CREATION AND EVALUATION OF A WEB-BASED LEARNING AND DISCUSSION TOOL FOR ELEMENTARY SCHOOL TEACHERS OF STUDENTS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER IN NOVA SCOTIA

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DEDICATION PAGE

To my parents for their unconditional love and support and always encouraging me to achieve my goals.

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ABSTRACT

ADHD is one of the most common childhood psychiatric disorders, with symptoms that are frequently displayed in the school environment. Past studies have measured teachers' knowledge, attitudes, and behaviours towards ADHD, but very few studies have aimed to change teachers' knowledge, attitudes and behaviour through the implementation of an intervention. The goal of the present study was to determine if a web-based medium is an effective tool for supporting knowledge, attitude, and behaviour change in teachers of elementary school children with ADHD. Teachers (n = 20) from Nova Scotia were recruited through word of mouth. Of these participants, 19 completed a 7-week intervention that consisted of presentations, web-links and discussion board activities related to different aspects of ADHD. Knowledge, attitudes, and behaviour were measured pre- and post-intervention. Teachers' knowledge improved from pre- to post-intervention ($p = 0.03$). In terms of attitudes, although there was no change on the overall measure of attitude, there was a significant change on the Lack of Control ($p = 0.001$) and Perceived Competence ($p = 0.000$) subscales. A measure of teacher behaviour toward ADHD did not significantly change. Participants agreed that the content was presented in a way that was usable and easy to understand, the links and discussion board functions were useful, and they learned something new from each of the sessions. The study demonstrated that a web-based medium is a useful tool for knowledge creation and translation and has potential as a means of providing professional development to teachers about ADHD.

LIST OF ABBREVIATIONS USED

FGS	Faculty of Graduate Studies
ADHD	Attention-deficit/hyperactivity disorder
MRI	Magnetic resonance imaging
fMRI	Functional magnetic resonance imaging
SPECT	Single photon emission computed tomography
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders
IT	Information technology
CPG	Clinical practice guideline
TOVA	Test of Variables for Attention
NNT	Numbers needed to treat
NNH	Numbers needed to harm
CBT	Cognitive behaviour therapy

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CHAPTER 1: INTRODUCTION

Attention-deficit/hyperactivity disorder (ADHD) is one of the most prevalent childhood mental health disorders, affecting between 3-5% of school-aged children (American Psychiatric Association, 2000). ADHD is identified by three sub-types: ADHD, Predominantly Hyperactive-Impulsive Type; ADHD, Predominantly Inattentive Type; and ADHD, Combined Type (DSM-IV, 2000). ADHD is often co-morbidly diagnosed with other disorders, such as learning disabilities, oppositional defiant disorder, and mood/anxiety disorders (DSM-IV, 2000; Barkley, 1990). Co-morbidities for children meeting full criteria for ADHD have been reported to be high as 87% (Kadesjo & Gillberg, 2001). Evidence-based treatments include: stimulant medication, behavioural interventions, and the combination of stimulant medication and behavioural intervention (Lilienfeld, Lynn, Lohn, & Tavris, 2003).

It has been estimated that approximately one child in every elementary school classroom has ADHD (Barkley, 1998). In Nova Scotia, Canada, teachers do not have specialized training in ADHD, but rather complete courses on teaching students with exceptionalities as part of their Bachelor of Education degree (NS Department of Education, 2010). While teachers do engage in professional development opportunities that sometimes cover topics such as ADHD, their experience is mostly formed from first-hand interaction in the classroom with students who have ADHD. Research has found that on average, teachers are relatively knowledgeable about some aspects of ADHD (Kos, 2008); however, it has been found that they have certain gaps and misconceptions in their knowledge base about this disorder (Scuitto, Tejereson, & Bender Frank, 2000; Jerome, Gordon, & Hustler, 1994; Kos, Richdale, & Hay, 2006; Jerome, Washington,

Laine & Segal, 1999; McLeod, Fettes, Jensen, Pescosolido, & Martin, 2007). Teachers' attitudes towards ADHD are influenced by their knowledge and misconceptions (Kos, 2008). Changing teachers' knowledge and attitudes can lead to a change in behaviour in terms of teaching strategies used in the classroom (Zint, 2002). Researchers have developed standardized measures to evaluate teachers' attitudes and expectations about students with ADHD (Hepperlen, Clay, Henly, Barke, Hehperlen, & Clay, 2002) One theory that can help to explain the link between knowledge, attitudes, and behaviour is the Theory of Reasoned Action (Kos, 2008). This theory asserts that an individual's attitudes towards ADHD and perceived influence of subjective norm (i.e., the social pressures the individual perceives) influence the individual's intention to perform a behaviour (Azjen & Fishbein, 1980). Based on this theory it would be postulated that changing knowledge would lead to a change in attitude and this in turn would lead to a change in behaviour.

There is a fairly large body of research that has measured teachers' knowledge, attitudes, and behaviour towards ADHD (Scuitto *et al.,* 2000; Kos, 2008). However, after an extensive literature search, only two studies were found that attempted to change teachers' knowledge of ADHD by implementing an intervention (Barbaresi & Olsen, 1998; Syed & Hussein, 2010), and one study that aimed to change teachers knowledge of ADHD and use of behaviour modification techniques by implementing an intervention (Jones & Chronis-Toscano, 2008). The lack of research evaluating interventions to change teachers' knowledge, attitudes and behaviours towards ADHD resulted in the current study. Unlike past interventions that aimed to solely change teachers' knowledge of ADHD (Barbaresi & Olsen, 1998; Syed & Hussein, 2010), and knowledge and

behaviour toward ADHD (Jones & Chronis-Toscano, 2008), the intervention for the present study aimed to change teachers' knowledge, attitudes, and behaviour, and was web-based rather than a face-to-face intervention (e.g., Barbaresi & Olsen study included pediatricians who gave professional development to teachers, Jones & Chronis-Toscano study used in-service training, and Syed & Hussein study used training workshops).

Current research suggests that online learning is growing in popularity and is an effective medium for knowledge creation (Huang & Liaw, 2004). Professional development for teachers is mostly workshop based. If the intervention of the current study is effective, it may suggest an opportunity for web-based professional development. Health Informatics is dedicated to advancing the marriage of health care and IT, using "health science as the focus, and technology as the enabler" (Department of Health Informatics, 2008, http://www.healthinformatics.dal.ca/overview.php). The internet is becoming an attractive medium to host behavioural interventions because it can host large quantities of people while delivering treatment or education in real time, simultaneously (Christensen, Griffiths & Jorm, 2004).

Usability of web-based learning tools has been studied in the literature. These tools have been shown to have a positive effect on learning when functional and well-designed, and are effective at changing behaviour (Storey, 2002; Ritterband *et al.*, 2003). The usability and usefulness of IT-based intervention strategies for teachers of students with ADHD has not been documented in the literature. Past studies have found that web-based interventions (focused on a range of health and mental health issues) are more effective than non-web-based interventions for supporting knowledge and behavioural change (Wantland, Portillo, Holzemer, Slaughter, & McGhee, 2004), and that web-based

programs are powerful mediums to support community-based health interventions (Christensen, et al., 2004).

The current study aimed to change teachers' knowledge, attitudes and behaviour through an innovative professional development model that allowed teachers timely access to needed information about ADHD. We provided teachers with a 7-session program accessible through our Blackboard Learning System (BLS) web-system. The primary research question for this study was: Are web-based learning sites with a discussion forum effective supporting knowledge, attitude, and behavioural change in elementary school teachers of students with ADHD? In order to assess change, the current study measured knowledge, attitudes, and behaviour before and after a series of evidence-based learning modules delivered via the web about various aspects of ADHD. The primary research objectives of this study are as follows:

1. To examine the change in teachers' knowledge, attitudes, and behaviour towards ADHD and interventions for ADHD in the classroom.
2. To determine if intention to change and subjective norm predict the magnitude of change.
3. To examine patterns in teacher's knowledge seeking and knowledge sharing practices while using this web-based site.
4. To evaluate the usability and usefulness of the individual sessions and overall intervention.

It is hypothesized that knowledge, attitudes and behaviours towards ADHD will improve from pre-intervention to post-intervention, and feedback will indicate that web-based tool is a usable and useful tool for learning about ADHD. In addition, it is expected that the

information collected will suggest changes that will improve how the web-based system can better support teachers in the management of ADHD.

CHAPTER 2: REVIEW OF THE LITERATURE

Introduction to Attention-Deficit/Hyperactivity Disorder

As previously introduced, ADHD is a childhood behavioral disorder (APA, 2000). It is one of the most commonly diagnosed childhood mental health disorders, affecting approximately 3-7% of school-aged children (DSM-IV, 2000). The basic feature of ADHD is "a persistent pattern of inattention and/or impulsivity/hyperactivity that is more frequently displayed and more severe than is typically observed in individuals at a comparable level of development (DSM-IV, 2000). There are three subtypes of ADHD based on the constellation of the three core symptoms (inattention, impulsivity, hyperactivity):

1. ADHD, Predominantly Hyperactive-Impulsive Type
2. ADHD, Predominantly Inattentive Type
3. ADHD, Combined Type (combination of hyperactive and inattention symptoms)

ADHD can be difficult to diagnose, as there is no single diagnostic test, such as laboratory tests or neurological recordings that have been established as the primary clinical assessment tool (DSM-IV, 2000). Behavioural rating scales, such as the Conner's Rating Scales or ADHD Rating Scales, are sometimes used to assess for ADHD symptoms (Francis, 1985). Schatz, Ballantyne, and Trauner (2001) conducted a series of computerized tests to compare the sensitivity and specificity of Test of Variables for Attention (TOVA) and Conner's Parent Rating Scale. The authors found that both the TOVA and the Conner's Parent Rating Scale were equally sensitive for indentifying ADHD symptoms in children who had been clinically diagnosed with ADHD, however the TOVA yielded a higher number of false positives (30% of control participants) than

the Conner's Parent Rating Scale (0% of control participants) (Schatz *et al.,* 2001). Primary care physicians (pediatricians, family physicians) are able to diagnose ADHD in their practice, but typically refer the patient to a psychologist who performs a comprehensive cognitive and behavioural assessment. According to the amount of training and specialty a physician has in diagnosing ADHD, problems exist with over and/or under-diagnoses of ADHD (Parens & Johnston, 2009). Rushton, Fant, and Clark (2004) found that the diagnosis and treatment of ADHD also depends on the physician's adherence to clinical practice guidelines (CPG). The authors found that most primary care physicians and pediatricians have integrated CPG for ADHD into their practices, however variation exists between the diagnostic practices used to diagnose and treat ADHD (Rushton *et al.,* 2004). Primary care physicians were more likely than pediatricians to adhere to CPG for the diagnosis and treatment of ADHD. Rushton *et al.* (2004) proposed that potential reasons why pediatricians were not adhering to the guidelines include disagreement with the established recommendations outlined in the CPG, lack of self-efficacy, and reimbursement for services. Since there is no formal "gold standard" for diagnosing ADHD, personal bias is a factor that may influence diagnosis (Mulhern, Dworkin, & Bernstein, 1994). However, past research suggests that pediatrician's diagnoses of ADHD are generally derived in a consistent and predictable manner (Mulhern *et al.,* 1994).

ADHD often co-exists with other mental health disorders, such as learning disabilities, oppositional defiant disorder, mood disorder, anxiety disorders, and Tourette's disorder (DSM-IV, 2000; Barkley, 1990). Kadesjo and Gillberg (2001) found that in a sample of children meeting full criteria for ADHD (N = 15), 87% had at least

one co-morbid diagnosis, and 67% had at least two co-morbid diagnoses. Similar findings were reported for those children (N = 42) who presented as sub-threshold for ADHD (71% and 36%, respectively), but markedly lower for those children (N = 352) that were not diagnosed as having ADHD (17% and 3%, respectively) (Kadesjo & Gillberg, 2001).

Prevalence

ADHD is diagnosed in 5-10% of children (DSM-IV, 2000). This statistic varies across the literature due to sampling methods, geographic region, age, sex, and diagnostic criteria (Barkley, 2003). Polanczyk*,* de Lima, Horta, Biederman, & Rohde (2007) conducted a systematic review of 102 studies to examine the worldwide prevalence of ADHD, and to evaluate factors contributing to the variability in reported prevalence. The authors chose to evaluate geographic location as an aspect of variability, as past studies have shown that ADHD is more prevalent in North America than other parts of the world (Polanczyk *et al.,* 2007). The authors found the worldwide-pooled prevalence of ADHD to be 5.29%, with prevalence rates ranging from 3.7 to 8.9% (Polanczyk *et al.,* 2007). The lowest prevalence rates were in studies with samples from Africa and the Middle East whereas the highest prevalence rates were found in studies using North American samples ($p = 0.03$, and $p = 0.01$, respectively). The authors reported no statistically significant differences between North American prevalence rates compared to those of Europe, South America, Asia, and Oceania (comprising Australia and the Pacific region) (Polanczyk *et al,* 2007). The authors advise that the results should be carefully interpreted, as generally, there were few differences between countries, with the differences existing possibly related to methodological issues (Polanczyk *et al,* 2007).

Sex Differences in ADHD

Sex differences in children with ADHD have been well documented in the literature (Barkley, 1990). Research has shown that boys have a much higher incidence of ADHD diagnosis than girls (2.5 to 9.0 times more likely) (Barkley, 1990). The ratio of ADHD diagnosis in boys and girls is thought to be related to setting in which diagnosis happens (e.g., hospital clinic versus epidemiological studies) and subtype of ADHD, and these two factors interact. For example, boys who are referred to a clinic are more likely to be diagnosed with ADHD combined type or hyperactive type, but no more likely to be diagnosed with the inattentive type (inattentive subtype is less affected by the gender ratio) (DSM-IV, 2000).

Age of Onset

According to the Diagnostic and Statistical Manual of Mental Disorders, 4th Ed. (DSM-IV), the primary manual clinicians consult for diagnosing mental disorders, one of the criteria is that ADHD symptoms must be present before age seven. The age of onset of ADHD has been a topic of debate in the literature. Barkley and Biederman (1997) assert that using the age of onset diagnosis criteria outlined in the DSM-IV might be "discriminatory", as it may exclude older individuals with ADHD symptoms (p. 1209). The authors propose that more differentiation is needed between the onset of symptoms and onset of impairment (Barkley & Biederman, 1997). Furthermore, the authors suggest that age of onset should be considered when forming a comprehensive clinical diagnosis, and should not be treated as a sole indicator of the presence or absence of the disorder (Barkley & Biederman, 1997). A later study by Todd, Huang and Henderson (2008) supported the work of Barkley and Biederman (1997), finding that the age of onset

criterion of the DSM-IV resulted in under-identification of ADHD, and inappropriate diagnostic categorization. The authors recommend that while age of onset should be considered (as it is apparent that ADHD is a childhood developmental disorder), it should not be so rigid as to exclude older individuals with symptoms of ADHD that became evident after the age of onset criteria to not receive a formal diagnosis (Todd *et al.,* 2008).

Etiology of ADHD

Current research has supported that the etiology of ADHD is an interaction between genes and environmental factors. While researchers support that ADHD is a highly heritable condition that presents itself in early childhood, the origins and pathogenesis of this disorder is currently not well understood, and most likely is due to a combination of factors (Thapar, Holmes, Poulton, & Harrington*,* 1999; Thapar, O'Donovan, & Owen, 2005). ADHD symptoms and diagnosis are more commonly found in the first-degree biological relatives of children with ADHD, which suggests a familial link (DSM-IV, 2000). Larsson*,* Larsson, and Lichtenstein (2004) examined the genetic and environmental contributions of ADHD symptoms in 2370 twin children between 8 and 9, and 13 and 14 years of age in a longitudinal study design. The authors reported a high stability of ADHD symptoms over five years, which attests to the genetic basis of ADHD, as the symptoms were occurring at both points in time in each twin (Larsson *et al.,* 2004). However, the authors also observed changes in ADHD symptoms between childhood and adolescence occurring between each twin. Self-report questionnaires were used to measure the change in symptoms, and the univariate and longitudinal twin models were used for statistical analysis. Larsson *et al.* (2004) noted that the prevalence of the

sample having 8 or more ADHD symptoms decreased from 4.7% at age 8 to 9, to 3.1% from age 13 and 14. The authors stated that this change was attributable to both genetic and environmental factors.

