   4   5   6   N/A

4. The intervention encouraged a collaborative process between the student, teacher, and parent/caregivers:

       1   2   3   4   5   6

5. The intervention was presented in a collaborative manner (as opposed to authoritarian manner):

       1   2   3   4   5   6

6. The interventions took just the right amount of time to implement:

       1   2   3   4   5   6   N/A

7. The delivery of the intervention through the Internet was accessible and user-friendly:

       1   2   3   4   5   6

8. The worksheets that went along with the sessions were useful:

       1   2   3   4   5   6   N/A

9. The supplemental information (e.g., web-links, videos, PDFs) were useful:

       1   2   3   4   5   6

10. The delivery of the intervention in a flexible format (so I could work on it based on my schedule) made it easier to implement:

       1   2   3   4   5   6   N/A

11. I learned new things from the ASSIST program:

       1   2   3   4   5   6   N/A

11.1. Please explain what you have learned: [text box]

11.2 I think I could use what I learned and apply this information to other students in my current class or future classes:

1   2   3   4   5   6   N/A

12. I was able to implement the interventions suggested by the ASSIST program.

1   2   3   4   5   6   N/A

12.1 What percentage of the interventions suggested by the ASSIST program were you able to implement. [drop down menu]

Numbers for drop down menu: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,… up to 100%

13. My favorite aspects of the intervention were: [Open text box]

14. My least favorite aspects of the intervention were: [Open text box]

15. Would you recommend this program to other teachers? Yes/No

15.1 Please explain why or why not: [Open text box]

16. If the ASSIST team was to develop another module, which mental health disorder or mental health topic would you like the module to cover? [Open text box]

17. Other comments on the intervention: [Open text box]

6-Month Follow-Up Questionnaire

Author made, 2021.

[Post-Intervention Measure Only]

Instructions: Thank you for your participation in the *ASSIST* Implementation Study. This 6-month follow-up questionnaire will help us to understand whether teachers continue to use the materials that they accessed in the *ASSIST* online program. This questionnaire will take about 5 minutes to complete.

1A) Did you complete or use the ASSIST program when it was offered in the 2020-21 school year?

   Yes, I completed the entire ASSIST program.
   I did not complete the entire ASSIST program, but I accessed some of the sessions.
   If this is selected, the participant is asked: How many sessions did you complete [Pull down menu   from 1-6]
   No, I did not use any of the ASSIST program during the 2020-21 school year.

1B) Did you complete or use the ASSIST program when it was re-offered in the 2021-2022 school year?

   Yes, I have completed the entire ASSIST program

   I did not complete the entire ASSIST program, but I accessed some of the sessions.

   If this is selected, the participant is asked: How many sessions did you complete [Pull down menu from 1-6]

   No, I did not use any of the ASSIST program during the 2021-22 school year.

   [If the participant answers a or b to either Question 1A or 1B, then the following items will be displayed]

2. Are you currently using any of the strategies provided in ASSIST in the classroom?

   Yes, most

   Yes, some

   Yes, a few

   No

   [IF YES]

   Which parts of ASSIST are you continuing to use? [Open text box]

3. How often are you using strategies you learned from the ASSIST program?

      o Always (every day)

      o Often (4 days per week)

      o Sometimes (2 or 3 days per week)

      o Rarely (1 day per week)

      o Not at all (0 days a week)

4. What is the likelihood that you will continue using the strategies you learned in ASSIST in the future with other students? (i.e., in the next month, in the next 1 to 2 years?)

      o Highly likely

      o Likely

      o Somewhat likely

      o Not likely

      o N/A (I did not start the program)

5. If the *ASSIST* team was to develop another module, which mental health disorder or mental health topic would you like the module to cover? [textbox]

6. Other comments on the intervention: [text box]