Attention Deficit Hyperactivity Disorder in the Classroom: Practical Strategies for Teaching to Student Strengths

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ATTENTION DEFICIT HYPERACTIVITY DISORDER IN THE CLASSROOM:
PRACTICAL STRATEGIES FOR TEACHING TO STUDENT STRENGTHS

by

Lisa Kreutz

A Research Project Presented in Partial Fulfillment
of the Requirements for the Degree
Master of Education

REGIS UNIVERSITY

June, 2007
ATTENTION DEFICIT HYPERACTIVITY DISORDER IN THE CLASSROOM:
PRACTICAL STRATEGIES FOR TEACHING TO STUDENT STRENGTHS

by

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June, 2007

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ABSTRACT

Attention Deficit Hyperactivity Disorder in the Classroom:
Practical Strategies for Teaching to Student Strengths

This project discusses the necessity of differentiated classroom instruction based on the educational and learning needs of students with Attention Deficit Hyperactivity Disorder (ADHD). Current estimates suggest that as many as 2 million school age students in the United States have been diagnosed with ADHD. A student with ADHD can be inattentive, hyperactive, and/or impulsive in his/her behaviors. With consideration for these behaviors and actions, this project identifies appropriate classroom instructional practices, which are based on the modifications and differentiation necessary for teaching students with ADHD. An understanding of Gardner’s theory of multiple intelligences (MI) provides educators with a unique perspective into how best to meet the needs of students with educational and learning differences. As such a curricular unit at the primary level was developed utilizing MI theory. It is clear that an understanding of MI theory provides educators with the necessary tools to develop and execute daily classroom instruction that meets individual students’ needs, regardless of a diagnosis of ADHD.
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Chapter 1

INTRODUCTION

Currently, it is a challenge for elementary school teachers to differentiate instruction to meet the varied needs of all learners, especially those diagnosed with Attention Deficit Hyperactivity Disorder (ADHD; Schirduan, Case, & Farynjarz, 2002). Historically, students with ADHD have been overlooked and underserved in the traditional classroom setting, because they learn differently. However, it may be that the use of Gardner’s (1999) theory of multiple intelligences (MI) can provide educators with a unique perspective into the complex task of understanding and teaching every student effectively. Because of the complexity of ADHD and its educational implications, there may be benefits when MI theory is implemented in the classroom as a tool to meet the varied needs of all learners.

Statement of the Problem

Current estimates suggest that as many as 2 million school age students in the United States have been diagnosed with ADHD and demonstrate at least one of the characteristic behaviors of hyperactivity, inattention, or impulsivity (U.S. Department of Education, 2004). While most educators recognize that students with ADHD require modifications to instructional strategies and student work requirements, there is still widespread debate
as to how students with ADHD learn and how to teach them. In order to effectively meet every child’s educational needs, teachers need to be able to identify individual learning styles. Identification of these learning styles will enable teachers to modify their instructional techniques to meet the individual learning needs of students with ADHD.

Purpose of the Project

A student with ADHD can be inattentive, hyperactive, and/or impulsive in his/her behaviors and actions. Although this student can be a source of frustration and a distraction to teachers and fellow students, he or she should not be removed from the classroom. The purpose of this project will be to develop a curricular unit integrating Gardner’s MI theory as a means of focusing on the ADHD child and meeting his/her varying needs and learning differences. Utilization of Gardner’s (1999) MI theory may be a viable method by which teachers will be able to accurately assess individual student intelligences and develop differentiated instructional methods to meet their individual needs. The purpose of the project will be to demonstrate to teachers that Garner’s MI theory provides necessary tools to educate each student in the classroom, regardless of a diagnosis of ADHD.

Chapter Summary

Through a clear understanding of individual student intelligences and academic strengths, it is this researcher’s position that teachers will be better equipped to educate all students, especially those diagnosed with ADHD. Also, it is this researcher’s position that it is essential to the utilize Gardner’s (1999) MI theory in order to gain this
understanding.

In Chapter 2, the Review of Literature, this researcher will present the background information on ADHD, as well as material to support these positions that students diagnosed with ADHD, because their needs are often not met through traditional teaching practices, can learn through the utilization of the MI theory (Gardner, 1999). In Chapter 3, Methods, the procedures to develop the proposed curricular will be detailed in order to equip teachers with the necessary knowledge and materials to understand ADHD and to implement MI theory into daily lessons in the classroom based on the author’s developed unit.
Chapter 2

REVIEW OF LITERATURE

The purpose of this project will be to provide teachers with the necessary tools and understanding to develop curricular units that will educate each student in the classroom, regardless of a diagnosis of Attention Deficit Hyperactivity Disorder (ADHD). To be an effective teacher, it is imperative to have an awareness, sensitivity, and understanding of the academic, behavioral, and emotional difficulties that some students experience. Educators need to be able to teach and adapt instruction to all ability levels and establish learning environments that will be motivating and comfortable for all students. In classrooms today, teachers will have students with ADHD as well as learning disabilities (Matthews, 2003). Teachers need to be knowledgeable about the strategies, structure, environmental modifications, adaptations, and support necessary to allow all children, even those with learning differences, to achieve. First and foremost, all students need to be perceived, not only by their teacher, but by their fellow students as well, as individuals who are unique in their abilities and their needs. One of the most important lessons that educators must teach their students is that, not only are all people different in their abilities and strengths, but these differences need to be respected and appreciated. Children must be taught this idea if they are to grow up to be tolerant and empathetic adults who are capable of being able to develop positive relationships in their personal and professional lives (Rief, 1996). Presented in this chapter is the current
research on the increasingly prevalent disorder of ADHD, as well as characteristics of the
disorder and information about the specific needs of these children. In general, children
with ADHD respond best to a hands-on, active learning environment that is stimulating,
relevant, developmentally appropriate, and focused on the learning strengths of the
students. These students need to be provided with choices, structure, and clear
expectations of performance. Also, the classroom environment must be focused on
acceptance and on nurture. The literature and research to be presented suggest that one of
the most effective ways to establish this necessary environment, as well as to instill the
understanding that all students are unique, is through teaching to various learning styles
and intelligences, which are focused on student strengths and abilities.

Attention Deficit Hyperactivity Deficit

Definition

Attention Deficit Hyperactivity Disorder (ADHD) refers to a family of related
chronic neurobiological disorders that interfere with a child’s ability to regulate activity
level, inhibit behavior, and attend to tasks in developmentally appropriate way,
(Matthews, 2003). Rief (2003) suggested that ADHD is a genetically transmitted disorder
and that it may result from a chemical imbalance or deficiency in the brain. Therefore,
ADHD is described as a “brain-based disorder that arises out of differences in the central
nervous system” (p. 3). Typically, children with ADHD struggle with a variety of
behaviors, including poor attention skills and, often, high impulsivity and activity related
to their impulsivity (U.S. Department of Education, 2004). Also, the presence of ADHD
can interfere with the child’s ability to achieve success academically, behaviorally and/or socially (Rief, 1996). Children who suffer from ADHD, are characterized by a persistent pattern of inattention, impulsivity, and/or hyperactivity that is more frequent and more severe than the behaviors typically observed in an individual at a comparable level of development (Salend & Rohena, 2003). These characteristics are apparent in early childhood, usually before the age of 7, are chronic, and have been observed to persist for at least 6 months (Salend & Rohena). In addition, these symptoms are evident in all environments in which the child functions.