Studies of molecular genetics have suggested that the dopaminergic system is involved in ADHD, however further support is required (Thapar *et al.,* 1999, 2005). While it is clear that there is a genetic basis contributing to the development of ADHD in children, the exact gene(s) responsible is still unknown (Durston 2003; Wallis*,* Russell, & Muenke, 2008). Researchers have studied the biological basis of ADHD using brain imaging techniques. Durston (2003) performed a literature review of the etiological basis of ADHD using magnetic resonance imaging (MRI) techniques. Anatomy of the brain was analyzed, such as volume, blood flow, circuitry, and areas of activity during task performance (Durston, 2003). Castellanos*,* Giedd, Hamburger, Vaituzis, Dickstein, Sarfetti, Vauss, Snell, Rajapakse and Rapoport (1996) used matched-control to compare total brain volume in males (ages 5-17) with ADHD. Image analysis showed that participants with ADHD had 4.7% smaller total brain volume than typically developing male participants (Castellanos *et al.,* 1996). The same authors performed a second study using matched-controls to compare total brain volume in females (ages 5-15) with ADHD (Castellanos*,* Giedd, Berquin, Walter, Sharp, Tran, Vaituzis, Blumenthal, Nelson, Bastain, Zijdenbos, Evans, & Rapoport, 2001). The authors found that the brains of female participants with ADHD were up to 5% smaller than typically developing female participants (Castellanos *et al.,* 2001). These findings suggest an anatomical basis for ADHD; however, Durston (2003) cautions that differences between studies on individual brain sizes are highly variable, and investigation using larger and more robust sample

sizes are necessary. Moreover, Giedd, Blumenthal, Molloy, and Castellanos (2001) argues that childhood and adolescence (the age range of the sample population studied) is a dynamic period of brain development whereby volume changes are ongoing (as cited in Durstan, 2003). Therefore, even when using matched-pair controls, further MRI studies are needed to support the findings presented.

Studies using functional magnetic resonance imaging (fMRI) have also measured blood flow in children with ADHD. Durston (2003) analyzed 23 functional imaging studies of ADHD. Most notably, Lou *et al.* published a series of papers about functional imaging in children with ADHD using single photon emission computed tomography (SPECT). From their multiple studies (1984, 1989, 1990), the authors concluded that children with ADHD experience reduced blood flow in the striatal region of the mid-brain (as cited in Durstan, 2003). However, Durstan (2003) added that the spatial resolution of SPECT is low compared to more recent imaging technologies and more control subjects are needed to support these results. Studies have found that the circuitry affected in children with ADHD is concentrated to the fronto-striatal region, which influences inhibition (Durstan, 2003). However, other functional imaging studies have shown widespread activation of brain areas, which suggests that ADHD affects various brain areas in different ways, which affects the brain in a more global way (Durstan, 2003).

Environmental influences, such as the influence of peers, family members, and school setting also affect ADHD symptoms (DSM-IV, 2000). Negative parenting has been known to exacerbate underlying ADHD symptoms (Daley, Jones, Hutchings, & Thompson, 2008). Environmental factors include factors such as coercive and/or chaotic

parenting techniques, inconsistent parenting style, and intrusive parenting style (Jacobvitz & Sroufe, 1987 in Daley *et al,* 2008). When a child with a biological predisposition to ADHD is raised in these environments, ADHD symptoms can be manifested (Johnston & Mash, 2001); however the association between ADHD and parenting influence is best viewed as reciprocal in nature (Daley *et al.,* 2008). Since ADHD is genetically linked, the probability of a child with ADHD having a parent with ADHD is common, which may also influence their approach to parenting (Daley *et al.,* 2008). The results of Durstan's (2003) literature review, as well as the results from other studies, suggest that there are multiple causes and origins of ADHD that involve genetic, environmental, anatomical, and physiological factors that each contribution to the severity, perseverance and maintenance of symptoms.

Treatment of ADHD

Treatment of ADHD has been well researched in the literature. Approaches to treatment are vast and treatment of ADHD has been a controversial subject of public opinion over the past decade (Lilienfeld *et al.,* 2003). Certain forms of treatment have been supported (e.g. stimulant medication, behavioural interventions, and the combination of stimulant medication and behavioural intervention), others show promise (e.g. classroom-based interventions, and non-stimulant medication), others are unsupported in the literature (e.g. cognitive training programs, dietary managements, and supplements), and others are pending further research (e.g. biofeedback, sensory integration, acupuncture, and homeopathy) (Lilienfeld *et al*, 2003). Based on empirical research, medication is considered one of the most effective forms of treatment for ADHD in children (Jensen*,* Hinshaw, Swanson, Greenhill, Abikoff, Elliot, Hechtman,

Hoza, March, Newcorn, Severe, Vitiello, Wells, & Wigal, 2001). A study by Safer and Krager (1994) reported that 90% of children with ADHD had taken medication as a form of treatment during elementary school (Lilienfeld *et al.,* 2003). The type of medication prescribed for children with ADHD are psychostimulants (e.g., methylphenidate and atomoxetine); trade names include (but not limited to): Ritalin®, Dexedrine®, Cylert®, Adderall®, and Concerta® (Lilienfeld *et al.,* 2003). The goal of these medications is to target the core symptoms of ADHD: inattention, hyperactivity, and impulsivity.

Stimulant treatment for ADHD has shown short-term efficacy in reducing the severity ADHD symptoms (Greenhill *et al.,* 2008 in MTA Cooperative Group, 2004). The number needed to treat (NNT) is a measure of risk reduction that refers to the number of children that need to be treated to prevent one adverse outcome (CEBM, 2009, http://www.cebm.net/index.aspx?o=1044). For the stimulant drug methylphenidate, which is commonly used to treat ADHD, the NNT is 3, which is considered highly favourable (Vitiello, 2008). For the stimulant drug atomoxetine, which is also used to treat ADHD, the NNT is 5, which is still considered favourable (Vitiello, 2008). Similarly, Cheng, Chen, Cho, and Ng (2007) found that the NNT for atomoxetine was 3.4 for treatment response. The numbers needed to harm (NNH) were also calculated to determine the number of participants that had to be treated with atomoxetine in order for one adverse event to occur (Cheng *et al.,* 2007). The NNH were calculated for each adverse event sub-type. The three most common adverse events from the administration of atomoxetine were: decrease in appetite (NNH = 8.81, $p < 0.01$), somnolence (NNH = 19.41, $p < 0.01$), and abdominal pain (NNH = 22.48, $p < 0.02$). The NNH data from

Cheng *et al.* (2007) illustrates that abdominal pain and somnolence is less common than a decrease in appetite after participants were given the drug atomoxetine.

Behavioural therapy and school-based therapy are treatment options that have been widely studied in the literature. The Multimodal Treatment of ADHD Study (MTA Study) is considered the largest and most comprehensive ADHD treatment study conducted to date. Participants (N = 597) were randomly assigned to one of four conditions: medication management only, behaviour therapy only, the multimodal combination of both of these treatments, or the treatment that is commonly used in the participant's community (MTA Cooperative Group, 2004; Swanson *et al.,* 2008). The findings revealed that multimodal combination was not better than medication management on any of the 10 outcome measures. The researchers also reported that medication management was only better than behaviour therapy on 3/10 outcome measures. Interestingly, community comparison was not better than multimodal combination or behaviour therapy on any of the outcome measures, and was only better than education management on 5/10 outcome measures. Moreover, the researchers found that participants who were randomly assigned to the medication management only condition experienced the greatest reduction in ADHD symptom severity than those who were randomly assigned to the behaviour therapy only condition (Swanson *et al.,* 2008).

DuPaul and Eckert (1997) conducted a meta-analysis of 63 school-based intervention program outcome studies for students with ADHD. The goal of the study was to determine if these interventions were effective in changing the behaviour and academic performance of students with ADHD, and which interventions specifically were more effective than others (e.g., contingency management, academic, or cognitive-

behavioural). The authors found that all interventions resulted in improvements in classroom behaviour. Moreover, contingency management and academic interventions were found to be more effective in improving behaviour than cognitive-behavioural therapy (DuPaul & Eckert, 1997). The authors concluded that school-based interventions are effective in reducing ADHD symptoms in the classroom (DuPaul & Eckert, 1997).

Prognosis of ADHD

The long-term prognosis of ADHD is heavily debated in the literature. Some studies have found that symptoms of ADHD do not persist into adulthood, strengthening the argument that ADHD is purely a developmental disorder of childhood and adolescence, and age of onset is a critical determining factor (Shaffer 1994; Hill & Shoener, 1996). On the contrary, the majority of studies have found that ADHD symptoms are manifested in adulthood, and can be accurately diagnosed (Barkley, 1997 in Faraone, Biederman, & Mick 2005; Wilens, Faraone, & Biederman, 2004; Faraone, Biederman, & Mick, 2000). While ADHD is a recognized as a disorder usually first diagnosed in childhood (DSM-IV, 2000), the belief that it is solely developmental is not globally accepted. Researchers have attempted to statistically measure the persistence of ADHD into adulthood to provide information about its long-term prognosis. Faraone *et al.* (2005) conducted a meta-analysis of follow-up studies to evaluate the age-dependent decline of ADHD. The authors found that the persistence into adulthood is "semantically-dependent" on the meaning the author defines to describe 'persistence'. When persistence was defined as "only those meeting full criteria for ADHD", the rate of ADHD persisting into adulthood was relatively low (approximately 15% at 25 years of age). Alternatively, when the authors included ADHD that was in partial remission, the rate of ADHD

persisting into adulthood is high - approximately 40-60% at 25 years of age (Faraone *et al.,* 2005).

ADHD in the Classroom

Barkley (1998) estimates that one child in every elementary school classroom has ADHD. Statistics Canada (2002) reported that approximately 60.7% of children aged 0-15 in Nova Scotia have a mild or moderate disability (whereby a mild or moderate disability includes attention-deficit/hyperactivity disorder), and approximately 39.3% of children have a severe or very severe disability. This rate is slightly higher than the national average, with a reported 57.4% of all Canadian children aged 0-15 having a minor or moderate disability, and 42.6% of Canadian children having a severe or very severe disability. According to the 2001 Participation of Activity Limitation Survey produced by Statistics Canada (2002), 65% of children with disabilities in Nova Scotia are involved in normal classrooms. This rate is higher than the national average of 56.9% of Canadian children with disabilities that are involved in normal classrooms (Statistics Canada, 2002). The prevalence of disabilities including ADHD in Canadian school systems is pronounced, and especially prevalent in Nova Scotia.

Teachers are often the first to notice symptoms of ADHD (Scuitto *et al.,* 2000) and are sometimes the first to refer a student for clinical evaluation (Sciutto *et al*., 2000). This information is not surprising, as the classroom environment requires children to behave in a manner that is at odds with the symptoms that characterize the disorder: hyperactivity, impulsivity, and inattention (Kos *et al.*, 2006). Teachers' perceptions of ADHD are highly influenced by classroom behavior. Scuitto, Nolfi, & Bluhm (2004) examined the effects of sex on elementary school teachers' referral decisions regarding

ADHD. Teachers viewed the behavior of male and female children differently; they were more likely to refer boys than girls. Furthermore, they were more likely to refer children who exhibited hyperactive behaviors versus those who experienced only inattentive behaviours. A study by Havey, Olson, McCormick and Cates (2005), which explored teachers' perceptions about the incidence and management of ADHD, revealed that 24% of teachers thought that students were overdiagnosed as having ADHD, 90% of teachers indicated that they preferred combination therapy (behaviour modification and medication) for their students with ADHD, and 39% of teachers believed that ADHD is a result of a combination of environmental and genetics.

Teachers' Knowledge, Attitude, and Behaviour Towards ADHD, and the Influence of Intention and Subjective Norm on Changing Behaviour

Knowledge

Teachers' knowledge of ADHD influences their attitude about the disorder, and how they choose to manage it in the classroom. It is known that students with ADHD have specific needs that must be identified and acted upon by the teacher in order for them to be successful in a school environment (Sherman, Rasmussen, & Baydala, 2008). Modifying the teaching program and implementing evidence-based behaviour strategies and/or interventions provides an opportunity to change ADHD behaviours and achieve positive outcomes for these students (Bowen, Woolley, Richman, & Bowen, 2001; Sherman *et al.,* 2008). An examination of the literature has found that while teachers are knowledgeable about the symptoms and diagnosis of ADHD, they are less knowledgeable about the treatment of ADHD (Scuitto *et al.,* 2000). It is suspected that teachers have knowledge gaps that persist across time and prevent them from applying

the best strategies to managing and supporting ADHD in the classroom. Such knowledge gaps include myths about the disorder, such as the role of nutrition in the treatment of ADHD (Jerome *et al.,* 1994; Kos *et al.,* 2006; Jerome *et al,* 1999).

Scuitto *et al.* (2000) examined teachers' knowledge and misperceptions of ADHD in the following 3 areas: symptoms/diagnosis, treatment, and general information. Scuitto *et al.* (2000) administered a 36-item knowledge scale (designed for this specific study) that assessed teachers' knowledge of the above content areas. The author's results were consistent with past literature; teachers were knowledgeable about the symptoms and diagnosis of ADHD, and less knowledgeable about treatment (Scuitto *et al.,* 2000). The study results led the authors to assert that future educational interventions should focus on approaches to treatment, misconceptions about ADHD (e.g., diet and ADHD), and prognosis of ADHD (Scuitto *et al.,* 2000). Furthermore, Scuitto *et al.* (2000) found that teachers who reported having taught more than one child with ADHD were more knowledgeable of ADHD than teachers who have not taught as many children.

Bekle (2004) examined practicing teachers' knowledge and attitudes about ADHD compared to undergraduate education students. Bekle's (2004) results supported that of Jerome *et al.* (1994, 1999), as it was found that while practicing teachers' knowledge of ADHD was fairly sound, certain gaps exist (Bekle, 2004). Such gaps include knowledge of the role of diet and ADHD, persistence of ADHD into adulthood, and general myths about the disorder (Bekle, 2004). Bekle (2004) noted that in each group (practicing teachers and undergraduate education students), knowledge and attitudes were significantly positively correlated ($r = .29$, $p < .05$). Not surprisingly, practicing teachers had more accurate knowledge of ADHD than the undergraduate

education students, which emphasizes the role of classroom experience on knowledge (Bekle, 2004).

Attitude

Teachers' attitudes towards ADHD are influenced by their conceptions. Bekle (2004) examined practicing teachers' attitudes towards ADHD and found that the amount of knowledge teachers had about ADHD reflected their attitude towards the disorder. It has been proposed that changing teachers' attitudes can lead to a change in behaviour and improve professional development (Zint, 2002). By comparing the difference between mean scores between teachers who stated they have received no training versus teachers who stated they have received brief training, she found that practicing teachers' attitude scores improved as their amount of training increased (Bekle, 2004). Hepperlen *et al.* (2002) also studied the attitudes, effect of expectations, and behavior of teachers on students with ADHD. He hypothesized that these factors may have a significant effect on the academic success of students with ADHD (Hepperlen *et al.,* 2002). Hepperlen *et al.* (2002) created his own standardized measure of evaluating teachers' attitudes and expectations of students, called the "Test of Knowledge About ADHD", commonly referred to in the literature as the "KADD". Hepperlen *et al.* (2002) recruited 130 elementary school teachers and paraprofessionals to participate in this study. Participants were instructed to fill out the KADD questionnaire, which consisted of 22 items that assessed teachers' attitudes towards students with ADHD (Hepperlen *et al.,* 2002). The authors found that the majority of teachers sampled possessed slightly positive attitudes towards students with ADHD, and these teachers reported experiencing moderate levels of tension in response to behavior related to students with ADHD (Hepperlen *et al.,*

2002). Importantly, the mean score of the variable which reported teachers self-confidence in teaching students with ADHD was 6.7 (SD = 2.1*)*, implying that teachers are somewhat confident in their ability to manage ADHD in the classroom. This study provided significant opportunities for future research. By identifying categories of negative attitudes, researchers are able to develop interventions to reduce the negative effect of teachers' attitudes and expectations on students with ADHD (Hepperlen *et al.,* 2002).