**Diagnostic Criteria**

According to Reiff (2004), for a child’s condition to be diagnosed as ADHD, there are three general criteria that must be met. First, any inattentive, impulsive, or hyperactive behavior must be inappropriate for the child’s age. That is, if children of the same age, who do not have ADHD, do not exhibit the same behaviors, then the behaviors could be an indicator of ADHD. Secondly, the staff of the American Academy of Pediatrics reported that inattentive, impulsive, or hyperactive behavior must lead to chronic and consistent problems in the child’s daily life. A child’s tendency to daydream, or to occasionally exhibit an active temperament, would not be considered a serious disability to the child. This would not be considered chronic, as is necessary for a diagnosis of ADHD. However, a child who consistently is unable to maintain focus, always seems to daydream, or seems incapable of remaining seated, for example, could be exhibiting symptoms of ADHD. The third and final criteria that must be met in order
to be diagnosed with ADHD is that the behavior the child exhibits is not the result of inadequate care, physical injury, disease, or some other environmental influence. The one way to specifically determine if the behavior in question is the result of an environmental influence is to determine whether it occurs in more than one setting, such as both at home and at school. If the behavior is observed in only one setting, then it is assumed that the behavior is environmentally caused, and not the result of ADHD. From these criteria, teachers, parents, and health care professionals can work together to determine if a child qualifies for a diagnosis of ADHD.

Currently, the clinical definition of ADHD is provided by the *Diagnostic and Statistical Manual-IV* (DSM-IV) of the American Psychiatric Association (1994, as cited in Rief, 1996). This most recent definition contains 18 symptoms, listed in two separate categories of first inattention and second hyperactivity-impulsivity. First, the 9 symptoms of inattention as cited by Rief are:

1. Fails to give close attention to details or making careless errors in schoolwork or other activities;
2. Has difficulty sustaining attention in tasks or play activities;
3. Often appears not to listen;
4. Does not follow through with instructions or fails to finish tasks;
5. Has difficulty with organization;
6. Avoids tasks that require sustained mental effort such as school work;
7. Loses things necessary for tasks or activities;
8. Is easily distracted by extraneous stimuli; and
9. Is forgetful in daily activities. (p. 175)

Also, Rief listed the 9 symptoms of hyperactivity-impulsivity as:

1. Fidgets with hands or feet, or squirms in seat;
2. Is unable to sit still during periods of time when remaining seated is expected;
3. Runs about or climbs excessively in inappropriate situations;
4. Has difficulty playing quietly;
5. Is on the go constantly as if “driven by a motor;”
6. Talks excessively;
7. Blurs out answers to questions;
8. Interrupts others; and
9. Has difficulty waiting in line or waiting turn in games. (p. 175)

There is no laboratory test that can conclusively identify ADHD in a child (Rief, 1996). In addition to meeting the *DSM-IV* (1994, as cited in Rief) criteria for diagnosis of ADHD, a conclusive diagnosis is based on interviews with parents and children, questionnaires completed by teachers and parents, a thorough physical examination to rule out any other medical problem, and detailed mental health and developmental histories. It is for this reason that it is so important for parents, teachers, and medical professionals to work together when in the evaluation of a child for ADHD. Each party is responsible for the contribution of his or her own observations, experiences with the child, and expertise in order to create an accurate and comprehensive picture of the child’s overall social, academic, and emotional well-being. Once this information is collected, Rief reported that it is then evaluated by clinicians or other medical professionals who must determine conclusively if a diagnosis of ADHD is warranted.

*Incidence*

Attention Deficit Hyperactivity Disorder is the most common disorder of childhood and among the most prevalent chronic health conditions that affect school aged children (Rief, 2003). According to Haber (2003), ADHD has become the most prevalent neurobehavioral disorder in childhood, and one of the most common public health
problems in children between 6 and 12 years old. Of all visits to the offices of mental health professionals, 30-50% are for the diagnosis and/or treatment of ADHD.

A condition that is identified four to nine times more often in boys than in girls, the staff of the Centers for Disease Control and Preventions (2002, as cited in Rief, 2003) estimated that “nearly seven percent of elementary-aged children in the United States have been diagnosed with ADHD” (p. 20). This statistic translates to over 3 million children in the U. S. alone (U.S. Department of Education, 2004). According to Selikowitz (2004), it seems that the predominance of boys in the overall number is due to their over representation in the hyperactive-impulsive group. In the inattentive group, there appear to be as many affected girls as boys.

History

According to an article published by the National Institute of Mental Health (NIMH, 2003) the history of ADHD can be traced back to the mid-19th C. Attention Deficit Hyperactivity Disorder was first described by Hoffman in 1845. Hoffman was a physician, who not only wrote books about medicine and psychiatry, but was also a poet who became interested in writing for children when he was unable to find suitable reading material for his 3 year old son. The result was a book of poems, complete with illustrations, about children and their characteristics. The book contained a poem, called “The Story of Fidgety Philip,” which described a boy who exhibited the symptoms of ADHD.
It was not, however, until 1902, that Still (as cited in NIMH, 2003) published a medical rationalization for this group of attentional and impulsive behaviors in children. Still published a series of lectures for the Royal College of Physicians in England in which he described a group of impulsive children, with notable behavioral problems, caused by what was thought to be a genetic dysfunction and not the result of poor child rearing. Today, these children would likely be recognized as having ADHD.

In 1940, according to Haber (2003), two clinicians, Warner and Strauss began to treat children, who suffered from severe disabilities, in an institution. In the course of their work, however, Warner and Strauss began to observe a distinct and separate second population of children separate from their more severely affected peers (Haber). The clinician observed a second group of children that appeared to have trouble learning in some specific areas, but did not appear to be mentally retarded, as was first believed. They were clumsy. They had trouble when they attempted to do gross motor activities, as well as fine motor coordination; however this disability was not severe enough to qualify the children as having cerebral palsy. In addition, Haber reported that Warner and Strauss observed that these children had problems with decreased attention span, increased activity levels, and impulsivity. Eventually, Warner and Strauss grouped these children into one diagnostic category, Minimal Brain Injury, the first official diagnostic name for what is today labeled ADHD.

The term, Minimal Brain Injury, was accepted by the medical community for more than 20 years, until the middle of the 20th C., when a group of international medical professionals convened in Oxford, England in an attempt to minimize the idea of actual
brain damage that was implied by the term, Minimal Brain Damage (Haber, 2003). These professionals coined the term, Minimal Cerebral Dysfunction. This term, along with Minimal Brain Dysfunction, became the prevalent designations for this disorder which was still explained as an overlapping and intertwined nature of the cognitive processes, behavioral, and neurobiological problems that the children displayed. In the mid 1960s and early 1970s, however, various groups of professionals began to approach this disorder in a different way (NIMH, 2003).

As opposed to taking the whole child, holistic approach that had been utilized to date, professionals began to divide children by what would, today, be characteristic ADHD symptoms into educational, neurobiological categories (Haber, 2003). According to Haber, in 1972, at the Advanced Study Institute, a conference of education experts constructed an educational definition of learning disabilities, which encompassed those children diagnosed with Minimal Brain Dysfunction, who were of “normal, near normal, or above normal intelligence, but had significantly discrepant learning in such areas reading, math, spelling, written language, and auditory comprehensions” (p. 29).

Haber (2003) reported that when the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III; 1987, as cited in Haber) was published by the American Psychiatric Association, the group of disruptive Disorders of Childhood included a new diagnostic category called, Attention Deficit Disorder. According to this newly published diagnostic criteria, the most prominent symptom of ADD was the failure of these children to pay attention. However, there was little attention to the learning problems and the difficulties that children experience with their peer and social
interactions (Haber). As a result, when the *Diagnostic and Statistical Manual* (DSM-IV; 1996, as cited in Rief, 1996) was updated, the diagnostic criteria of ADD was changed as well. The updated term, Attention Deficit Hyperactivity Disorder, was now described in three separate and distinct categories. These categories are: (a) ADHD, Predominantly Inattentive Type; (b) ADHD, Predominantly Hyperactive Impulsive Type; and (c) if some symptoms were present across all categories, ADHD, Combined Type (Haber). It is based on this published diagnostic criteria that ADHD is identified and diagnosed today.

*Challenges Faced in the Classroom*

The presence of ADHD can seriously inhibit a child’s ability to pay attention and to control impulses and behavior. These deficits can be problematic in many different areas of a child’s school life. According to the staff of the American Academy of Pediatrics (2004, as cited in Reiff, 2004), “in general, children with ADHD experience their greatest challenges in the areas of behavior management and academic progress” (p. 156).

*Behavioral Issues*

At the elementary school level, children diagnosed with ADHD are primarily highly impulsive in their classroom actions; they blurt out and are unable to wait for their turn (Rief, 1996). These children are said to “lack self-control and regulatory behavior, have a high activity level, trouble sitting [still], and are constantly touching or playing with nearby objects” (Rief, p. 176). Children with ADHD are easily distractible and not only is it difficult for them to start activities, but they experience difficulty in staying on
task and the completion of assigned class work. It is difficult for these children to sustain attention and effort without continual prompts and refocusing. Other characteristics often seen in children with ADHD, are that they are easily bored, disorganized, and experience difficulty with written work.

**Academic Concerns**

Often, behavior management problems are the first to emerge in the school setting, and children with ADHD struggle to meet the academic expectations of the classroom (Reiff, 2004). Not all children with ADHD exhibit the hyperactive and impulsive characteristics that lead to behavior management issues in the classroom. Among those children diagnosed with ADHD, some have the predominantly inattentive form of the disorder. Generally, children with the inattentive form of ADHD have fewer disciplinary problems at school, and their behavior is far less disruptive. However, the primary struggle for these children is in the area of academics. While their hyperactive and impulsive counterparts experience academic difficulty as well, their struggle stems from the behavioral issues. The children, who are inattentive, experience academic difficulty because they are easily distracted, have problems with the initiation and completion of assignments, and they are unable to maintain continual attention in order to complete tasks (Rief, 1996).

Many of the behaviors that are commonly associated with ADHD can interfere with a student’s ability to learn successfully in a typical classroom setting (Reiff, 2004). First, a child’s distractibility and lack of persistence may prevent him/her from being able
to retain the material that is taught in class. Secondly, impulsivity, which is often characteristic of children with ADHD, may cause a student to rush through school work and respond too quickly to questions instead of taking the time necessary to think through the ideas. In addition, many students are unable to organize and plan, and they cannot complete class work, have poor note taking skills, and cannot follow a work schedule, in order to finish work on time.

Success in the Classroom

Success for the ADHD student in the classroom is dependent upon a number of variables and adaptations that the teacher must make in his/her approach to teaching (Rief, 1996). In general, there are three basic areas that an educator must address in order for a child with ADHD to achieve academic success.

First, in a classroom that includes students with ADHD, the teacher must maintain a highly structured, organized, and routine driven atmosphere (Rief, 1996). A common difficulty for children with ADHD is disorganization and the inability to maintain focus. In a classroom with a highly predictable routine, where explanation of what is expected is clearly defined, where procedures are outlined, and prompts or reminders are given frequently, a student with ADHD will be constantly reminded of how work is expected to be completed and what behavioral guidelines are expected.

Secondly, lesson presentation and activities should be based on the idea of active learning and engage the senses, in order to meet the needs of the various strengths and intelligences represented in the classroom (Rief, 1996). The curriculum should be
designed to be creative and highly engaging. Children, those with and those without learning disabilities, tend to have certain propensities and interests that, when nurtured, allow them to not only learn, but to succeed. This idea of multisensory instruction and learning style adaptations are two of the keys to Gardner’s (1999; as cited in Rief, 1993) MI theory.

The third area of accommodation is to allow students choices (Rief, 1996). Often, a child with ADHD is perceived as being unfocused and disinterested in the way lessons are taught or the way material is presented. When students are given choices in how they learn material and in how they present what they know, they can become active participants in their learning. A student will be more interested and invested in learning a subject if s/he feels a certain ownership of the project itself.

Multiple Intelligence Theory

The presence of individual learning styles and intelligences directly affect the way a student thinks, behaves, approaches learning, and the way information is processed (Rief, 1996). First, teachers must recognize their own learning styles and preferences in order to effectively meet the needs of children with learning differences, and evaluate their own strengths and weaknesses as learners. A personal awareness of one’s own teaching styles and the understanding that the development of new strategies and techniques in the classroom may be necessary in order to provide an environment where the needs of all students are being met is important.
Historically, the IQ test has been used to measure intelligence. However, the results from IQ tests are not perfect, and there is much about a person that cannot be determined by an IQ score. An IQ test cannot predict “what a child will grow up to be or what they will achieve in life” (Armstrong, 2003, p. 1). Also, test results can reflect certain biases of the people who designed the tests. Therefore, many people cannot exhibit their different kinds of intelligences when they take an intelligence test.

In general, IQ tests “focus their attention on being good with words or numbers, and they neglect other important things like music, art, nature, and social ability” (Armstrong, 2003, p. 1). According to Armstrong, “IQ tests are limited and don’t test for the wide range of abilities that people often use” (p. 2), and that children tend to exhibit. In school, it is necessary to understand that the needs of all children, those with and without learning disabilities, are not typically met by traditional curriculum and teaching methods. The needs of children, to have their intelligences nurtured, is something teachers need to recognize and adjust their teaching strategies to accommodate.