As previously discussed above, Kos (2008) evaluated the attitudes of elementary school teachers by using a direct method of attitude assessment, a 31-item self-report questionnaire developed by the author. The assessment was in Likert scale format, and asked teachers to agree or disagree to a particular statement about ADHD. Kos (2008) performed a factor analysis and identified seven factors, which later formed the attitude measurement sub-scale. The results indicated that in general, teachers agree that ADHD is a legitimate educational problem and medically valid diagnosis (Kos, 2008). Furthermore, Kos (2008) reported that teachers believed that ADHD is often over-diagnosed and children with ADHD should be taught in the regular school system versus special education schools. Lastly, it was reported that teachers strongly believed that managing the behavior of students with ADHD is not easy and strongly disagree with the misconception that children with ADHD misbehave because they are naughty (Kos, 2008). Kos' (2008) study provided a more current view of teachers' attitudes towards ADHD, and identified several attitude factors that can be acted upon for future research-based classroom interventions.

Behaviour

Kos (2008) study provided great insight into the link between how teachers' knowledge and attitude of ADHD affect their behaviour. As previously discussed above, Kos administered two separate questionnaires that measured teachers' 1) knowledge, and 2) attitudes of ADHD, separately. The author then administered one of eight self-constructed vignettes that described a student with ADHD (possessing the underlying ADHD sub-type of either: ADHD, predominantly hyperactive/impulsive; ADHD, predominantly inattentive; or ADHD, combined type), or a control scenario. It was reported that teachers were not very good at diagnosing the hypothetical child with the correct sub-type of ADHD, and had difficulty identifying males with the inattentive sub-type of ADHD, and females with the hyperactive/impulsive sub-type of ADHD (Kos, 2008). This was not surprising, as male children displaying the inattentive type only, and female children displaying the hyperactive/impulsive type only are less reported in the literature (Kos, 2008). In terms of classroom strategies, teachers believed maintaining classroom organization and curriculum to be the most useful, and reported positive benefits for the children from emotional support and reinforcement (Kos, 2008). Certain strategies were reported as neither positive nor negative (e.g. planned ignoring and negative consequences) (Kos, 2008). Obstacles to teaching students with ADHD were also highlighted from the vignettes. The author captured these obstacles as themes. The themes included: 1) Time, 2) Equity within the classroom, 3) Class size, and 4) Parental involvement. These obstacles were classified as preventing teachers from successfully implementing strategies for students with ADHD, and were uniformly reported by almost 50% of the sample (Kos, 2008).

A study by Ohan, Cormier, Visser, Hepp and Strain (2008) supports Kos' (2008) findings. The authors found that teachers' knowledge of ADHD affects not only their perceptions of students with ADHD, but also behavior towards students with ADHD. The authors used vignettes to model "real-life" situations, and asked participants to describe their reactions (Ohan *et al.,* 2008). While this study has similar limitations as the study by Kos (2008), for example, their responses on the vignette may not fully reflect how they would handle similar real-life scenarios (Ohan *et al.,* 2008), the overall implications of the study are clear; improving teachers' knowledge of ADHD positively influences teachers' behavior. This effect provides opportunities for identifying and treating ADHD. For example, if a teacher is more knowledgeable of ADHD, they may recognize the symptoms more easily, and would be more likely to refer a student for a clinical assessment than using negative coping strategies for dealing with the student's behavior (Ohan *et al.,* 2008).

Theoretical Framework 1: Theory of Reasoned Action

Kos (2008) applied the Theory of Reasoned Action as one of the theoretical frameworks to support her research (Azjen & Fishbein, 1980). Based on this theory, subjective norm and intention impact a person's intention to perform a behavior, which then determines if they perform that particular behavior or not (Figure 1). The study demonstrated construct validity as it successfully predicted behavior by assessing teachers' attitudes and knowledge.

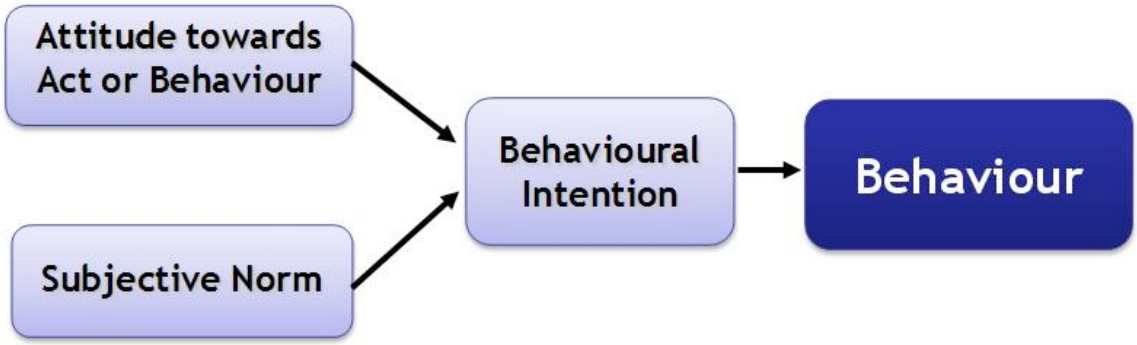

Figure 1: Model of the Theory of Reasoned Action as proposed by Azjen and Fishbein (1980). Image from Fidis.net.

Role of Subjective Norm and Intention

Subjective norm refers to the influence by social pressures, and attitudes are influenced by a person's perceptions of the particular behavior (Armitage & Conner, 2001). Chang (1998) found that subjective norm has been shown to influence a person's attitude. Simply stated, the more favourable a person's attitudes are towards the particular behavior, the stronger the intention to perform it (Armitage & Conner, 2001). The influence of subjective norm on behavioural intention has been debated in the literature. Armitage and Conner (2001) concluded that subjective norm is a weak predictor of individual's intentions, while, Ryu, Ho, and Han (2003) found that subjective norm was a strong predictor of behavioural intention. In addition, Kos (2008) studied the effect of intention as a predictor of how teachers behave. The author hypothesized that when teachers have a positive attitude towards performing a behavior, and when they believe others evaluate this behavior positively as well, they are more likely to perform this given behavior (Ajzen & Fishbein, 1980). Kos (2008) found that knowledge did not significantly predict teachers' intention to use any of the behavioural management strategies. The author also reported that negative consequences and planned ignoring

were strategies that were viewed least favourably by teachers. This reflects teachers behavior as these strategies were mentioned the least in the behavior vignette responses (Kos, 2008). Zint (2002) aimed to predict science teachers' intention to incorporate more teaching on environmental risk, and measured their attitudes about this using a questionnaire. The author used the Theory of Reasoned Action (Azjen & Fishbein, 1980) to explain the theoretical link between attitudes, intention and behaviour. Zint (2002) found that teachers attitudes towards the behaviour (in this case, to incorporate more information about environmental risk in teaching practice), was a better predictor of intention than subjective norm.

Subjective norm is important to measure as a predictor of behaviour. Armitage and Conner (2001) state that subjective norm refers to "the individual's perceptions of general social pressure to perform (or not to perform) the behaviour" (p. 474). Therefore, if an individual intrinsically believes that others important to them approve or support the behaviour, they are more likely to intend to perform it. Vice verse, if they believe others disapprove of the behaviour, they are less likely to intend to perform it (Armitage & Conner, 2001). Subjective norm, in addition to a person's attitudes predicts their intention to perform a behaviour, which is a predictor of behaviour (Azjen & Fishbein, 1980). Kos (2008) studied the effect of subjective norm on predicting behaviour in teachers. The author proposed that teachers will perform a behaviour when they have a positive attitude towards the behaviour, when they believe others believe it is important for them to perform the behaviour, and when they intend to perform it. It was found that subjective norm did not significantly predict teachers' behaviour (i.e. predict if they would use the behavioural strategies in the classroom) (Kos, 2008). Subjective norm is often used as a

predictor of behavioural intention. Kos' (2008) findings are supported by the earlier conclusions of Armitage and Conner (2001) who found that subjective norm is a weak predictor of intention because it performs poorly as a function of measurement. Results of Zint's (2002) study contradict the results of Armitage and Conner; the author found that subjective norm was a better predictor of teachers' intention, and proposed that this factor should be considered when creating interprofessional development opportunities in teaching. Zint (2002) acknowledge the divergence from Armitage and Conner's (2001) results, and proposed that perhaps the difference in findings was due to the fact that subjective norm was only measured using a single item versus multiple item scales.

Gap in the Literature

Studies to date have been focused almost exclusively on measuring teachers' knowledge, attitudes, and behaviour towards ADHD. While this information is valuable, it does not capture information about knowledge, attitude, and behaviour change. There are many studies that have aimed to change teachers' attitudes and behaviour towards students with exceptionalities using an intervention (Elik, Theule, & Wiener, 2005); however, there are few that aim to change teachers' knowledge of ADHD, specifically. After an extensive literature search, only two studies were found that attempted to change teachers' knowledge of ADHD implementing an intervention (Barbaresi & Olsen, 1998; Syed & Hussein, 2010), and one study that aimed to change teachers knowledge of ADHD and use of behaviour modification techniques by implementing an intervention (Jones & Chronis-Toscano, 2008). No studies were found that aimed to change teachers' attitudes and behaviour towards ADHD, and no studies were found that tried to change a

combination of teachers knowledge, attitudes, and behaviour (e.g., the aim of the current study).

Barbaresi and Olsen (1998) implemented an education intervention led by pediatricians for elementary teachers of students with ADHD. Teachers' knowledge of ADHD, training, ratings of student behaviour, and information about ADHD and stress were assessed pre- and post-intervention via questionnaires. The authors found that teachers' knowledge of ADHD increased and stress decreased because of the intervention. While the result indicate that the intervention was effective in positively changing teachers' knowledge about ADHD, and responses to teacher stress because of ADHD, the authors noted that this was only a pilot study. Similar to the research of Barbaresi and Olsen (1998), Jones and Chronis-Toscano (2008) found that by implementing teacher in-service training about ADHD, teacher's knowledge of ADHD positively increased as a result of the intervention. In addition, special education teachers were more likely to use behaviour modification techniques discussed in the intervention (Jones & Chronis-Toscano, 2008). More recently, Syed and Hussein (2010) implemented a week long intervention that aimed to change teachers' knowledge of ADHD through a series of training workshops. Teachers knowledge of ADHD was measures pre- and post-intervention using a series a questionnaires. The authors found that the intervention significantly improved teachers' knowledge of ADHD ($p < 0.05$). The authors noted that this was a pilot study, and requires a larger follow-up study to evaluate the effect of improving teachers' knowledge of ADHD and their ability to identify a child for a referral (Syed & Hussein, 2010). Therefore, the lack of research evaluating interventions

to change teachers' knowledge, attitudes and behaviours towards ADHD using a web-based medium resulted in the current study.

Using Web-Based Mediums to Support Change

The area of e-learning is becoming increasingly popular in the literature as researchers are choosing to use web-based mediums to support scientific research. The potential of information technology to support health care and health services is limitless. Areas of study and research, such as Health Informatics, are dedicated to advancing the marriage of health care and Information Technology (IT), using "health science as the focus, and technology as the enabler" (Department of Health Informatics, Dalhousie University, 2008). There is a growing body of evidence on the effectiveness of IT-based intervention strategies. Wantland, Portillo, Holzemer, Slaughter and McGhee (2004) conducted a meta-analysis to evaluate the effectiveness of web-based vs. non web-based interventions to encourage behavioural change related to self-care and management in 11,754 participants across a number of outcome variables (increased exercise time, increased knowledge of nutritional status, increased knowledge of asthma treatment, increased participation in healthcare, slower health decline, improved body shape perception, and 18-month weight loss maintenance). Based on the effect size, the authors concluded that the web-based interventions were more effective than the non-web based interventions in achieving knowledge and behavioural change in the participants (Wantland *et al.,* 2004).

The area of e-learning has been growing in popularity and practicality. Tools such as distance learning through telecommunication and the internet, offer learners instruction that is easily accessible and flexible in structure and is being increasingly used

in education (Learning Disabilities Association of Canada, 2003). The internet is becoming an attractive medium to host behavioural interventions because it can host large quantities of people while delivering treatment or education in real time, simultaneously (Christensen, Griffiths, & Jorm, 2004). Teacher's willingness to implement and participate in behavioural interventions has been documented in the literature (Power, Hess, & Bennett, 1995). However, the delivery of past health interventions to teachers have not been web-based. The acceptability and demand of online learning and interaction tools has become well documented in the recent literature. A study by Tung and Chang (2008) evaluated nursing students' intention to use online courses as a mode of learning. The authors aimed to investigate why nursing students would choose e-learning over classroom-based learning. Tung and Chang (2008) found that the following factors positively influenced student's decisions to choose e-learning over classroom-based learning:

1. The effect of self-efficacy by using the computer as a mode of learning
2. Compatibility (e.g. how consistent this particular mode of learning is with the values, needs, and experiences of the end user)
3. Perceived usefulness
4. Perceived ease of use

The authors also reported the factors that negatively affected students' decisions to choose e-learning over classroom-based learning (Tung & Chang, 2008):

1. Computer anxiety
2. Perceived financial cost
3. Perceived information quality

A positive correlation was found for perceived usefulness and perceived ease of use. These factors positively influenced a participant's intention to use online courses. The authors stress the importance of computer self-efficacy and intention to participate in online courses (Tung & Chang, 2008).

The findings of Tung and Chang (2008) are important as they reflect the needs of the end user. By analyzing the positive and negative factors that influence a user's decision to participate in web-based programs, we are able to design more user-friendly tools and functions that reflect the best-practice approaches to e-learning and behaviour change (Tung & Chang, 2008). Christensen *et al.* (2004) conducted a study evaluating the efficacy of two web-based psychoeducation interventions for individuals with depression. One site was education-focused, and the other offered cognitive behaviour therapy (CBT) via distance (Christensen *et al.,* 2004). The authors found that both the depression education website and the CBT website were effective in reducing symptoms of depression (Christensen *et al.,* 2004). Website activity was monitored for information and assessment access rates. The authors remarked that the Internet is a wise medium for hosting interventions of this nature because of its feasibility in hosting large quantities of participants at the same time, and because of its power in delivering community-based public health interventions (Christensen *et al.,* 2004).

A study by Edwards, Felix, Harris, Ferguson, Free, Landon, Lock, Michie, Miners and Murray (2010) outlined the protocol in designing a study aimed at analyzing the role and use of e-learning in improving dietary behaviour. The goal of the investigation was to analyze how cost-effective and valuable e-learning technology was in developing an intervention to change behaviour about diet. The authors concluded that a program such

as this has great potential in positively changing participants' behaviour about diet on both an individual and population-wide scale (Edwards *et al.,* 2010). Since the authors only proposed the research protocol they will follow when conducting this study, the results are still pending. If the results of this study show promise for the use of e-learning in implementing and delivering adaptive technologies such as the proposed behaviour intervention, this will help inform decision making and funding in support of web-based interventions for behaviour change (Edwards *et al.,* 2010).

Similar to the study by Edwards *et al.* (2010), Tate, Wing and Winnett (2001) investigated the difference in effectiveness between an education-based site (knowledge focused) weight loss and a weight loss program (therapy focused) delivered via the web. The goal of the study was to determine which site was more effective in changing behaviour (i.e. lose weight). The author found that while the education program was valuable in that it offered beneficial resources and information about how to change behaviour, the weight loss program was more effective as it included a series of assessments delivered via email, feedback, and use of a bulletin board (Tate *et al.,* 2001). The dynamic and interactive nature of the weight loss program helped facilitate behaviour change better than simply reading information off of a web-based education site. The Internet is an effective medium for supporting web-based interventions as it is widely-accessible, extremely powerful for data transmission and data storage, is interactive (e.g. the chat function, which allows participants to communicate in real time), and it cost-effective (Edwards *et al.,* 2010). While Internet education sites are useful in cultivating knowledge, intervention programs hosted through a web medium have been effective in changing behaviour (Tate *et al.,* 2001). Elementary school teachers'

acceptability of online health interventions for ADHD has not yet been documented in the literature. If the results are positive, indicating that teachers find online interventions both useful and usable, this will be a field of research that offers many opportunities for program development implementation.

CHAPTER 3: METHODS

Ethics

Ethical approval was awarded by the Health Science Research Ethics Board at Dalhousie University (Project #: 2009-2112). Approval was also provided by the Chignecto-Central Regional School Board (CCRSB) in order to have teachers from this school board participate in the study.