What Is Intelligence?

There is no generally agreed upon definition of what intelligence is. However, when one considers the needs and the abilities of all students in the classroom, especially those with learning differences like children with ADHD, intelligence is defined as multidimensional (Armstrong, 2003). Also, it is the ability to “analyze information previously acquired and to transfer concepts and ideas to new situations. [Intelligence is]
the ability to apply critical and creative thinking skills to all domains, [and] is essential to the reasoning process” (Cline, 1999, p. 106). In addition, intelligence is described in terms of three characteristics. These characteristics, which are said to be essential to intelligence, include “a possession of knowledge, the ability to efficiently use knowledge to reason about the world, and the ability to use reasoning adaptively in different environments” (Bernstein, Clarkes-Stewart, Penner, Roy, & Wickens, 1999, p. 323).

**History of Intelligence Testing**

The history of intelligence testing can be traced back to the early 20th C., when the French government appointed two psychologists, Binet and Simon (as cited in Vasta, Haith, & Miller, 1999), to a commission to identify, study, and provide special education programs for children who were not doing well in school (Vasta, et al.). As a part of their work and study with the commission, Simon and Binet developed a battery of intellectual test items that are now used as the model for modern IQ tests. These questions were based on the assumption that intelligence is involved in many reasoning, thinking, and problem-solving activities (Gardner, 1999). The goal was to “distinguish between children who were capable, perhaps with extra help, of succeeding in school and children who were simply not intelligent enough to cope with the regular curriculum” (Vasta et al., p. 347). It was thought that, once the latter group was identified, these children could be placed in special classes from which they might benefit.

With this goal in mind, Simon and Binet (1905, as cited in Bernstein et al., 1999) looked for “tasks that would highlight differences in children’s ability to reason, judge,
and solve problems” (p. 323). During the process, Simon and Binet tried out a number of possible items for their test, which included tests that would “access both a range of ages and a range of ability levels” (Vasta et al., 1999, p. 347).

Nearly a decade after Binet published his method of testing, at Stanford University, an English version of the test was developed, known as the Stanford-Binet Intelligence Scale (Terman, 1916, as cited in Bernstein et al., 1999). The Stanford-Binet shares several features with Binet’s original intelligence assessment. “It is a test of childhood intelligence, applicable to every age group within the span of childhood. It is a global measure of intelligence designed to yield a single intelligence quotient, or IQ score that summarizes the child’s ability” (Vasta et al., 1999, p. 348). In the Stanford-Binet, the emphasis is on the academic and verbal skills that are important in school (Vasta et al.).

The Stanford-Binet, like its predecessor, Binet’s original test, measures a child’s intelligence based on a comparison of the performance of different groups of individuals (Vasta et al., 1999). “All contemporary tests of intelligence are comparative, or relative, measure” (p. 348). A child’s IQ is a function of a child’s performance in comparison with the performance of children the same age.

Standard IQ tests reflect an approach to studying intelligence known as psychometric testing, which is focused on an assessment of the products of intelligence (Bernstein et al., 1999). Generally, researchers who take this approach, ask whether intelligence is “one general trait or rather a bundle of more specific abilities” (p. 342). This is important because if intelligence is found to be a single thing, then it could be
determined that, if a person is deficient in one aspect of his/her skill ability, then it could be assumed that this person would be deficient in all other aspects of life.

Tests for intelligence were designed for a specific purpose to measure a child’s intellectual abilities; historically, they have had practical uses, such as the ability to determine what kind of schooling a child should receive (Vasta et al., 1999). However, it is this factor that contributes to the controversy. Unlike other forms of psychological measurement, IQ test scores can make a difference in a child’s life if they are interpreted incorrectly or overused.

Gardner’s Theory

Gardner (1993, as cited in Vasta et al., 1999) proposed a theory of intelligence that is “considerably more diversified and multifaceted than the notion of general intelligence admits” (p. 386). Unlike some researchers, Gardener did not rely solely on the results from standardized tests to draw conclusions about intelligence. In general, in Gardner’s theory of multiple intelligences (MI), he claims that humans possess eight separate and distinct intelligences, which he defined as “the ability to solve problems or fashion products that are of consequence in a particular cultural setting or community” (p. 387).

Gardner’s MI (1993, as cited in Bernstein et al., 1999) theory is focused on how students “learn and use symbol systems such as language, mathematics, and music” (p. 345). According to Gardner, all people have intellectual potential, or intelligences, as he
called them, each of which includes skills that allow people to solve problems (Bernstein et al.). Although the intelligences interact with one another, also, they function with some independence, which, in turn allows individuals to develop certain intelligences more than others.

The eight intelligences that Gardner (1989, as cited in Bernstein, et al., 1999) proposed are: (a) linguistic, (b) logical, (c) spatial, (d) musical, (e) bodily-kinesthetic, (f) intrapersonal, (g) interpersonal, and (h) naturalistic. According to Bernstein et al., Gardner has evidence to support the existence of linguistic, spatial, and logical intelligences. In his view, “musical ability meets all the signs for consideration as a distinct form of intelligence” (Vasta, et al., 1999, p. 386) because it can appear in “isolated forms in cases of brain injury or musical prodigy, and can be analyzed in terms of a set of core elements,” (p. 387) like pitch, rhythm, and the like. Similar arguments have been offered in support of kinesthetic and the two personal intelligences, interpersonal and intrapersonal. Recently, Gardner reported that the eighth form of intelligence, naturalistic, is focused on the skill of “recognizing flora and fauna” (Vasta et al., p. 389).

In conventional IQ tests, from which traditional teaching practices and most curricula are based, the primary focus is on the first three of Gardner’s intelligences (Rief, 1996). Gardner claims that IQ tests, as well as most traditional teaching strategies “fail to do justice to the diversity of intelligences” (Bernstein et al., 1999, p. 345). Instead, Gardner (1999) believes that children’s intelligence can be measured by the establishment of an environment that allows children to demonstrate the spectra of their intelligences in
as natural a way as possible. The establishment of this environment is essential since Gardner admits, that “certain aspects of intelligence can be measured quickly and easily but many others cannot” (p. 136). Based on this theory, and the understanding that children with ADHD often demonstrate knowledge in different ways, Rief believed that the choices, options, variety in instructional strategies and techniques that are offered in a curriculum focused on the nurture of a child’s strengths or intelligences, are critical elements in classrooms that are inclusive of all students.

A Description of the Eight Intelligences

In his book, *Frames of Mind*, Gardner (1989, as cited in Gardner, 1999) presented his MI theory that reinforces his multifaceted view of human intelligence. Originally Gardner presented seven distinct human intelligences and later revised his theory to include an eighth distinct human intelligence. Essentially, the eight identified intelligences are influenced by the culture into which each person is born. These intelligences are the tools used for learning, problem solving, and creating that all people can use (Silver, Strong, & Pernini, 2000).

The first of Gardner’s (1999, as cited in Silver et al., 2000) intelligences is linguistic intelligence. Linguistic intelligence consists of a person’s ability to think in terms of words. Also, it is the ability to effectively use language to express and appreciate complex meanings. Generally, authors, speakers, poets, and newscasters exhibit high degrees of linguistic intelligence.
Gardner’s (1999, as cited in Silver et al., 2000) second intelligence is logical-mathematical intelligence, which enables a person to calculate, quantify, consider hypotheses, and complete complex mathematical operations. Scientists, accountants, and engineers demonstrate this type of intelligence.

The third intelligence that Gardner (1999, as cited in Silver et al., 2000) identified was spatial intelligence, is the ability for a person to think in three-dimensions. It allows a person to recreate, transform, or modify images, to navigate oneself and objects through space, and to produce and decode graphic information. This intelligence is generally found in sailors, pilots, painters, and architects.

The fourth of Gardner’s (1999, as cited in Silver et al., 2000) intelligences is bodily-kinesthetic intelligence, which allows a person to effectively manipulate objects and master physical skills. This intelligence is evident in athletes, dancers, surgeons, and craftspeople.

Gardner’s (1999, as cited in Silver et al., 2000) fifth intelligence is musical intelligence. It is evident in people who demonstrate a sensitivity to pitch, melody, rhythm, and tone. Those people who possess this intelligence include composers, conductors, musicians, critics, and even sensitive listeners.

The sixth of Gardner’s (1999, Silver et al., 2000) intelligences is interpersonal intelligence, the capacity to understand and interact effectively with others. This intelligence is evident in successful teachers, social workers, actors, and politicians.

Gardner’s (1999, as cited in Silver et al., 2000) seventh intelligence is intrapersonal intelligence, the ability for a person to construct an accurate perception of
oneself and to use that knowledge in planning and directing life choices. Some individuals with a strong intrapersonal intelligence include theologians, psychologists, and philosophers.

Finally, the eighth of Gardner’s (1999, as cited in Silver et al., 2000) intelligences is the naturalist intelligence, the ability to observe patterns in nature, and identify and classify objects. Also, this intelligence includes an understanding of natural and human made systems. This intelligence is evident in farmers, botanists, hunters, and landscapers.

Why Teach MI Theory

In general, learning and teaching in the traditional classroom is restricted to two (e.g., linguistic and logical) of the eight intelligences identified by Gardner (1999) and his MI theory (Schirduan, Case, & Faryniarz, 2002). Often, it seems that educators fail to recognize the other intelligences, or strengths, that children may demonstrate. With MI theory, educators can perceive the students in the classroom with learning differences as “at-promise vs. at-risk” (p. 325).

Although some children may possess all eight of Gardner’s (1999, as cited in Schirduan et al., 2002) intelligences, also, they may have a natural inclination, or strength, toward one or two of the intelligences. Gardner believed that it is the responsibility of the teacher to observe and determine each student’s individual learning styles and strengths. In doing this, he believed that children, especially those with ADHD, can move beyond their “learning disabilities to learning abilities” (p. 325).
It seems logical to teach students in the ways that appeal to their strengths (Schirduan et al., 2002). This is especially relevant and necessary for those students who tend to be less successful in a traditional classroom setting. Essentially, the use of MI theory means building on a child’s natural strength or interest and in turn bridges the gaps between a child’s strength and his/her weaknesses (p. 326).

Chapter Summary

Many of the identifiable characteristics of ADHD, as well as a description of the specific accommodations these children need in order to achieve academic success in the traditional classroom setting were provided in this chapter. Evidence (Rief, 1996; Schirduan et al., 2002) that children with ADHD respond best to a hands-on, active learning environment that is stimulating, relevant, developmentally appropriate, and focused on the learning strengths of the students was presented, also. It is apparent that these students are best able to achieve academic success when they are provided with choices, structure, and clear expectations of performance. The classroom environment should be one that is focused on acceptance and on nurture. The literature and research suggest that one of the most effective ways to create this learning environment is through teaching to various learning styles and intelligences, which focus on student strengths and abilities. In Chapter 3, this author will detail the development of a curricular unit in order to provide educators with insight into how to meet the varying needs and learning differences of the ADHD child in the classroom through the integration of Gardner’s MI theory (1999, as cited in Silver et al., 2000).
Chapter 3

METHOD

The purpose of this project was to detail the development of a curricular unit of instruction that focused on the integration of Gardner’s MI theory as a means of meeting the varying needs and learning differences of the ADHD child in the classroom. Utilization of Gardner’s (1999) multiple intelligence (MI) theory was presented as a viable method by which teachers are able to accurately assess individual student intelligences and develop differentiated instructional methods to meet these individual student needs. It is this author’s position that the curricular unit demonstrated to teachers that Gardner’s MI theory provides necessary tools to educate each student in the classroom, regardless of a diagnosis of ADHD.

Target Audience

The individuals who were interested in utilizing Gardner’s MI theory in the development and presentation of curricular units of instruction were primarily elementary level teachers. Teachers gained background knowledge on ADHD and MI theory (Gardner, 1999), and were able apply the various strategies to incorporate Gardner’s MI theory into lesson instruction, in order to better assess each student’s individual abilities and adjust teaching techniques to meet diverse needs in the classroom.
Goals

The main purpose of this project was to develop a curricular unit which integrated Gardner’s MI theory as a means of meeting various learning styles of children with ADHD. Often, children diagnosed with ADHD experience difficulty in a traditional classroom setting. The research presented in Chapter 2 suggests that this difficulty is due in part to the fact that these children learn differently. Typically, these students demonstrate varied learning styles and intelligences that can be identified, and in turn taught to, by use of MI theory.

This project developed of a curricular unit that integrated Gardner’s MI theory and provided strategies and techniques that teachers can use to effectively teach students with a variety of learning styles and intelligences in the classroom. In general, children with ADHD respond best to a hands-on, active learning environment that is stimulating, relevant, developmentally appropriate, and focuses on the learning strengths of the students. These students need to be provided with choices, structure, and clear expectations of performance. Also, the classroom environment must be focused on acceptance and on nurture. Strategies for achieving this classroom environment were incorporated into the lessons included in the unit.

Procedures

For the development of the unit, this author will first determine the curricular focus of the unit, as well as the district and state standards to be assessed upon completion of instruction. This author will then develop a series of lessons utilizing
Gardner’s eight intelligences. The implementation of Gardner’s MI theory into the teaching methods of the unit will meet the varied needs of students with various learning styles and intelligences. Students will be pre-assessed and post-assessed on the unit of instruction.