Recruitment

Twenty participants were recruited to participate in this study. Inclusion criteria required that the participants were:

1. Registered teachers
2. Teaching grades primary to six
3. Have at least one student in their class who has been diagnosed with ADHD

Two educators working within the CCRSB assisted in recruitment by compiling names of interested teachers within their school board and forwarding the list onto the study investigator. The study investigator then contacted the list of potential participants via email to determine if they met the inclusion criteria, and if they were still interested in going forward with the study. This recruitment procedure resulted in 18 participants. Teachers were also recruited through word of mouth by the study investigator and supervisor. This procedure yielded two teachers who were not teaching within CCRSB. Once it was determined that the potential participant met the inclusion criteria (through verification from the CCRSB website staff directory), the researcher contacted each person with further information about the study, as well as instructions for navigating and logging onto the web-based learning site. Participation was strictly voluntary and no

monetary reward was offered for participation. Participants were anonymous to each other, but not to the researchers. First and last names, as well as any demographic information was not captured and stored on the web-based learning site. Rather, participants were given a unique user name and default password, which they changed upon first login to the web-based learning site. Participants were only identifiable by a screen name, which they were able to choose themselves. Each participant's user name and screen name was linked to their name and email address on a master spreadsheet. This spreadsheet was stored on a secure database on the Dalhousie University server, and could only be accessed by the study investigator and her supervisor.

Participants

Demographic information was collected by means of a questionnaire, which was administered to participants during the baseline testing period. Participants were given the option to not disclose any demographic information (no more than five participants chose not to disclose information for each of the variables). The sample population consisted of 20 elementary school teachers, all of whom were females. One participant withdrew from the study immediately following the baseline orientation and testing period due to the time demands of the study; therefore the total attrition rate was 5%. Participants ranged in age from 25-55 years (Mean = 36.88, SD = 9.25). Within the sample, 12 participants held Bachelor degrees, seven held Masters degrees, and one held a College degree. The number of years participants had been teaching ranged from 1-35 years (Mean = 11.82; SD = 9.59). The majority of participants were full-time classroom teachers (n = 15), however some were part-time classroom teachers (n = 3), learning centre teachers (n = 1), and an educational assistant (n = 1).

When asked to rate their knowledge of ADHD, most participants indicated that they were "moderately knowledgeable" (n = 12), some reported that they were "somewhat knowledgeable" (n = 4), and some reported that they were "not very knowledgeable" (n = 4). When asked to rate their experience with ADHD, most participants rated themselves as having "some knowledge" of ADHD (n = 14), while others provided ratings indicating "a lot of experience" (n = 6). None of the participants stated that they had "very little experience" or "no experience" with ADHD. The numbers of students with ADHD taught by these teachers ranged from 2-35 students (Mean = 9.88; SD = 7.57). Almost all participants had experience with children taking medication as a form of treatment of ADHD (n = 19; only one teacher did not have experience with children taking medication). When teachers were asked if they have received support in dealing with students with ADHD, most teachers responded "yes" (n = 17). Teachers who indicated that they have received support in dealing with students with ADHD were asked to list their sources of support (participants could list more than one source of support). Their responses included:

1. Other teachers (n = 13)
2. School Psychologist (n = 8)
3. Parents (n = 5)
4. School system (n = 3)
5. Clinical Psychologist (n = 2)
6. School administration (n = 1)
7. Site-based Support Team (n = 1)
8. Learning/Resource Centre (n = 1)

9. Program Support (n = 1)
10. Books (n = 1)
11. Doctors (n = 1)
12. Personal experiences of others (n = 1)

When teachers were asked if they have ever taken part in a professional development seminar and/or training workshop about ADHD, most participants responded "yes" (n = 14). Of those who responded "yes", the number of hours participating in seminars about ADHD ranged from 1-10 hours (Mean = 3.73; SD = 2.79). Participants were instructed to rank the following options according to their preferred mode of learning about ADHD. Participants were instructed to rate the items using the following scale: one = most preferred, to five = least preferred. Sixteen participants provided rankings, whereas three participants did not complete the ranking system correctly. The results showed the following rankings:

1 = Workshop

2 = Seminar/Presentation

3 = Web

4 = Written Materials

5 = CD Materials

The Intervention

The intervention consisted of seven sessions that covered different aspects about ADHD. The content of each session was evidence-based, and developed by Dr. Penny Corkum and Dr. Nez Elik for use in a larger study. The researcher took the written material for each session and summarized the content of each session, and transformed it

into a web-ready format so that it could be accessed and viewed on the web-based learning site. The seven sessions presented are summarized below.

- Session 1: Introducing ADHD

The aim of Session 1 was to help teachers understand their role in helping a student with ADHD in the classroom. It discussed setting expectations and dealing with stress, introduced the "team work" approach to helping children with ADHD, discussed the "toolbox" analogy, and presented the characteristics of students with ADHD. Session 1 also presented methods of balancing the teachers' views with the student's strengths and talents, and how to establish and communicate goals effectively.

- Session 2: ADHD and It's Treatment

Session 2 focused on the treatment of children with ADHD. The presentation covered the types of treatment available for ADHD, such as medication, educational interventions, cognitive-behavioural interventions, social-emotional interventions, parental interventions, and family therapy/psychotherapy. More specifically, these treatments were reviewed in three categories: evidence-based forms of treatment (medication, behaviour therapy, combination of medication and behaviour therapy), promising treatments (classroom-based interventions, non-stimulant medication), unsupported treatments (cognitive training programs, dietary management, supplements), and treatments that requires further research (biofeedback, sensory integration, acupuncture, homeopathy).

- Session 3: Introducing the Reward Program

Session 3 was focused on the reward program. An overview of the reward program was provided, and content was focused on the implementation of the program, alternative reward programs, and positive approaches to school-home communication.

- Session 4: The Classroom Setting

Session 4 covered aspects of the classroom setting. Topics covered included how to set-up the physical setting for students with ADHD, the use and importance of rules, routines, and transitions, as well as behavioural management of the classroom in general.

- Session 5: Academic and Cognitive Needs

Session 5 discussed the academic and cognitive needs of students with ADHD. This session covered reasons for academic problems, ADHD and learning disabilities, academic and cognitive considerations of students with ADHD, strategies to increase academic success, and what to do about homework.

- Session 6: Other Needs of the Student with ADHD

In Session 6, other needs of the student with ADHD (e.g., needs excluding academic and cognitive considerations) were discussed. Such needs included metacognitive awareness, building study skills, and the role of social skills. Session 6 also provided strategies to help enhance metacognition, study skills, and social skills.

- Session 7: Review and Fading of Behavioural Interventions

Session 7 provided a review of past sessions, and how to approach fading of a reward program. Topics discussed included strategies used to fade a reward program, rewarding yourself, and resources for the future.

Measures

A total of eight measures were collected from participants. All measures were administered, completed, and submitted using the web-based learning site. Additionally, data pertaining to internal site activity was automatically collected by the BLS system. Information about each of the eight measures, their psychometric properties, and a description of the internal site audit are detailed below.

1. *Demographic Questionnaire*

The Demographic Questionnaire is a 16-item questionnaire created by Barnett and Corkum (2009) that used multiple choice and short-answer format. The goal of this questionnaire was to collect demographic information, such as age, sex, teaching experience (years, grade levels), and self-rated experience with ADHD from the participants in order to describe the sample.

2. *Knowledge Questionnaire*

The Knowledge Questionnaire is a 43-item questionnaire based on the "Knowledge of Attention Deficit Disorder Scale" originally developed by Scuitto *et al.* (2000), and later modified by Kos (2008). It employs a true/false format. The goal of this questionnaire is to determine participants' level of knowledge about ADHD. Scuitto *et al.* (2000) reported that there is preliminary evidence about the validity of this measure: Scuitto and Terjesen (1994, unpublished study; mentioned in Scuitto *et al.,* 2000) administered an earlier version of the KADDS to undergraduate and graduate education students and reported a coefficient alpha of 0.71. Bender (1996, unpublished study; mentioned in Scuitto *et al.,* 2000) evaluated the pre-post scores on a modified version of the KADDS used by Scuitto and Terjesen (1994, unpublished study; mentioned in Scuitto

et al., 2000) and found it has good internal consistency based on the alpha scores of two different educational interventions ($\alpha = 0.81$).

3. *Attitudes Questionnaire*

The Attitudes Questionnaire is a 31-item questionnaire created by Kos (2008). It uses a Likert scale format, and requires participants to select the option that best describes their feeling towards the statement presented. Kos (2008) grouped individual question items into sub-scales and performed a factor analysis to investigate the relationship between items (sub-scales can be found in Appendix A). In Kos' (2008) study, construct validity was achieved as the attitude questionnaire accurately predicted the relationship between knowledge, attitudes and behaviour. The reliability of the measure has not been established.

4. *Behaviour Questionnaire*

The Behaviour Questionnaire, created by Kos (2008), consists of two vignettes describing two different children with ADHD. It requires participants to read the scenario presented, and document in writing how they would manage each particular child's behaviour in the classroom. The Behaviour Questionnaire was chosen as a best possible alternative to actual classroom observations for measuring behaviour. Since direct observation was not feasible for the current study, this measure was employed to assess how participants would respond if a situation of this nature was encountered in the classroom. In total, 18 participants completed both the pre and post-behaviour measure.

A volunteer of the study supervisor's lab scored the pre- and post-test behaviour vignettes. This research assistant manually counted the number of positive and negative strategies each participant listed as a potential strategy she would use to manage the

child's behaviour. The scoring criteria included a list of the 20 strategies and this list was used to classify strategies as either positive of negative, and group them into the appropriate sub-scales. The sub-scales were created by the researcher based on the strategies discussed throughout the intervention. The validity and reliability of this measure is pending further research.

Note: The Knowledge, Attitudes, and Behaviour Questionnaires were administered at both the pre- and post-intervention time points. These questionnaires were used with permission from the original author (Kos, 2008).

5. *Intention Questionnaire*

The goal of the Intention Questionnaire was to rate participant's readiness to change their beliefs about ADHD and was administered only at baseline. The Intention Questionnaire was a slightly modified version of the measure developed by Prochaska and DiClemente (1984). It was multiple-choice format, and required participants to answer a single question that assesses the stage of change that they best associate with (four stages were presented and each participant needed to select only one stage). Nineteen participants completed the questionnaire at baseline. The researcher assigned point values to each of the stages of change (Table 1) so that a higher score indicated increased readiness for change.

Table 1

Intention Questionnaire with corresponding scoring values

Statement No.	Statement	Assigned Point Value
1	I believe that my attitudes, beliefs and opinions are correct and do not feel the need to change them.	1
2	I believe I have misconceptions of ADHD, and see the pros and cons of ADHD education in order to broaden my knowledge of ADHD.	2
3	I believe that I have knowledge gaps and misconceptions about ADHD and intent to change them by becoming more knowledgeable.	3
4	I have a plan to become more knowledgeable about ADHD, and am actively working towards achieving my goal.	4

The Intention Questionnaire was developed for the purpose of this study, therefore the reliability and validity of this measures is unknown.

6. Subjective Norm Questionnaire

The goal of the Subjective Norm Questionnaire was to gather information about the influence of subjective norm, based on the definition of subjective norm put forth by Azjen and Fishbein (1980). The Subjective Norm Questionnaire was developed by Barnett and Corkum (2009) and was only administered at baseline. Participants were instructed to read four statements about the influence of subjective norm on behaviour, and state whether they agreed or disagreed with each statement using a Likert scale

format. The researcher assigned point values to the Likert scale options, so that higher scores were associated with greater influence of others' expectations. Nineteen participants completed the questionnaire at baseline. The Subjective Norm Questionnaire was developed for the purpose of this study, therefore the reliability and validity of this measures is unknown (Table 2).

Table 2

Subjective Norm Questionnaire with corresponding scoring values

Statement No.	Statement	Assigned Point Values			
		Strongly Agree	Agree	Disagree	Strongly Disagree
1	It is important to me to become more knowledgeable about ADHD because I believe the school board would like teachers to be better able to manage ADHD in the classroom	4	3	2	1
2	It is important to me to become more knowledgeable about ADHD because I believe the administration at my school would like teachers to be better able to manage ADHD in the classroom	4	3	2	1
3	It is important to me to become more knowledgeable about ADHD because I believe other teachers in my school would like me to be better able to manage ADHD in the classroom	4	3	2	1
4	It is important to me to become more knowledgeable about ADHD because I believe parents would like teachers to be better able to manage ADHD in the classroom	4	3	2	1
	TOTALS	16	12	8	4

7. *Post-Content Session Satisfaction Questionnaire*

The Post-Content Session Satisfaction Questionnaire was a 12-item questionnaire created by Barnett and Corkum (2009). Following each of the seven sessions, participants were instructed to complete this questionnaire. The questionnaire was composed of two parts: a quantitative component (multiple choice format), and a qualitative component (short answer format). The quantitative component required participants to read four statements, and select the option that best described how they feel using a Likert scale format. The qualitative component allowed participants to comment on different aspects of the sessions they had just viewed. The main motivation for administering the post-content assessments was to elicit feedback to consider for future program revisions, and for post-study analysis on the usefulness of each of the sessions and tools presented. Point values were awarded for each response of the quantitative component (Table 3) so that higher scores indicated more positive perspectives.

Table 3

Scoring Rubric for Quantitative Component of Post-Content Satisfaction Questionnaire

Statement No.	Statement	Assigned Point Value			
		Strongly Agree	Agree	Disagree	Strongly Disagree
1	The content was presented in a manner that was easy to understand.	4	3	2	1
2	The links were useful and informative.	4	3	2	1
3	I learned something new from this module.	4	3	2	1
4	I found that the Discussion Board was a useful tool for communicating questions, comments, and idea from this module.	4	3	2	1

Teachers were also asked to complete the following eight qualitative questions as part of the Post-Content Satisfaction Questionnaire:

1. My favourite aspect of this session was
2. My least favourite aspect of this session was
3. I would add the following information to this session
4. I would remove/change the following information to this session
5. My favourite aspect of the Discussion Board was

6. My least favourite aspect of the Discussion Board was
7. I would add the following to the Discussion Board tool
8. I would remove/change the following from the Discussion Board tool

The participants' responses on the qualitative questions were not scored, but rather evaluated for trends to improve the quality and functionality of the tools and sessions.

8. Program Feedback Questionnaire

A follow-up questionnaire was sent via email to all participants who completed the study (n = 19) approximately two weeks after finishing the study. Participants were instructed to complete the questionnaire, and either send their responses back to the researcher via email, or through the web-based learning system. The response rate for the questionnaire was 47.4% (n = 9). The program feedback questionnaire used the same format and scoring method as the Post-Content Session Satisfaction Questionnaire (see above).

9. Internal site activity audit

The researcher was also interested in evaluating participant's knowledge seeking and knowledge sharing practices and therefore an audit of internal web-based learning site activity was conducted. The following five aspects of internal site activity were collected:

1. Total number of Discussion Board messages read
2. Total number of Discussion Board messages sent
3. Total number of web links accessed/viewed
4. Total number of folders accessed/viewed (sessions and supplemental materials were enclosed in individual folders)
5. Total number of files accessed/viewed

Procedures

The researcher emailed the interested participants, and attached two documents, one that gave a comprehensive summary of the study, and the other being the consent form (Appendix B). Once the researcher had confirmed the participant's interest in participating in the study (in the form of an email response back stating that she was willing to go forward with the study), a unique user ID and details regarding how to navigate to the web-based learning site was individually sent to each potential participant via email. In this email, instructions regarding when the study would commence, how to navigate to the site, information about site layout, and how to view the "Blackboard Learning Systems (BLS): How-To" PowerPoint (created by the researcher with illustrations and descriptions of BLS functions) was also outlined.