Chapter Summary

The purpose of the project will be to demonstrate to teachers that Garner’s MI theory provides necessary tools to educate each student in the classroom, regardless of a diagnosis of ADHD. Through the utilization of Gardner’s (1999) MI theory, teachers will be able to determine individual student intelligences and develop differentiated instructional methods to meet these individual student needs. It is this author’s intention that the development of a curricular unit of instruction provided teachers with insight to how best to educate each student in the classroom, regardless of a diagnosis of ADHD.
Chapter 4

RESULTS

The goal of this project was to develop a curricular unit that would help teachers create an academic environment in which second grade students with ADHD would demonstrate a high level of participation and engagement throughout the 12 lesson study of plants, while still satisfactorily demonstrating content knowledge based on student learning objectives. The learning objectives for this unit were written in conjunction with the Colorado Model Content Standards and designed that teachers would rely on the utilization of Gardner’s multiple intelligence (MI) theory (1999), as defined in the previous chapters of the project, in order to more effectively meet the varied needs of learners with ADHD. The unit was developed based on the idea that students with ADHD benefit more fully from lessons taught using Gardner’s MI theory (1999), which was suggested in the research presented in the Review of Literature.

This chapter is divided into four primary sections. First, the Colorado Model Content Standards outline the specific learning objectives of the unit, as defined by grade level expectations. Second, a curriculum wheel and brief summarization of each lesson’s objectives and activities offer a spatial representation of how this author integrated each of Gardner’s Multiple Intelligences into the curricular unit as a means of meeting the varied needs of a student with ADHD. Third, the instructional sequence outlines daily lesson plans for the curricular unit, which includes read alouds, group and individual activities, and experiments. Finally, informal assessments will be given to students as a
means of determining the overall effectiveness in teaching the curricular unit to students with ADHD through the utilization of Gardner’s MI theory (1999).
Colorado Model Content Standards

Standards addressed in this unit

1. Science: 1, 2, 3, 5
2. Geography: 5
3. Math: 3
4. Reading and Writing: 1, 2, 4

Students participating in this unit will...

1. ask questions and state predictions (hypotheses) that can be addressed through scientific investigation.

2. select and use simple devices to gather data related to an investigation (for example, length, volume, and mass measuring instruments, thermometers, watches, magnifiers, microscopes, calculators, and computers).

3. use data based on observations to construct a reasonable explanation.

4. communicate about investigations and explanations.

5. examine, describe, classify, and compare tangible objects in terms of common physical properties (for example, state of matter, size, shape, texture, flexibility, color).

6. observe and describe parts of a system.

7. describe an observed change in terms of starting conditions, type of change, and ending conditions, using words, diagrams, or graphs.

8. distinguish living from nonliving things.

9. describe the basic needs of an organism.

10. recognize that green plants need energy from sunlight and various raw materials to live.

11. describe life cycles of selected organisms.

12. identify characteristics of plants and animals that allow them to live in specific environments.
13. describe resource-related activities in which they could participate that can benefit their communities.

14. construct, read, and interpret displays of data including tables, charts, pictographs, and bar graphs.

15. generate topics and develop ideas for a variety of writing and speaking purposes.

16. organize their speaking and writing.

17. choose vocabulary that communicates the messages clearly and precisely.

18. revise and edit speech and writing.

19. create readable documents with legible handwriting or word processing at the appropriate time.

20. use reading, writing, speaking, and listening to define and solve problems;

21. use listening skills to understand directions.

22. describe the role of resources in daily life.
## Curriculum Wheel

<table>
<thead>
<tr>
<th>INTERPERSONAL</th>
<th>MUSICAL</th>
<th>INTRAPERSONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group activities</td>
<td>Song on parts of a plant to the melody of</td>
<td>“How would it feel to be an animal living</td>
</tr>
<tr>
<td></td>
<td>The Farmer and the Dell</td>
<td>in the rainforest that is being destroyed?”</td>
</tr>
<tr>
<td>Raising awareness of</td>
<td></td>
<td>“Why are plants important to you?”</td>
</tr>
<tr>
<td>preserving the rainforest</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>NATURALIST</th>
<th></th>
<th>BODILY-KINESTHETIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation of seed</td>
<td></td>
<td>Observation of plants and trees in their</td>
</tr>
<tr>
<td>types and travel</td>
<td></td>
<td>natural environment</td>
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<tr>
<td>Scientific Experiments</td>
<td></td>
<td></td>
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<tr>
<td>Observing plant growth</td>
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<tr>
<td>and change</td>
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</table>

### Curricular Theme: PLANTS

<table>
<thead>
<tr>
<th>VERBAL-LINGUISTIC</th>
<th>LOGICAL-MATHEMATICAL</th>
<th>SPATIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class discussion</td>
<td>Analyzing and graphing the number of seeds found in various fruits</td>
<td>Videos</td>
</tr>
<tr>
<td>Writing a persuasive</td>
<td>Determining the cause ofrainforest destruction</td>
<td>Drawing/ labeling of plants</td>
</tr>
<tr>
<td>paragraph</td>
<td>Comparing and contrasting living and non-living things</td>
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<tr>
<td></td>
<td>Classifying foods</td>
<td></td>
</tr>
</tbody>
</table>
To what extent does the each lesson address each particular intelligence?

<table>
<thead>
<tr>
<th>Key:</th>
<th>XXX = To a great extent</th>
<th>XX = Considerable</th>
<th>X = Somewhat</th>
</tr>
</thead>
</table>

Intelligences:
- **V**: Verbal/Linguistic
- **S**: Spatial
- **L**: Logical/Mathematical
- **P**: Intrapersonal
- **B**: Bodily/Kinesthetic
- **I**: Interpersonal
- **M**: Musical
- **N**: Naturalist

Lesson #1: Living vs. Non-Living Things

**Intelligences**

<table>
<thead>
<tr>
<th>V</th>
<th>X</th>
<th>B</th>
<th>XXX</th>
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</thead>
<tbody>
<tr>
<td>L</td>
<td>XXX</td>
<td>P</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>X</td>
<td>I</td>
<td>X</td>
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<tr>
<td>M</td>
<td>N</td>
<td>X</td>
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</tbody>
</table>

**Lesson**: Students will sort and classify assorted living and non-living items based on determined characteristics.

**Extension Activity**: Students will observe plant movement through experimentation.

Lesson #2: Inside a Seed

**Intelligences**

<table>
<thead>
<tr>
<th>V</th>
<th>X</th>
<th>B</th>
<th>XXX</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>XX</td>
<td>P</td>
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<tr>
<td>S</td>
<td>X</td>
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<td>M</td>
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<td>X</td>
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</table>

**Lesson**: Students will identify the parts of a seed through a hands-on activity.

**Extension Activity**: Students will observe plant growth and chart the changes in the plant.

Lesson #3: Seeds Travel

**Intelligences**

<table>
<thead>
<tr>
<th>V</th>
<th>X</th>
<th>B</th>
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<tbody>
<tr>
<td>L</td>
<td>XXX</td>
<td>P</td>
</tr>
<tr>
<td>S</td>
<td>XX</td>
<td>I</td>
</tr>
<tr>
<td>M</td>
<td>N</td>
<td>XX</td>
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</tbody>
</table>
### Lesson #4: Plant Parts

**Lesson:** Students will draw and label the four parts of a plant as well as label on the illustration the four things that plants need to grow based on group discussions and hands-on plant activity.