During the orientation weeks (weeks one and two of the nine-week program), participants were instructed to complete and submit the pre-intervention assessments. Before these assessments were "unlocked" (made accessible to the participants by the researcher), the participants had to indicate their consent to participant in the study by clicking on the "yes" box (Appendix B). Session 1 was made available to the participants after the pre-intervention assessment period ended. The orientation and assessment period was initially scheduled for one week in duration, but was extended to accommodate new participants, as well as the late completion of pre-intervention assessments. All participants began the intervention (beginning with Session 1) at the same time. Each learning session was one week in duration, spanning Monday at 8 am to Sunday at 11:59 pm. The Sunday night prior to the beginning of each new session, the researcher sent out

a detailed outline of the tasks for that particular session, and how to complete them (Appendix C). Participants were instructed to:

1. View the web-based presentation for each particular learning session
2. Explore the supplemental material for each particular learning session (web links, learning tools and worksheets, etc.)
3. Post one question and one reply on the Discussion Board

The researcher acted as a moderator for Discussion Board conversation, ensuring that communication adhered to the confidentiality and anonymity rules of the research, and that the flow of communication was maintained. The researcher also posed questions to the participants (as a group), in order to spark new conversations surrounding certain topics that were mentioned in the learning session. Following each of the seven learning sessions, participants were asked to complete and submit the 12-item post-content satisfaction questionnaire. If the participants required technical assistance, or had a general inquiry about the study or session, they either posted a question on the Discussion Board, or emailed the study researcher directly. Following the final learning session (Session 7, held on week nine), participants were instructed to not only complete and submit the post-content satisfaction questionnaire, but they were also asked to complete the post-intervention assessment measures (i.e., Knowledge Questionnaire, Attitudes Questionnaire, and Behaviour Vignette). Once post-intervention data was completed and the researcher confirmed the submissions, the participants were notified via email that the study was completed. The participants were also informed that the web-based learning site would be accessible for an additional month if they chose to review the content at a later time. This information was also posted on the web-based learning site's home page.

(Participants were not able to download information in order to ensure that the information was not shared with others as this would have negative consequences for the upcoming study.)

After the study was complete, the participants were emailed a post-study follow-up questionnaire. Participants were instructed to complete and submit the questionnaire on the course website, or email their responses directly back to the researcher. Upon completion of the study, the participants were rewarded with a certificate of professional development and book about ADHD. The results of the study will be sent out via email as a PDF document upon successful completion of the researcher's oral defense.

CHAPTER 4: RESULTS

SPSS statistical software was used to analyze quantitative data and the results are organized based on the research questions as outlined in the Introduction:

1. To examine the change in teachers' knowledge, attitudes, and behaviour towards ADHD and interventions for ADHD as a result of the web-based intervention.
2. To determine if the variables *intention to change* and *subjective norm* are related to the magnitude of change in knowledge, attitudes, and behaviour.
3. To examine patterns in teachers' knowledge seeking and knowledge sharing practices while using this web-based learning site.
4. To evaluate the usability and usefulness of the individual sessions and overall intervention.

Exploratory Data Analysis

Prior to evaluating the effect of the intervention on participant's knowledge, attitude, and behaviour a series of exploratory data analyses were conducted to investigate the relationship of demographic information on scores on the Knowledge Questionnaire. Pearson correlations were conducted to evaluate the following relationships:

1. Participant's age vs. knowledge of ADHD (r = -0.16; p = 0.53)
2. Education level vs. knowledge of ADHD (r = -0.31; p = 0.19)
3. Number of hours of professional development vs. knowledge of ADHD (r = 0.03; p = 0.92)
4. Number of students with ADHD taught vs. knowledge of ADHD (r = 0.25; p = 0.36)

All analyses were not significant.

1. To examine the change in teachers' knowledge, attitudes, and behaviour towards ADHD and interventions for ADHD as a result of the web-based intervention.

Knowledge

In total, 19 participants completed both the pre and post-knowledge measure. Although the original questionnaire was comprised of 43 items, some of these items were dropped when computing a total score. A review of individual items by the researcher, her supervisor and the two educators who helped with this study indicated that some of the questionnaire items were confusing (because of wording) and therefore not likely to be reliable. A total of 12 items were omitted (13.9% of total questions) and therefore the final scale consisted of 31 questions (all items, both the ones retained and omitted, can be found in Appendix A). A total score was computed, with correct responses given 1 point and incorrect responses given 0 points. Therefore, the maximum total score for the revised Knowledge Questionnaire was 31. The mean total score pre-intervention was 24.95 (SD = 1.90), and the mean total score post-intervention was 25.79 (SD = 2.02). A paired samples t-test showed that participants' knowledge significantly improved with the intervention (t = -2.39, p = 0.03). Participants correctly answered 80.5% of questions pre-intervention and 83.2% post-intervention.

Attitude

In total, 19 participants completed both the pre and post-attitude measure. Participants were given a questionnaire consisting of 31 statements about different aspects of ADHD in a Likert scale format. Point values were awarded depending on how

much the participant agreed or disagreed with the statement presented (i.e., five points for "Strongly Agree" and one point for "Strongly Disagree"). Positive statements were awarded a total of five points, and negative statements were awarded one point. The maximum total score for the original Attitudes Questionnaire was 155, with a higher number indicating a more positive attitude. The mean total score pre-intervention was 106.84 (SD = 1.32), and the mean total score of attitudes post-intervention was 109.84 (SD = 1.45). Paired-sample t-test revealed a trend toward a change in participants' attitudes (t = -1.95, p = 0.07). The rate of positive attitudes pre-intervention was 69%, and the rate of positive attitudes post-intervention was 71%. These percentages were calculated by dividing the score on pre- or post-intervention measure by the maximum total score (155). Data was next analyzed for the five sub-scales of this measure. Significant differences were found on two of the five subscales: "Lack of Control" *(*t = -3.92*,* p = 0.001) and "Perceived Competence" *(*t = -8.55 p = 0.000). See Table 4 below.

Table 4

Results of Attitudes Questionnaire Sub-Scale Factor Analysis

Factor No.	Factor (max score)	Pre-intervention Mean (SD)	Post-intervention Mean (SD)	t-value	p-value
1	Lack of Control (30)	23.84 (1.74)	25.63 (2.03)	-1.95	0.001
2	Perceived Competence (15)	8.58 (1.58)	11.21 (1.32)	-8.55	0.000
3	Expectations (15)	9.74 (1.98)	9.84 (1.73)	-1.54	0.14
4	Influences to Management (15)	8.53 (1.10)	9.11 (1.57)	-0.29	0.78
5	External Control (15)	9.37 (1.07)	9.63 (1.21)	-0.82	0.43

Behaviour

In total, 18 participants completed both the pre and post-behaviour measure. The mean total score of positive behaviour management strategies pre-intervention was 14.83 (SD = 7.85), and the mean total score of positive behaviour management strategies post-intervention was 13.72 (SD = 8.72). The change in the number of positive behaviour management strategies from pre-intervention to post-intervention was not significant (t = 0.55, p = 0.59). The researcher then examined the difference between pre- and post-

intervention negative behaviour management strategies. The mean total score of negative behaviour management strategies pre-intervention was 1.39 (SD = 4.46), and post-intervention was 0.11 (SD = 0.32). The change in the number of negative behaviour management strategies from pre-intervention to post-intervention was also not significant *(t* = 1.20, *p* = 0.25).

2. To determine if the variables, intention to change and subjective norm, are related to the magnitude of change in knowledge, attitudes, and behaviour.

Intention to Change

In total, 19 participants completed the pre-intervention Intention measure.

First, the distribution of responses on the Intention Questionnaire were calculated (Table 5).

Table 5

Item-by-item analysis of the Intention Questionnaire

Statement No.	Statement	Responses n (%)
1	I believe that my attitudes, beliefs and opinions are correct and do not feel the need to change them.	n = 0 (0%)
2	I believe I have misconceptions of ADHD, and see the pros and cons of ADHD education in order to broaden my knowledge of ADHD.	n = 2 (10.5%)
3	I believe that I have knowledge gaps and misconceptions about ADHD and intent to change them by becoming more knowledgeable.	n = 10 (52.6%)
4	I have a plan to become more knowledgeable about ADHD, and am actively working towards achieving my goal.	n = 7 (36.8%)

The mean response was 3.26 (SD = 0.56). A Pearson correlation was conducted to determine if intention to change is related to the magnitude of change (post-treatment scores minus pre-treatment scores) on the Knowledge Questionnaire, and on two sub-scales of the Attitude Questionnaire (Lack of Control and Perceived Competence). An analysis was not conducted for the behaviour measure given that there was no pre-post intervention difference. Intention to change was not significantly correlated with change on the Knowledge Questionnaire (r = -0.34, p = 0.16), or on either of the subscales of the Attitude Questionnaire (Lack of Control; r = -0.06, p = 0.82; Perceived Competence; r = -0.16, p = 0.52).

Subjective Norm

In total, 19 participants completed the pre-intervention Subjective Norm measure. The distribution of responses on the Subjective Norm Questionnaire is provided in Table 6.

Table 6

Item-by-item analysis of the Subjective Norm Questionnaire

Statement No.	Statement	Responses n (%)			
		Strongly Agree	Agree	Disagree	Strongly Disagree
1	It is important to me to become more knowledgeable about ADHD because I believe the school board would like teachers to be better able to manage ADHD in the classroom	n = 7 (36.8%)	n = 11 (57.9%)	n = 1 (5.3%)	n = 0 (0%)
2	It is important to me to become more knowledgeable about ADHD because I believe the administration at my school would like teachers to be better able to manage ADHD in the classroom	n = 7 (36.8%)	n = 12 (63.2%)	n = 0 (0%)	n = 0 (0%)
3	It is important to me to become more knowledgeable about ADHD because I believe other teachers in my school would like me to be better able to manage ADHD in the classroom	n = 7 (36.8%)	n = 12 (63.2%)	n = 0 (0%)	n = 0 (0%)
4	It is important to me to become more knowledgeable about ADHD because I believe parents would like teachers to be better able to manage ADHD in the classroom	n = 5 (26.3%)	n = 13 (68.4%)	n = 1 (5.3%)	n = 0 (0%)

The mean response was 13.26 (SD = 1.63). In order to determine if subjective norm is related to the magnitude of change in knowledge and attitude, a Pearson correlation was performed. Total score on the Subjective Norm questionnaire was not significantly related to change on the Knowledge Questionnaire *(r* = -0.32, p = 0.19). Subjective Norm total score was also not significantly related to the change score for either of the two subscales of the Attitudes Questionnaire: Lack of Control, r = 0.02, p = 0.94; Perceived Competence, r = 0.10, p = 0.69). As previously mentioned when evaluating the effect of intention, an analysis was not conducted for behaviour as there was no change from pre to post intervention.

3. To examine patterns in teachers' knowledge seeking and knowledge sharing practices while using this web-based learning site.

Table 7 includes the results of the internal site activity analysis, which was generated by the web-based learning system. The number of Discussion Board messages read varied substantially across teachers from a minimum of 39 to a maximum of 1408. Similarly, the number of web-links, folders, and files accessed and/or viewed also varied widely across teachers. The means of each aspect of internal activity measured may have been influenced by outliers, which is why the medians for each aspect are also reported. In general, participants followed instructions: to post at least one question and one reply on the Discussion Board per session. The results of the internal site activity analysis indicated that most teachers were maximizing their use of the web-based learning site (Table 7).

Table 7

Results of Internal Site Activity Analysis

Internal Activity Measured	N	Min; Max	Mean	Median	SD
Total number of Discussion Board messages read	19	39; 1408	326.05	213	341.50
Total number of Discussion Board messages sent	19	0; 20	8.47	7	5.86
Total number of web links accessed/viewed	19	0; 70	26.84	30	20.98
Total number of folders accessed/viewed	19	38; 190	98.53	93	50.34
Total number of files accessed/viewed	19	14; 92	44.26	41	24.33

4. To evaluate the usability and usefulness of the individual sessions and overall intervention.

Session Feedback Analysis

The rate of completion for the Post-Content Satisfaction Questionnaires was 86.46% (SD=10.47). Descriptive statistics were compiled to measure the rate of completion for each of the 7 Post-Content Satisfaction Questionnaires (Table 8).

Table 8

Results of Post-Content Satisfaction Survey Completion Rate Analysis

Session No.	Questionnaire Completed
1	n = 17 (89.5%)
2	n = 14 (73.7%)
3	n = 19 (100%)
4	n = 15 (78.9%)
5	n = 15 (78.9%)
6	n = 16 (84.2%)
7	n = 19 (100%)

Participants were given a questionnaire consisting of four items asking about different aspects of the session (Appendix A). Point values were awarded depending on how much the participant agreed or disagreed with the statement presented (i.e., four points for "Strongly Agree"; three points for "Agree"; two points for "Disagree"; one point for "Strongly Disagree"). Generally, all sessions were rated highly for all four questions presented. For question one ("The content was presented in a manner that was easy to understand"), Session 3 ("Introducing the Reward Program") received the highest score (Mean = 3.74; SD = 0.45), and Session 2 ("ADHD and It's Treatment") received the lowest score (Mean = 3.33; SD = 0.62). For question two ("The links were useful and informative"), Session 7 ("Review and Fading of Behavioural Interventions") received the highest score (Mean = 3.58; SD = 0.51), and Sessions 1 and 2 ("Introduction to ADHD" and "ADHD and Its Treatment") received the lowest scores (Mean = 3.20; SD = 0.41-0.56). For question three ("I learned something new from this module"), Session 6

("Other Needs of the Student with ADHD") received the highest score (Mean = 3.53; SD = 0.52), and Sessions 1 and 3 ("Introduction to ADHD" and "Introducing the Reward Program") received the lowest scores (Mean = 3.00; SD = 0.52-0.54). For question four ("I found that the Discussion Board was a useful tool for communicating questions, comments, and ideas from this module"), Session 5 ("Academic and Cognitive Needs") received the highest score (Mean = 3.29; SD = 0.73), and Session 7 ("Review and Fading of Behavioural Interventions") received the lowest score (Mean = 2.74; SD = 0.65). The descriptive statistics from the Post-Content Satisfaction Questionnaire scores by Question are illustrated in Table 9.

Table 9

Distribution of Post-Content Satisfaction Questionnaire Score for Questions 1-4 by Session

Session	Question 1	Question 2	Question 3	Question 4
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
1	3.53 (0.52)	3.20 (0.56)	3.00 (0.54)	2.80 (0.78)
2	3.33 (0.62)	3.20 (0.41)	3.47 (0.52)	3.13 (0.74)
3	3.74 (0.45)	3.32 (0.58)	3.00 (0.82)	2.95 (0.78)
4	3.63 (0.50)	3.31 (0.60)	2.75 (0.86)	2.81 (0.66)
5	3.50 (0.52)	3.36 (0.63)	3.50 (0.52)	3.29 (0.73)
6	3.47 (0.52)	3.27 (0.80)	3.53 (0.52)	2.87 (0.74)
7	3.58 (0.51)	3.58 (0.51)	3.11 (0.66)	2.74 (0.65)

Teachers were also asked the following eight qualitative questions as part of the Post-Content Satisfaction Questionnaire:

1. My favourite aspect of this session was
2. My least favourite aspect of this session was
3. I would add the following information to this session
4. I would remove/change the following information to this session
5. My favourite aspect of the Discussion Board was
6. My least favourite aspect of the Discussion Board was
7. I would add the following to the Discussion Board tool
8. I would remove/change the following from the Discussion Board tool

Teachers' responses on the qualitative component of the Post-Session Satisfaction Questionnaire were analyzed for trends. Generally, teachers did not list very many negative aspects of each session.

- For Session 1, teachers expressed that their favourite aspect of the session was how identifying personal strengths and student strengths can be used together to set specific goals. Their least favourite aspect was the ADHD facts and myth spreadsheet included as supplemental material, as they had seen this resource before. Teachers felt that a direct link to supplemental resources embedded within the slideshow would be a useful addition to this session.
- For Session 2, teachers' favourite aspect was learning about information about different forms of treatment. Teachers would have enjoyed more information on how medication works and when/if it doesn't work. Also, more information on

how medication works to control certain characteristics of ADHD (e.g., fidgeting) would have been useful.

- For Session 3, teachers enjoyed the web links, and discussing how to use non-monetary items as rewards. Teachers also felt that the information on behaviour plans was concise and very informative. Teachers felt that more examples of achieving target behaviour using positive language should have been included, and they would have benefitted from an approximate timeline of using reward systems to refer to (e.g. when to change rewards, review the program, response-cost, etc.).
- For Session 4, teachers liked the classroom seating and room arrangement suggestions, and how to incorporate transitions. Teachers also enjoyed learning about the importance of praise and routine.
- For Session 5, teachers liked learning about the relationship between ADHD and learning difficulties.
- For Session 6, teachers enjoyed learning about social skills and motivation related to ADHD, and learning about difficulties that are often found in children with ADHD (e.g. social skills, etc.).
- For Session 7, teachers liked learning about the fading of interventions and specific examples of how to do so, as well as learning that these programs are short-term and not meant to be implemented long-term. Teachers also enjoyed learning that relapses are okay. Teachers felt that more information on fading one student's intervention while other students continue with their individual

behaviour plans would have been useful. Also, more information on what to do when many reward programs do not work could have been included.

Across all seven sessions, teachers' favourite aspects of the Discussion Board were being able to share and learn from others' perspectives, and discussing their thoughts and feelings with colleagues. It was a general consensus that the lack of "expert opinion" or "expert guidance" on the Discussion Board was teachers' least favourite aspect of the Discussion Board across all seven sessions. In addition, teachers expressed that it would have been useful to have the ability to print and save resources in the supplemental material to consult in their practice.

Feedback about the Overall Program

After completion of the intervention, participants were sent a follow-up questionnaire which was exactly the same as the post-content questionnaire described above.

A total of 9 of 19 participants completed the follow-up program evaluation questionnaire (47% of sample). The overall ratings of the program were extremely favourable (ratings > 3.67 on all four questions with 4.0 being the highest rating). The descriptive statistics from the program feedback questionnaire by question are illustrated in Table 10.

Table 10

Results of Program Feedback Questionnaire by Question

Question	Mean (SD)
1	3.56 (0.53)
2	3.67 (0.50)
3	3.78 (0.44)
4	3.67 (0.50)

Teachers were also asked the following eight qualitative questions as part of the Post-Program Follow-Up Questionnaire. Similar to the Post-Session Satisfaction Questionnaire, teachers did not list very many negative aspects of each session. Teachers' favourite aspects of the program were the links and supplemental resources, supportive feedback from teachers on the Discussion Board, and the accessibility (e.g., how easily the program accommodated the busy schedule of teachers). The least favourite aspects of the program were the time limits for each session (e.g. one week per session), and the overlap of content from their Bachelor of Education. Teachers expressed that more information would have been helpful on how to combine and organize the various strategies (e.g. reward systems, behaviour tracking) in a classroom where there are many diverse learners within one class. Teachers generally enjoyed sharing ideas and strategies with others on the Discussion Board, but sometimes felt forced to post one question and one reply per session. They also felt that a moderator would have been useful to direct conversation. One teacher felt that presenting case scenarios on the Discussion Board might have been useful to see how other teachers would react to different scenarios. Overall, the qualitative feedback indicated the program was valuable, informative, and appreciated by the participants.

CHAPTER 4: DISCUSSION

The aim of the current study was to determine if the web-based intervention was effective in supporting knowledge, attitude, and behavioural change in elementary school teachers of students with ADHD. Overall, it was found that teachers' knowledge of ADHD improved as a result of the intervention. Teachers' attitudes improved on two factors of the attitude sub-scale: Lack of Control and Perceived Competence. Teachers' behaviour did not change from pre-intervention to post-intervention based on the change in overall pre-post intervention score. Below, each finding is elaborated upon.

The results of the current study demonstrated a statistically significant improvement in teachers' knowledge about ADHD following completion of the web-based intervention. This result speaks to the success of the program. Teachers' overall score on the Knowledge Questionnaire indicated that the content learned within the seven learning sessions positively influenced their knowledge about ADHD. Past studies have shown that while teachers are relatively knowledgeable about ADHD, certain knowledge gaps exist (Jerome *et al.,* 1994, 1999; Bekle, 2004). Barbaresi and Olsen (1998) found that implementing a physician-run evidence-based intervention for teachers of students with ADHD positively improved teachers' knowledge about ADHD.

It has been reported that teachers' knowledge can influence their attitudes about ADHD (Kos, 2008), and the attitudes they hold may affect classroom teaching practices (Barkley, 1990). According to the Theory of Reasoned Action, it was expected that participants' attitudes towards ADHD will predict their behaviour (Azjen & Fishbein, 1980). Two of the sub-scales of the Attitude Questionnaire changed as a result of the intervention: Lack of Control and Perceived Competence. As defined by Kos (2008), the

Lack of Control sub-scale measures a perception held by teachers that children with ADHD have little control over managing their own behaviour, and similarly teachers of these students have little control over managing their behaviour in their classroom environment. Improvement on this scale indicates that teachers felt more in control managing the behaviour of students with ADHD after the intervention than before the intervention. This change is important as it indicates that teachers have gained the skills and strategies to be confidently able to manage students with ADHD more effectively in the classroom. Additionally, teachers' perceived competence also changed from pre- to post-intervention. Kos (2008) defined perceived competence as the belief a teacher has in his or her own ability to manage ADHD in the classroom. Therefore the results of the study suggest that teachers are more confident in their ability to manage ADHD in the classroom after participating in the program. There was no change on the other three attitude subscales: Influences to Management (i.e., the perception that others' beliefs do not affect how a teacher manages a student with ADHD), Expectations (i.e., the expectations teachers have about students with ADHD), and External Control (i.e., the belief of teachers that "external agents" might be required to manage ADHD symptoms).

The Behaviour Vignette was designed to simulate how teachers would manage different situations related to students with ADHD in the classroom. Although direct observation is considered the gold standard to measuring behaviour change, this was not possible for this thesis research. For the current study, teachers read two vignettes at pre- and post-intervention, then wrote down the strategies they would use to manage the child's behaviour in the classroom. A research assistant blind to the study, counted the number of positive and negative strategies recorded by each teacher. The number of

positive and negative behaviour strategies did not change from pre- to post- intervention. This finding is surprising as research has demonstrated that teachers' knowledge of ADHD can affect their behaviour (Ohan *et al.,* 2008; Kos, 2008). It may have been that the measure was not sensitive to actual behavioural change or that there were methodological issues that resulted in insignificant findings. For example, teachers may not have put forth a similar amount of effort in describing strategies at post-intervention as they had at pre-intervention.

Intention and the effect of subjective norm were measured in order to evaluate the magnitude of change on participant's knowledge, attitude, and behaviour. Since there were no pre-post differences in behaviour as a result of the intervention, an analysis of the relationship between the variables intention to change and behaviour, as well as subjective norm and behaviour could not be preformed. Based on the results, it was determined that intention to change and subjective norm did not predict the magnitude of change on teachers' knowledge and attitude. The results of the current study did not support the Theory of Reasoned Action, which asserts that subjective norm and intention to change influence behaviour.

Participant activity within the web-based learning site was monitored and measured throughout the intervention. Descriptive statistics showed a large range/variance in the number of Discussion Board messages read and Discussion Board messages sent, web links accessed, and files accessed. For example, the number of Discussion Board messages read ranged from 39-1408 (Mean = 326.05, SD = 341.50), and the number of web links accessed ranged from 0-70 (Mean = 26.84, SD = 20.98). These results show wide variability in the access patterns of the sample population. While

most participants followed instructions to post at least one question and one reply on the Discussion Board per session, and to explore the resources included in each session's supplemental materials folder there was variability, which may be attributed to how much time the participant can or has decided to dedicate to this program, or interest in the resources provided.

Feedback from the Post-Content Satisfaction Questionnaires and Program Follow-Up Questionnaires show that teachers found the web-based learning tool to be both usable and effective in supporting change in knowledge and attitudes. The cumulative rate of completion for the seven Post-Content Satisfaction Questionnaires was 86.46%. This high percentage indicates that the participants were dedicated to giving feedback to the researcher. On average, the participants agreed that the content was presented in a manner that was easy to understand, and the links were informative for each of the seven sessions. The participants generally agreed that they learned something new from each of the sessions. On average, participants somewhat agreed that the Discussion Board was a useful component of the intervention. Feedback collected indicated that this tool may require modification and refinement before implementing this program again. Such revisions might include the involvement of an ADHD expert as a consultant, and Discussion Board moderator to direct conversation flow.

Participants were asked to complete a Post-Program Follow-Up Questionnaire following completion of the post-intervention measures (Appendix A). The quantitative and qualitative feedback collected was extremely positive; participant's indicated that they felt the web-based intervention was a novel approach to learning about ADHD. The scores on the quantitative section of the Post-Program Follow-Up Questionnaire were

greater than 3.67/4.0, indicating that on average, they agreed with all of the statements presented. Unfortunately, less than half of the participants completed this survey. The questionnaire was available on the web-based learning site as well as being emailed to participants a few weeks after the study had finished. It is postulated that the completion rate was not very strong because of the lapse of time between study completion and questionnaire administration (e.g., negatively influencing participants' motivation to complete the survey), and also because it was administered during the end of the school-year which is a very busy time for teachers (e.g., preparation of report cards). For future implementation of this program, it is suggested that the questionnaire be both made accessible on the web-based learning site and sent to teachers via email immediately following program completion to improve the survey completion rate.

The results of the Post-Program Follow-Up Questionnaire showed that the Discussion Board and web links were very useful components of the study. This is inconsistent with the findings based on the post-session surveys. It may be that the sample of individuals who completed the final survey included only the highly motivated participants. It is hypothesized that if a participant believes the program is important to them, they might find the tools and functions (e.g., the Discussion Board) more useful than those who are less motivated. The results of the Post-Session Satisfaction Questionnaire and Post-Program Follow-Up Questionnaire indicate support for the hypothesis that the web-based learning site is both a useful and usable tool for learning about ADHD.

Limitations

The limitations of the current study include the sample population (e.g., the absence of a control group, small sample size), the measures (e.g., behaviour, intention, and subjective norm), and changes to the intervention (e.g., lack of moderator and active "expert" on the Discussion Board).

Limitations of Sample Population

The current study did not have a control group. It would be interesting to add a control group and measure knowledge, attitude, behaviour change in the absence of participating in the intervention. Since this was a pilot study for a larger study, the sample population was relatively small (N = 20). The information collected from this study will be used to refine the intervention and research methods for the larger study. The goal for the upcoming larger study is to recruit 60 teachers (30 in the control group and 30 in the treatment group) which will comprise a more robust sample population.

Limitations of Measures

Only self-report questionnaires and vignettes were used to measure teachers' knowledge, attitudes and behaviour. While these have been cited as valuable and credible sources of information, they may not be as good as field-based observation. When considering future implementations of this program, a modification to the behaviour measure is necessary in order to more successfully measure the action it intended to target, and capitalize on the true potential of this measure of behaviour. It is suggested that behaviour strategies be presented to the participant, and allow them to select which strategies they would consider using, with an open-ended item that asks about other strategies that they would likely use. This is more straightforward than asking participants to list strategies off the top of their head, and might be a more timely method

of assessment. Another potential way to target teachers' classroom behaviour might be to ask teachers to record the strategies they used to manage ADHD in a daily journal. This method would have to include a baseline period (asking teachers to record behaviour strategies before the intervention), and post-intervention period. Or, teachers could list strategies in a daily journal while the intervention is taking place, and the number and type of strategies used could be measured over time. If direct observation is permitted, an individual could observe the teacher and record the number and type of strategies they are using in the classroom. While the Behaviour Vignette was designed to be a best possible alternative to direct teacher observation, it did not quite target the theoretical construct the researcher aimed to measure.

The results of the current study did not support the Theory of Reasoned Action. The reason for this may be attributed to a problem with the measure. The Intention Questionnaire was administered as a predictor of how ready participants were to change their behaviours. After thoughtful reflection post-study, it was determined that the Intention Questionnaire might have not been targeting how ready participants were to change their behaviours towards ADHD in particular, but rather was more of a general measure of change. For future implementations of this intervention, the researcher may want to consider different approaches to capturing and subsequently measuring intention as well as subjective norm so that it will be a better predictor of behaviour.

Limitations of Intervention

Recommended changes to the intervention include the addition of an active moderator on the Discussion Board, and the addition of an ADHD expert who participants may consult throughout the program. Based on the feedback from the Post-

Session Satisfaction Questionnaire, a moderator would have been useful to direct conversation on the Discussion Board. Teachers expressed that sometimes the conversation on the Discussion Board was not progressing forward (e.g., too many teachers asking questions, not enough answering questions). Moreover, teachers responded that they would have preferred if an ADHD "expert" were available on the Discussion Board to answer questions. Participants expressed on the Post-Session Satisfaction Questionnaires that having an ADHD expert would be valuable to incorporate.

Future Research

Based on the results of the current study, recommendations for future research include: 1) recruitment of a more representative sample population; 2) addition of measures (e.g., addition of a sub-scales on the Knowledge Questionnaire, and modification to the Demographic Questionnaire to determine teachers' preferred mode of learning post-intervention); and 3) further analyses (e.g., investigation into some of the demographic variables subjected to exploratory analysis, and investigation of the role of teachers' confidence and classroom behaviour management practices).

Recommended Changes to Sample Population

The participants comprising the sample population were highly educated, experienced and knowledgeable teachers. This poses potential limitations for future adaptations. While the intervention program was valuable and successful for changing the knowledge and aspects of teachers' attitudes, it is uncertain if it will produce the same effect for teachers with less experience, knowledge, education, and motivation to learn about ADHD.

Recommended Changes to Measures

Although the change in knowledge from pre- to post- was statistically significant, the mean score only changed by approximately one point. Future knowledge measures should include sub-scales that measure teachers' knowledge about certain areas of ADHD (e.g., treatment, prognosis, etc.). In addition to the Knowledge Questionnaire, a modification to the Demographic Questionnaire is also necessary. Pre-intervention, teachers were asked on the Demographic Questionnaire what their preferred mode of learning was. The results indicated that teachers prefer a workshop approach to learning about ADHD. A potential reason for these results may be that workshops are the most common modes of continuing education for teachers. Participants selected the web as their overall third choice of preferred mode of learning. This indicates that while they do not prefer the web as the main mode of ADHD education at this time, it is not the least preferred option. Participants were not asked their preferred mode of learning post intervention. Future modifications of the Demographic Questionnaire should measure participants' preferred mode of learning both before and after the intervention to evaluate if their preference has changed.

Recommended Changes to Analysis

Consistent with the work of Scuitto *et al.* (2000), our study found that teachers' age, education level, and number of professional development hours about ADHD were unrelated to knowledge of ADHD. However, Scuitto *et al.* (2000) reported that the relationship between number of students with ADHD taught, and knowledge of ADHD was statistically significant. The author also reported that the relationship between years of teaching and knowledge of ADHD was statistically significant. This was not found in

the current study; number of students taught with ADHD and years of teaching were unrelated to knowledge of ADHD. The relationship between the different variables selected for exploratory analysis provides opportunity for future research topics. Little is known about the influence of different aspects of demographic information and teachers' knowledge, attitudes and behaviours (e.g., number of students taught who are currently using medication for ADHD symptoms and teachers knowledge of ADHD medication; type of teacher and knowledge and attitude towards ADHD; currently receiving support for managing students with ADHD in the classroom and attitudes towards ADHD). These would be an interesting topic to investigate and report on further.

Conclusion

The current study has also demonstrated the effectiveness of a web-based intervention. Past research has shown that web-based learning is becomingly increasingly popular as a tool to facilitate knowledge creation (Huang & Liaw, 2004). Web-based learning is considered an effective mode of education, and the results of this study provide additional evidence. Past research, and the results of the current study indicate that web-based learning should be considered as a useful alternative to workshop-based professional development, as it is easily accessible, is capable of hosting large quantities of people, and provides users with timely access to information (Christensen, Griffiths, & Jorm, 2004). The results of a study by Edwards *et al* (2010) show great promise for the use of Web-based interventions to support behaviour change. The results of the current study support the work of Edwards *et al.* (2010), and demonstrate opportunities for the use of web-based learning for educational interventions. Results of the intervention hosted on the web-based learning site illustrate the following:

1. Teachers knowledge improved as a result of the intervention, and teachers attitudes towards ADHD in terms of Perceived Competence and Lack of Control became more positive as a result of the intervention
2. Based on the internal site activity data and quantitative and qualitative data produced from the post-session and post-study satisfaction questionnaires, teachers found the site to a useful and usable mode of learning about ADHD
3. Based on the feedback provided by participants and lessons learned by implementing this program, the researcher has suggested ways in which learning tools can support future online professional development opportunities for teachers of students with ADHD

The results of this study contribute to the larger literature, as prior to this study, research has mostly focused on measuring teachers' knowledge, attitude, and behaviour towards ADHD rather than determining if an intervention would be effective in changing these factors. The few studies that have examined change in knowledge/attitudes were based on face-to-face interventions, not web-based interventions. Therefore, this study has offered insight into how teachers' knowledge, attitudes, and behaviour about ADHD can be changed as a result of a web-based intervention. This provides opportunity for professional development for teachers, and also demonstrates the effectiveness of hosting an intervention online.