**Extension Activity:** Students will sing a song about the parts of a plant.

| Intelligences |  |
|---------------|  |
| V             | X |
| L             | B |
| S             | P |
| M             | X |

### Lesson #5: Roots and Stems

**Lesson:** Students will describe the functions of a plant’s roots and stems.

**Extension Activity:** Students will observe the function of a stem through an experiment demonstrating how food-colored water travels up a stalk of celery overnight; students will observe the function of roots through experimentation.

| Intelligences |  |
|---------------|  |
| V             | X |
| L             | B |
| S             | P |
| M             | X |

### Lesson #6: Leaves

**Lesson:** Students will watch a video about photosynthesis and through class discussion be able to describe the function of a plant’s leaves, as well as define photosynthesis and the function of chlorophyll.

<p>| Intelligences |  |
|---------------|  |
| V             | X |
| L             | B |
| S             | P |
| M             | X |</p>
<table>
<thead>
<tr>
<th>Lesson #7: Flowers</th>
<th>Intelligences</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lesson</strong>: Students will watch a video about the function of a flower as well as participate in a hands-on activity utilizing bloomed flowers as a means of identifying the parts of a flower and discussing pollination and how seeds travel.</td>
<td>V X B XX</td>
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<tr>
<td></td>
<td>L P</td>
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<tr>
<td></td>
<td>S XX I XX</td>
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<td>M N XXX</td>
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<thead>
<tr>
<th>Lesson #8: Seeds Inside a Fruit</th>
<th>Intelligences</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lesson</strong>: Students will understand that fruits contain seeds through a hands-on activity using various fruits. Students will record and graph the results of the activity.</td>
<td>V X B XX</td>
</tr>
<tr>
<td></td>
<td>L XXX P</td>
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<tr>
<td></td>
<td>S X I X</td>
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<td></td>
<td>M N XX</td>
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<thead>
<tr>
<th>Lesson #9: Food Classification</th>
<th>Intelligences</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lesson</strong>: Students will sort and classify fruits and vegetables based on knowledge of stems, roots, leaves, flowers, seeds, and fruit, through a game.</td>
<td>V X B XX</td>
</tr>
<tr>
<td></td>
<td>L XXX P</td>
</tr>
<tr>
<td></td>
<td>S X I X</td>
</tr>
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<td>M N X</td>
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<tr>
<th>Lesson #10: Trees</th>
<th>Intelligences</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lesson</strong>: Students will compare trees to flowering plants and identify different types of trees through physical identification of trees in their natural environment.</td>
<td>V XX B XXX</td>
</tr>
<tr>
<td></td>
<td>L X P</td>
</tr>
<tr>
<td></td>
<td>S X I X</td>
</tr>
<tr>
<td></td>
<td>M N XXX</td>
</tr>
<tr>
<td>Lesson #11: Why Do We Need Plants</td>
<td>Intelligences</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>--------------</td>
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<tr>
<td><strong>Lesson</strong>: Students will understand the role plants play in people’s lives, through providing food, oxygen, and things we use. Students will respond to a discussion about “Why nature is important to them.”</td>
<td>V</td>
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<tr>
<td></td>
<td>L</td>
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<td>S</td>
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<tr>
<th>Lesson #12: Importance of the Rainforest</th>
<th>Intelligences</th>
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</thead>
<tbody>
<tr>
<td><strong>Lesson</strong>: Students will increase public awareness of the importance of the rainforest, for people and animals, as well as to discourage the destruction of the rainforest through the completion of a persuasive writing exercise.</td>
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</tr>
<tr>
<td></td>
<td>L</td>
</tr>
<tr>
<td></td>
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</table>
Lesson #1

Lesson Focus: Living vs. Non-Living Things (Extension activity included below)
Grade: 2nd
Duration: 1 lesson; 45 minutes

Lesson Objective: Students will define living things as those that can move, grow, breathe, need food and water, and reproduce.

Demonstration of Understanding: Satisfactory completion of a Venn diagram comparing the characteristics of a non-living and a living thing.

Materials Needed:
1. Living (several small plants, picture of animals, human photographs) and non-living (a rock, a book, a toy car, a shoe) objects
2. Student science/plant journals

Anticipatory Set:
- Display various living and non-living objects. Discuss similarities between the objects.

Teaching the Lesson/ Guided Practice:
- Begin by grouping objects based on similar characteristics (i.e. size, shape, feel, etc.) List observations on chalk board.
- Group live objects together. Discuss similar characteristics.
- Discuss characteristics of living things, as those that move, grow, breathe, need food and water, and reproduce.
- Using information recorded, students make a new entry in their science/plant journals listing the characteristics of all living things.

Summarize:
- Check for student understanding. Ask students to compare a dog and a rock using a Venn diagram. What these objects have in common, based on what we have just recorded in the science/plant journals.
- Model for students how to begin to compare and contrast these items utilizing the information gathered on the characteristics of living things.

Evaluate:
- Students demonstrate their understanding by accurately comparing and contrasting the living and the non-living objects using the Venn diagram.
- Satisfactory completion of this activity based on a grade of S (80%) or higher.
Lesson #1 Extension Activity

Lesson Focus: Plant Movement

Duration: Set-up- 10 minutes; daily observations for the remainder of the week

Objectives: Proving through experimentation that plants do move.

Materials Needed:
1. One sunflower in bloom
2. One prayer plant
3. One shamrock
4. Window that receives direct sunlight
5. Closet or other area that does not receive sunlight
6. Experiment worksheet

Anticipatory Set:
- Recall characteristics of living things.
- Discuss the movement of plants.

Experiment Procedure:
- Place plants on a table in the front of the room. Ask students if these plants are moving. Ask how they know.
- Tell students that through this experiment we will prove that plants do move. Explain that one thing that all plants need is sunshine or light.
- Place the sunflower in front of the window, with the flower facing away from the window.
- Place the prayer plant and the shamrock plant in a dark closet.
- Students complete beginning of experiment record in science/plant journal.

Follow-up:
- Each remaining day of the week, observe the plants’ movements, and record what is seen on the experiment worksheet. On the final day of observation, students will write a conclusion of what they learned from the experiment-Plants move, and some plants move toward sunlight.
Lesson #2

Lesson Focus: What is inside a seed? (Extension activity included below)
Grade: 2nd
Duration: 1 lesson; 30 minutes

Objectives: Identifying the parts of a seed; charting the growth process of a seed

Materials Needed:
1. Bean seeds (some soaked overnight in water)
2. Small paper plates
3. Magnifying glasses (1 per student)
4. Science/plant journal

Anticipatory Set:
- Each student will receive three unsoaked bean seeds. Ask students what they think is inside the seeds. List predictions on chalkboard. Discuss why they made their predictions, and what they think that the job of seed is.