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APPENDIX A: Measures used for data collection

1. *Demographic Questionnaire* (Modified version by Barnett & Corkum, 2009 based on the AKOS by Rostain, Power & Atkins, 1993).

Question No.	Question (Response options)
1	What is your age? (Free text, Do not wish to disclose)
2	Are you male or female? (Male, Female, Do not wish to disclose)
3	What is your highest degree conferred? (High School, Bachelors, Masters, PhD, Other (Text box), Do not wish to disclose)
4	How many years have you been teaching? (Free text, Do not wish to disclose)
5	What grade(s) have you taught in your teaching career and for how many years at each level? (Primary, X years (Text box); Grade 1, X years…Grade 12, X years; Do not wish to disclose)
6	What type of teacher are you? (Full-time classroom, Part-time classroom, Resource, Learning Centre, Supply, Other (Text box), Do not wish to disclose)
7	How much experience do you have teaching children with ADHD? (No experience, Very little experience, Some experience, A lot of experience, Do not wish to disclose)
8	Approximately how many children with ADHD have you taught in your teaching career? (Text box, Do not wish to disclose)
9	Did you receive support in dealing with your students with ADHD? (Yes, No, Do not wish to disclose)
10	If yes, from whom? (Other teachers, School system, Parents, Clinical Psychologist, School Psychologist, Other (Text box), Do not wish to disclose)
11	Have you ever taken any professional development seminars about ADHD? (Yes, No, Do not wish to disclose)

12 Approximately how many hours of professional development training have you completed on ADHD? (Text box, Do not wish to disclose)

13 How would you rate your knowledge of ADHD? (Very knowledgeable, somewhat knowledgeable, moderately knowledgeable, not very knowledgeable, unknowledgeable, Do not wish to disclose)

14 Do you have experience with children with ADHD that have taken or are currently taking medication as a form of treatment? (Yes, No, Don't Know, Do not wish to disclose)

15 If you answered 'yes' to Question 15, approximately how many children with ADHD that have taken or are currently taking medication as a form of treatment do you have experience with? (Text box, Do not wish to disclose)

16 What would be the best way for you to learn more about ADHD? Please rank options (1 – most preferred).

_____ Seminar/Presentation
_____ Workshop
_____ Written materials
_____ CD materials
_____ Web page accessible via the Internet
_____ Other (please specify)

2. *Knowledge Questionnaire* (Knowledge of Attention Deficit Disorders Scale (KADDS) developed by Scuitto *et al.,* 2000, and Kos, 2008)

Participants were instructed to read each question, and state whether they thought it was true or false.

Question No.	Question	Correct Answer
1	Most estimates suggest that ADHD occurs in approximately 15% of school aged children.	F
2	Current research suggests that ADHD is largely the result of ineffective parenting skills.	F
3	Children with ADHD are frequently distracted by extraneous stimuli.	T
4	Children with ADHD are typically more compliant with their fathers than with their mothers.	T
5	In order to be diagnosed with ADHD, the child's symptoms must have been present before age 7.	T
6	ADHD is more common in the 1st degree biological relative (i.e. mother, father) of children with ADHD than in the general population.	T
7	One symptom of children with ADHD is that they have been physically cruel to other people.	F
8	Antidepressant drugs have been effective in reducing symptoms for many children with ADHD.	T
9	Children with ADHD often fidget or squirm in their seats	T
10	Parent and teacher training in managing a child with ADHD are generally effective when combined with medication treatment.	T
11	It is common for children with ADHD to have an	F

	inflated sense of self-esteem and grandiosity.	
12	When treatment of a child with ADHD is terminated, it is rare for the child's symptoms to return.	F
13	It is possible for an adult to be diagnosed with ADHD.	T
14	Children with ADHD often have a history of stealing or destroying other people's things.	F
15	Side effects of stimulant drugs (e.g. Ritalin) used for treatment of ADHD may include mild insomnia and appetite reduction.	T
16	Current wisdom about ADHD suggests two clusters of symptoms. One of inattention and the other consisting of hyperactivity and impulsivity.	T
17	Symptoms of depression are found more frequently in children with ADHD than in non-ADHD children.	T
18	Individual psychotherapy is usually sufficient for the treatment of most children with ADHD.	F
19	Most children with ADHD "outgrow" their symptoms by the onset of puberty and subsequently function normally in adulthood.	F
20	In severe cases of ADHD, medication is often used before other behaviour modification techniques are attempted.	T
21	In order to be diagnosed with ADHD, a child must exhibit relevant symptoms in two or more settings (e.g. home and school).	T
22	If a child with ADHD is able to demonstrate sustained attention to video games or TV for over an hour, that child is also able to sustain attention for at least an hour of class or homework.	F
23	Reducing dietary intake of sugar or food additives is generally effective in reducing the symptoms of ADHD.	F
		F

24	A diagnosis of ADHD by itself makes a child eligible for placement in special education.	
25	Stimulant drugs are the most common type of drug used to treat children with ADHD.	T
26	Children with ADHD often have difficulties organizing tasks and activities.	T
27	Children with ADHD generally experience more problems in unfamiliar situations than in familiar situations.	F
28	There are specific physical features which can be identified by medical doctors (e.g. pediatrician) in making a definitive diagnosis of ADHD.	F
29	In school age children, the prevalence of ADHD in males and females is equivalent.	F
30	In very young children (less than 4 years old), the problem behaviours of children with ADHD (e.g. hyperactivity, inattention) are distinctly different from age-appropriate behaviours of children without ADHD.	F
31	Children with ADHD are more distinguishable from children without ADHD in a classroom setting than in a free play situation.	T
32	The majority of children with ADHD evidence some degree of poor school performance in the elementary school years.	T
33	Symptoms of ADHD are often seen in children without ADHD who come from inadequate and chaotic home environments.	T
34	Behavioural/Psychological interventions for children have been found to be an effective treatment for severe cases of ADHD.	F
35	Treatments for ADHD which focus primarily on punishment have been found to be the most effective in reducing the symptoms of ADHD.	F
		F

36	If medication is prescribed, educational interventions are often unnecessary.	
37	Children with ADHD are born with biological vulnerabilities towards inattention and poor self-control.	T
38	ADHD can be diagnosed in the doctor's office most of the time.	F
39	Children with ADHD always need a quiet environment to concentrate.	F
40	Medication is a cure for ADHD.	F
41	The cause of ADHD is unknown.	F
42	Children from any walk of life can have ADHD.	T
43	Research has shown that prolonged use of stimulant medications leads to increased addiction (i.e. drug, alcohol) in adulthood.	F

Items that were omitted from the Knowledge Questionnaire (Kos, 2008) during data cleaning.

Items Omitted in calculating total score: 8, 11, 24, 27, 28, 30, 31, 33, 34, 35, 38, 41.

3. *Attitude Questionnaire* (Kos, 2008)

Participants were instructed to select their attitude towards each statement presented.

Question No.	Question	Attitude Towards This Statement				
		Strongly Disagree (1 pt)	Disagree (2 pts)	Neutral (3 pts)	Agree (4 pts)	Strongly Agree (5 pts)
1	ADHD is a valid diagnosis.					
2	ADHD is an excuse for children to misbehave.					
3	ADHD is diagnosed too often.					
4	ADHD is a behaviour disorder that should not be treated with medication.					
5	All children with ADHD should take medication.					
6	Medications such as Ritalin and Dexamphetamine should only be used as a last resort.					
7	ADHD is a legitimate educational problem.					
8	Having an ADHD child in my class would disrupt my teaching.					
9	I would feel frustrated having To teach a child with ADHD.					
10	Young children with ADHD should be treated more					

leniently than older children with ADHD.

11 Children with ADHD should be taught by special education teachers.

12 I would prefer to teach a student that was over-active than inattentive.

13 Most students with ADHD don't really disrupt class that much.

14 Children with ADHD should not be taught in the regular school.

15 The extra time teachers spend with students with ADHD is at the expense of students without ADHD.

16 Other students don't learn as well as they should when there is a child with ADHD in the classroom.

17 You cannot expect as much from a child with ADHD as you can from other children.

18 Children with ADHD could control their behaviour if they really wanted to.

19 Children with ADHD misbehave because they are naughty.

20 Children with ADHD cannot change the way they behave.

21 Students with ADHD could do

	better if only they'd try harder.
22	Children with ADHD have little control over the way they behave.
23	Children with ADHD misbehave because they don't like following rules.
24	Students with ADHD are just as difficult to manage in the classroom as any student.
25	Managing the behaviour of students with ADHD is easy.
26	I have the skills to deal with children with ADHD in my class.
27	I have the ability to effectively manage students with ADHD.
28	I am limited in the way I manage a child with ADHD.
29	My school has policies that regulate how teachers manage a child with ADHD.
30	Other staff influence how I would manage a child with ADHD.
31	Parents of students with ADHD influence how I would manage a student with ADHD.

Attitude Sub-Scale Items From Factor Analysis (Kos, 2008)

1. Lack of Control: “A perception by teachers that children with ADHD have very little control over their own behaviour, and that managing the behaviour of these children is quite difficult.” (Items 18, 23, 21, 17, 25, 14)
2. Perceived Competence: “Showed that teachers believe they have the skills and ability to manage students with ADHD.” (Items 27, 26, 28)
3. Influences to Management: “Indicated that teachers’ classroom management of a student with ADHD would not be strongly influenced by parental or staff beliefs, or the ADHD-status of a child.” (Items 31, 30, 24)
4. Expectations: “Revealed that teachers hold some expectations about ADHD and the children with the condition.” (Items 17, 10, 6)
5. External Control: “A belief that external agents (e.g., medication and policy) may be required in the management of ADHD.” (Items 5, 29, 22)

4. *Behaviour Questionnaire* (Kos, 2008)

Participants were instructed to read the vignettes, and describe (free-text) how they would manage each student in the classroom.

Vignette #1: Kayla

> Kayla is a nine-year old girl. She is often reprimanded by her teacher for not paying attention in class. Her teacher says that Kayla does not listen when she speaks to her, and has noticed that she finds it difficult to follow through on instructions. She rarely finishes her schoolwork, and on the few occasions that she has finished her work, it is has been full of careless mistakes. She is easily distracted by external stimuli, such as what other children are doing. Kayla finds it hard to pay attention for any significant amount of time – both in her schoolwork and in play activities. Hence, she often avoids tasks that require sustained mental effort (such as schoolwork and homework). Kayla has difficulty organising tasks and activities, and frequently loses the things she needs to complete her work (e.g., school assignments, pencils, books). As a result of all of these difficulties, Kayla's teacher wants her to repeat the year. According to Kayla's past teachers these problems have been evident since prep. Kayla's parents reported that similar problems have been occurring at home for the past three years.

Vignette #2: Brandon

Brandon is a nine-year old boy. While in class, he often fidgets with his hands and feet, and is constantly being reprimanded for being out of his seat. He is always *on the go*, and regularly gets into trouble for running around and climbing over furniture in the classroom. According to his teacher, Brandon talks all of the time, and tends to blurt out answers before questions have been completed. His teacher is also concerned about Brandon's apparent inability to play appropriately with his peers. Brandon finds it difficult to wait his turn when playing with other children, and often interrupts other children's games. Brandon's teacher is concerned that his behaviour is jeopardizing his chances of passing the year. According to Brandon's past teachers these problems have been evident since prep. Brandon's parents reported that similar problems have been occurring at home for the past three years.

Behaviour Questionnaire Sub-Scale Measure:

1. Using the *Team Work* approach
2. Setting goals and expectations with student
3. Discussing strengths, weaknesses, and challenges with student
4. Implementing a classroom-based intervention
5. Implementing a reward program
6. Using verbal praise
7. Maintaining consistent school-home communication
8. Positive organization of the physical classroom setting
9. Positive organization of the instructional classroom setting
10. Implementation and maintenance of rules and routines
11. Using transitions between tasks
12. Implementing time-related strategies (a cognitive-academic strategy)
13. Implementing physical skills-related strategies (a cognitive-academic strategy)
14. Implementing executive function-related strategies (a cognitive-academic strategy)
15. Implementing cognitive skills-related strategies (a cognitive-academic strategy)
16. Implementing motivation-related strategies (a cognitive-academic strategy)
17. Positive approach to developing good study skills and organization
18. Positive approach to metacognitive strategies and self-monitoring
19. Positive approach to social skills and motivation
20. Other (not belonging to any of the categories previously listed)

5. *Intention Questionnaire* (Modified by Barnett & Corkum, 2009 based on Stages of Change Model Prochaska & DiClemente, 1984)

Participants were instructed to select the option (statement) they best associate themselves with.

Intention Questionnaire with corresponding scoring values.

Statement No.	Statement	Assigned Point Value
1	I believe that my attitudes, beliefs and opinions are correct and do not feel the need to change them.	1
2	I believe I have misconceptions of ADHD, and see the pros and cons of ADHD education in order 3to broaden my knowledge of ADHD.	2
3	I believe that I have knowledge gaps and misconceptions about ADHD and intent to change them by becoming more knowledgeable.	3
4	I have a plan to become more knowledgeable about ADHD, and am actively working towards achieving my goal.	4

6. *Subjective Norm Questionnaire* (Barnett & Corkum, 2009)

Participants were instructed to state whether they strongly agree, agree, disagree, or strongly disagree with each of the four statements presented.

Subjective Norm Questionnaire with corresponding scoring values.

Statement No.	Statement	Assigned Point Values			
		Strongly Agree	Agree	Disagree	Strongly Disagree
1	It is important to me to become more knowledgeable about ADHD because I believe the school board would like teachers to be better able to manage ADHD in the classroom	4	3	2	1
2	It is important to me to become more knowledgeable about ADHD because I believe the administration at my school would like teachers to be better able to manage ADHD in the classroom	4	3	2	1
3	It is important to me to become more knowledgeable about ADHD because I believe other teachers in my school would like me to be better able to manage ADHD in the classroom	4	3	2	1
4	It is important to me to become more knowledgeable about ADHD because I believe parents would like teachers to be better able to manage ADHD in the classroom	4	3	2	1
	TOTALS	16	12	8	4

7. Post-Session Satisfaction Questionnaire

Scoring Rubric for Post-Content Satisfaction Questionnaire: Quantitative Component

Statement No.	Statement	Assigned Point Value			
		Strongly Agree	Agree	Disagree	Strongly Disagree
1	The content was presented in a manner that was easy to understand.	4 pts	3 pts	2 pts	1 pt
2	The links were useful and informative.	4 pts	3 pts	2 pts	1 pt
3	I learned something new from this module.	4 pts	3 pts	2 pts	1 pt
4	I found that the Discussion Board was a useful tool for communicating questions, comments, and idea from this module.	4 pts	3 pts	2 pts	1 pt
	TOTALS	16	12	8	4

Post-Content Satisfaction Questionnaire: Qualitative Component

Statement No.	Statement	Free text
5	My favourite aspect of this module was:	
6	My least favourite aspect of this module was:	
7	I would add the following information to this module:	
8	I would remove the following information from this module:	
9	My favourite aspect of the Discussion Board conversation for this module was:	
10	My least favourite aspect of the Discussion Board conversation was:	
11	I would add the following to the Discussion Board tool:	
12	I would change/remove the following from the Discussion Board tool:	

8. Post-Program Follow-Up Questionnaire

Scoring Rubric for Post-Program Follow-Up Questionnaire: Quantitative Component

Statement No.	Statement	Assigned Point Value			
		Strongly Agree	Agree	Disagree	Strongly Disagree
1	The content was presented in a manner that was easy to understand.	4 pts	3 pts	2 pts	1 pt
2	The links were useful and informative.	4 pts	3 pts	2 pts	1 pt
3	I learned something new from this program.	4 pts	3 pts	2 pts	1 pt
4	I found that the Discussion Board was a useful tool for communicating questions, comments, and idea from this program.	4 pts	3 pts	2 pts	1 pt
	TOTALS	16	12	8	4

Post-Program Follow-Up Questionnaire: Qualitative Component

Statement No.	Statement	Free text
5	My favourite aspect of this program was:	
6	My least favourite aspect of this program was:	
7	I would add the following information to this program:	
8	I would remove the following information from this program:	
9	My favourite aspect of the Discussion Board conversation for this program was:	
10	My least favourite aspect of the Discussion Board conversation was:	
11	I would add the following to the Discussion Board tool:	
12	I would change/remove the following from the Discussion Board tool:	

APPENDIX B: Information about the study and informed consent form

Creation and evaluation of a web-based learning and discussion tool for elementary school teachers of ADHD students in Nova Scotia

Informed Consent Form

Primary Investigator	*Research Supervisor*	*Research Committee Members*
Brittany Barnett, BSc. Masters Student Health Informatics Dalhousie University Halifax, Nova Scotia (902) 440-1394 (P) bbarnett@dal.ca	Penny Corkum, PhD. Associate Professor Psychology Department Dalhousie University Halifax, Nova Scotia B3H 4J1 (902) 494-5177 (P) (902)494-6585 (F) penny.corkum@dal.ca	Nez Elik, PhD. Assistant Professor Faculty of Education Mount St. Vincent's University Halifax, Nova Scotia B3M 2J6 Nez.Elik@msvu.ca David Zitner, MD Professor Medical Informatics Faculty of Medicine Dalhousie University Halifax, Nova Scotia B3H 4J1 David.zitner@dal.ca

Invitation to Participation

The purpose of this document is to provide an invitation to participate in a study through Dalhousie University. This study is in partial fulfillment for the requirements of Brittany Barnett's Master's degree in Health Informatics. The study is intended to begin in January 2010 and end April 2010. Participation is strictly voluntary. There are no consequences to deciding to not participate in the study or withdrawing from the study at any time. Please read the following documentation carefully.

Introduction

My name is Brittany Barnett. I am a research student of Dr. Penny Corkum (Psychologist and Professor at Dalhousie University). My research committee consists of Dr. Nez Elik (Psychologist and Professor in the Faculty of Education at Mount St. Vincent's University) and Dr. David Zitner (Family Physician and Professor in the Health Informatics Program at Dalhousie University). We would like to invite you to take part in a research study being conducted with elementary school teachers. It is the aim of the study to share with teachers evidence-based

knowledge about ADHD presented in a useful and usable manner through a web-site. We hope to positively change teachers' knowledge, attitudes and approaches to managing ADHD in the classroom.

We will also examine how knowledge is being modified and built upon in order to create a model of knowledge transformation (i.e., how teachers use the website to learn information). The study is in partial fulfillment for the requirements of Brittany Barnett's Masters' degree in Health Informatics from Dalhousie University.

Purpose

The goal of the study is to evaluate the usefulness of a web-based learning and discussion tool for teachers about ADHD and classroom interventions for ADHD. We are interested in determining whether the content and the delivery of this content via a Blackboard Learning System (BLS) will change teachers' knowledge and opinions of ADHD and behavioural interventions for ADHD in the classroom. The web-site will allow teachers to learn evidence-based information about ADHD and to share their own experiences about managing ADHD in the classroom. Teachers will be able to access resources about ADHD and to pose questions about ADHD to the researchers.

Eligibility and Participation

In order to participate in this study, you need to be teacher who is currently teaching in grades 1 to 4 and have at least one child with ADHD in your class. Your eligibility to participate was established when you called to inquire about the study. We are hoping to recruit 20 teachers from CCRSB to participate in this study. The research will be conducted at a location of the participant's choice. Since the study is web-based, it may be accessed through any web-browser. Participants log onto the site by entering their unique login ID and password, which will be given to them by the researcher. The study will take 8 weeks to complete. The first week will be an orientation to the site and pre- testing, and the remaining 7 weeks will be dedicated to viewing the content modules (1 module per week), and post-testing.

Orientation Period:

Once consent is received, each participant will be asked to complete the demographic questionnaire which asks questions about your teaching background and knowledge about ADHD. This will take about 5 minutes. Next participants will be encouraged to explore the site and become familiar with its format, and email the researcher if technical help is needed. Orientation time will vary depending on the participant's familiarity with web-based learning and discussion sites. It is estimated that participants will spend between 10-60 minutes becoming familiar with the web-site (BLS) during the orientation period.

Pre-Testing Period:

Participants will be asked to be complete four questionnaires to measure their: 1) knowledge of ADHD; 2) attitudes towards ADHD; 3) intention to change their knowledge, beliefs, attitudes, and behaviour; and 4) subjective norm on approaches to ADHD. You will also be asked to read two vignettes about two children who have ADHD and write your ideas about how you would work with these children in your classroom. Your responses to these vignettes will measure your current approach to managing ADHD in the classroom. These questionnaires and responses to the vignettes will take 30-40 minutes to complete.

Content Modules:
Participants will be asked to view a series of 7 modules. For each module, participants will do the following:

- View the PowerPoint presentation pertaining to the specific module. This will take approximately 10-20 minutes.
- Follow the designated links to other web pages and view content (e.g. a video, pod cast, etc.). This will take between 5-10 minutes.
- Complete a 12-item survey asking for your feedback pertaining to each module. This will take ~3 minutes.
- Participate in the discussion board. Some participants may wish to more actively contribute to the discussion board, some may choose to participate less. It is encouraged that participants post 2 questions and 3-5 response per module. Time will vary depending on the participant; however, it is estimated that participants will spend between 10-30 minutes on the discussion board per content module. This data will not be analyzed for this study.

Teachers' knowledge seeking and sharing behaviour will be monitored by internal auditing methods (e.g., tracking the amount of time each participant accesses the website, which links are viewed). This tracking process will allow the researchers to examine how information is accessed, and how it can be optimized for future ADHD teacher support systems.

Post-Testing:
After completion of the seven modules, you will be asked to complete two questionnaires and the vignettes. The two questionnaires assess knowledge of ADHD and attitudes about ADHD and are the same as those completed during the pre-testing. The two vignettes will also be the same as pre-testing and once again you will be asked to record how you would work with these children in your classroom. Completion of these three measures will take 20-30 minutes. The Intention to Change Questionnaire, and Subjective Norm will not be administered during post-testing (only used in pre-testing).

Note: At each of the two time points (pre and post-testing), all measures will be completed in one sitting in order to ensure that participants do not solicit input from their colleagues or other sources. If a problem arises in which the participant needs to have the assessment re-set, he/she will be instructed to contact the primary investigator who will provide assistance.

Total Time:
Orientation: 15-65 minutes
Pre-Testing: 30-40 minutes
Content Modules: 20-40 minutes per module (140-280 minutes total)
Discussion Board: 10-30 minutes per module (70-210 minutes total)
Post-Testing: 20-30 minutes

Minimum Estimated Total Time Dedication to Study: 275 minutes, 4 hours 30 minutes
Maximum Estimated Total Time Dedication to Study: 625, 10 hours 25 minutes

Design

This study uses a pre/post design. This means that we will compare answers given on the questionnaires prior to and after the intervention. We will also compare the number and type of strategies generated based on the vignettes prior to and after the intervention. Finally, we will use internal auditing methods within BLS (e.g., tracking the amount of time each participant accesses the website, which links are viewed) to examine how information is accessed within this web-site.

Possible Risks & Discomforts

There are no known risks to participating in a study of this nature.

Possible Benefits

Teachers will learn evidence-based information about ADHD and classroom interventions for ADHD. Also, they will have the opportunity to share information with other teachers and with the researchers. We think that learning this information may change your knowledge and opinions about ADHD as well as the strategies you use to support students with ADHD in your classroom.

Compensation & Expense Reimbursement

No compensation will be offered to participants, and participants will not incur any additional expenses as a result of this study. If you chose to print any of the resources on the web-site, you will need to incur this cost. A certificate of professional development and a book about ADHD will be sent to each participant.

Confidentiality & Anonymity

Only the researchers will have access to your name and contact information. None of the participants in this study will have access to this information under any circumstance. Anonymity while using the web-based resource will be maintained in several ways:

1. No names of students or schools will be used on this web-site. If a name of a student or school is mentioned, the study investigator will immediately delete the post and associated message threads from the message board.
2. Participants will be asked to be identified by a screen name of their choice. If a participant uses their real name, the study investigator will immediately delete the post and associated message threads from the message board.
3. We ask that all participants respect the confidentiality of all other participants. All conversations within the site should not be discussed outside the online learning environment. If a participant feels that they know another participant, this should not be disclosed.

Confidentiality should be respected at all times. Participants' responses and feedback will only be used for the purpose of this study.

Ability to Withdraw

Participation in this study is on a voluntary basis. Participants may withdraw from the study at anytime by notifying the researcher. If you decide to withdraw from this study, none of the information you provided to the researchers will be used in the study.

Following Study Completion

We will e-mail all participants an overview of the study results, and a book about ADHD after the completion of the study.

Questions or Concerns

If you have any questions about the study, please contact any of the individuals from the research team (contact information is included on page 1 of this document). This study has received ethical review by the Dalhousie University Health Science Research Ethics Board. You are welcome to contact Patricia Lindley, Director of Research Ethics at Dalhousie University at 494-1462, or by email: patricia.lindley@dal.ca. It has also received ethical approval from CCRSB.

Electronic Consent

I have read this document describing the details of the study. By selecting the button titled "I Agree", I hereby consent to participate in this study. By selecting the button titled "I Disagree", I do not give my consent to participate in this study. I realize that my participation is voluntary and that I am free to withdraw from the study at any time. You may download and print a copy of this consent form.

If you are willing to be contacted in the future about upcoming studies, please select the "yes" button. If you would not like to be contacted about future studies, please select the "no" button.

Please provide your e-mail address so we can reach you if necessary _____

Please provide your name and school mailing address below, so we can forward you a book about ADHD and a certificate of participation in this professional development activity

_____

Please provide your screen name (this name should be one that you can easily remember and will not allow others to determine your identity) _____

APPENDIX C: An example of the instructions for beginning each session (Session 1 instructions presented). Instructions were emailed to participants the Sunday night prior to the commence of each session.

Creation and evaluation of a web-based learning and discussion tool for elementary school teachers of ADHD students in Nova Scotia

Instructions for Participation in a Research Study on ADHD

February 28, 2010

Session 1 introduces attention deficit-hyperactivity disorder, and your role as the teacher. The goals of Session 1 include:

- Discussing your role in helping a student with ADHD in the classroom
- Introducing the Team Work approach to helping children with ADHD
- Introducing the Toolbox Analogy: Every child is different and adaptation of the techniques to meet their needs is important
- Discussing the characteristics of children with ADHD and identification of the ones that your student exhibits: a) Behavioural Characteristics, b) Social/Emotional Characteristics, c) Academic and Cognitive Characteristics
- Balancing our views with your student's strengths and talents
- Establishing your goals based on your student's areas of most difficulty
- Communicating your goals and getting collaboration from your student by involving him/her and his/her parent(s)

Creation and evaluation of a web-based learning and discussion tool for elementary school teachers of ADHD students in Nova Scotia

WEEK 2, SESSION 1 TASK LIST

Week No.	Topic
1	Site orientation, completion of pre-testing questionnaires
2	**Introducing ADHD, and Your Role as the Teacher**
3	ADHD and It's Treatment
4	Introducing the Reward Program
5	The Classroom Setting
6	Academic and Cognitive Needs
7	Other Needs of the Student with ADHD
8	Review and Fading of Behavioural Interventions

You will have from Monday March 1, 2010 – to Sunday March 7, 2010 to complete the following tasks:

- ✓ Log-on to the ADHD website (www.dal.ca/ilo), and enter your unique username and password
- ✓ View the course homepage; click on the folder icon entitled **"Session 1"**
- ✓ Click on the podium icon to view the presentation entitled **"Session 1 Presentation"**
- ✓ View the presentation; please note the playback icons at the bottom left hand side of the presentation screen (these icons allow you to move forward and back using mouse)
- ✓ Click on the Assessments tab located in the Course Tools menu
- ✓ Select the Assessment entitled **"Session 1 Questionnaire"**
- ✓ Complete the questionnaire; you will have until Sunday March 1, 2010 at 11:59 pm to submit the questionnaire. As long as you save your answers, you may re-visit the assessment without submitting it. When you are confident with your answers, you may submit your assessment by selecting "Submit".
- ✓ Post 1 question/comment, and reply to 1 question/comment throughout the week on the **Discussion Board**. To access the Discussion Board, click on the **"Discussions"** tab located in the Course Tools menu
- ✓ **Thank you! You are finished Week 2, Session 1.**

Generally speaking, each week participants will 1) view a module about a specific aspect of ADHD, 2) complete an online questionnaire about the Session, and 3) participate in the Discussion Board. You may discuss anything related to the content presented in the Session you just viewed.

Please remember that this study is of confidential nature; please <u>do not</u> use names of students, reveal your identity, or reveal your school's name.

<u>Statements to avoid:</u>

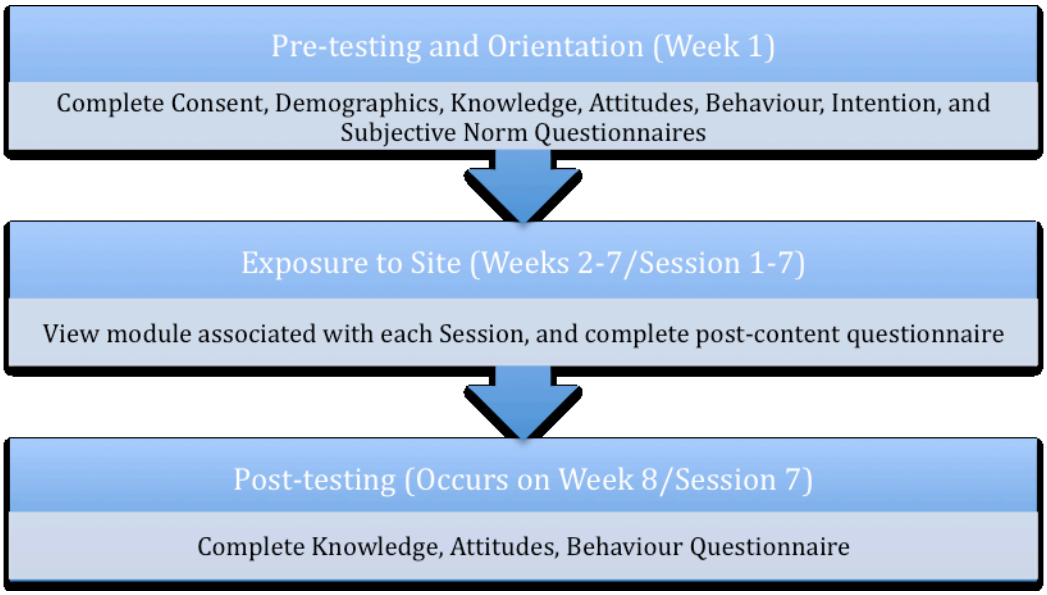
- "[Student's name] at my school, [School's name] often displays the following behaviour: [behaviour]"
- "As a 3rd grade teacher at [School's name], I find that our school lacks resources, etc."

<u>Statements to use:</u>

- "The content presented in Session 4: ADHD and the Classroom Setting was very interesting. I have a question regarding visual reminders of rules and routines: Has anyone tried using a designated corner of the board for upcoming tests? I find that it's been effective in alerting the student to upcoming events."
- "After viewing Session 1", I am still unsure of how cognitive characteristics of ADHD differ from behavioural characteristics of ADHD. Can anyone help clarify?"

We appreciate that you are very busy, and have given you a week's time to complete each Session. You will find that Session 1 (Week 2) and Session 7 (Week 8) will require more time to complete. This is because Session 1 includes 7 pre-testing assessments, and Session 7 includes 3 post-testing assessments. Some Sessions might include supplemental information for you to try in your classroom. This is for your personal use and benefit.

The following schematic illustrates the overall organization of the study:



If you ever experience any difficulty, please feel free to contact me at any time. I will be monitoring the site for proper use and practice over the next 8 weeks. Again, please be mindful of confidentiality and anonymity.

…Until next Sunday!

Sincerely,

Brittany Barnett