Teaching the Lesson/ Guided Practice:
- Collect dry seeds. Distribute two beans that have been soaked in water overnight to each student, along with a small paper plate, and a magnifying glass.
- Ask students to study the outside of the bean. What do they notice (color, shape, size, texture, etc.)
- Model for students how to open the seed in order to study what is inside the seeds.
- Students then open their seeds. Using the magnifying glasses, students start to make observations of what is seen inside the seeds.
- Discuss that a seed is the start of a new plant.
  o Inside the plants student will see the beginning of a new plant, as well as a small root system.
  o The outside covering on a seed is called the seed coat. Ask students when they go outside to play in the snow what they have to wear. When they answer a coat, reinforce that a coat is used to protect something. A coat on a child protects the child from the cold, just as a seed coat protects the leaves and roots of the new plant from harm.
  o Explain that the seed also contains enough food for the new plant to have until it is big enough to reach for sunlight, when it can then make its own food.
- Allow students time to observe their seeds and the small plants that they found inside.
Summarize:
- After the seed observations are made, draw an outline of the seed on the chalkboard. Ask students to do the same in their science/plant journals. Have students label on their drawing the tiny leaves and roots inside, as well as the seed coat.
Lesson #2 Extension Activity:

Lesson Focus: Growing seed bags

Duration: 15 minute set-up; daily observations

Objective: Students will grow small bean plants from seeds in plastic bags in order to observe how plants change as they grow.

Materials:
1. 1 quart, self-closing plastic bags
2. 4 bean seeds per student
3. Paper towel
4. Permanent marker
5. Stapler
6. Science/ plant journal

Anticipatory Set:
- Ask students to recall what is inside an unplanted seed.
- Tell students that every seed has the beginning of a new plant inside it, and it is interesting to observe the many changes that a seed undergoes as it is watered and begins to grow.
- Explain that today we will be “planting” seeds in order to observe their changes as they grow.

Experiment Procedure:
- Each student will fold one paper towel in 1/2 and place it in the plastic bag (the paper towel should touch the bottom of the bag.)
- Draw a line 2 inches from the bottom of the bag and staple along the line.
- Drop 4 seeds into the bag.
- Add water to dampen the paper towels.
- Zip the bag shut and tape to a location in the classroom that will receive sunlight.

Follow-up:
- Have students observe the bag each day and record the changes on their log sheet in their science/plant journals.
Name:___________________________________________

Draw picture of the bean seed each day in order to chart how the seed changes as it grows.

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
<th>Day 7</th>
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<td>Day 16</td>
<td>Day 17</td>
<td>Day 18</td>
<td>Day 19</td>
<td>Day 20</td>
<td>Day 21</td>
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</table>
Lesson #3

Lesson Focus: Seed movements (Extension activity included below)
Grade: 2nd
Duration: 1 lesson; 30 minutes

Objectives: Students will be able to list 5 ways in which seeds travel (the wind, picked up or caught on something and transported to a new location, scattered by the plants, animals, and some float).

Demonstration of Understanding: Satisfactory completion of the “Seeds on the Go” worksheet independently.

Standards:

Materials Needed:
1. The Tiny Seed by Eric Carle
2. A variety of seeds, seed pods, etc. that will model the variety of ways seeds travel
3. Science/ plant journal
4. “Seeds on the Go” worksheet

Anticipatory Set:
- Ask student where they think that seeds come from, and how they think that the seeds end up where they do in order to be planted and to grow.
- Brainstorm different possibilities.
- Explain that seeds are different shapes and sizes, and there are 5 different ways that they get from place to place. Encourage students to try to note each of the 5 as the book is read.

Teaching the Lesson/ Guided Practice:
- Read The Tiny Seed by Eric Carle. Point out the different modes of travel that the seeds have.
- Discuss the differences in the ways that the seeds look and why they travel as they do. Explain for example that some seeds have hooks and stickers and travel by being attached to something; some seeds have wing-like parts and travel in the wind.

Summarize:
- After you have finished reading the book, make a list on the chalkboard of the 5 different ways that seeds can travel. Next to each mode of transportation, have students brainstorm various types of seeds that travel that way.
Evaluate:
- Students demonstrate their understanding by completing the “Seeds on the Go” worksheet independently.
- Satisfactory completion of this activity based on a grade of S (80%) or higher.
Lesson #3 Extension Activity

Lesson Focus: Categorizing seeds

Duration: 15 minutes

Objectives: Students will correctly categorize a variety of seeds based on determined methods of travel.

Materials Needed:
1. Several seed pods and seeds that might be moved from place to place in one of more ways (seeds with wings, seeds with hooks/stickers, seed pods, fruit seeds, and floating seeds).
2. Categorization work mat divided into categories (wind, animals, seeds that are scattered, and float)

Anticipatory Set:
- Ask students to recall the various ways that seeds can move from place to place. Students may use their journals to refer to.

Activity:
- Place a selection of different seeds on a plate for each group of 4-6 students to work with.
- Tell students that they are to examine each of the seeds they have. Students are to determine which mode of travel each seed is likely to use.
- Then, they are to draw a picture of that seed in the correct box and write one sentence on why they think that seed matched that mode of travel.
Seeds on the Go

Most plants have roots that keep them in one place, and yet their seeds can travel. Here's how some seeds travel.

Plants like the dandelion and milkweed produce seeds with silky parachutes that allow them to travel on the wind. Maple and elm trees have winged seeds that spin away in the breeze.

Some seeds travel with people and animals. A sticktight plant has seeds that do just that—they stick tight to fur or clothes until they are brushed off. Acorns, the seeds of the oak tree, are carried by squirrels and birds who sometimes drop them or bury them and forget them.

Some plants scatter their seeds. The violet and the witch hazel plant make seeds in a pod. When the pod dries it shrinks, and out pop the seeds.

The coconut and the water lily are water travelers. A coconut fruit can be carried in the ocean until it reaches land, where it will sprout. Water lily seeds float away and sprout at the bottom of a pond.

Make a table to show how some seeds travel. Use the information in the paragraphs above. Give your table a title.

<table>
<thead>
<tr>
<th>Air</th>
<th>People/Animals</th>
<th>Scatter</th>
<th>Water</th>
</tr>
</thead>
<tbody>
<tr>
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Brainwork! Make a list of seeds you might find in your kitchen.
Lesson #4

Lesson Focus: Parts of a Plant (Extension activity included below)
Grade: 2nd
Duration: 1 lesson; 45 minutes

Objectives: Students will be able to draw and label the 4 parts of a plant; demonstrate understanding of S.A.W.S.

Demonstration of Understanding: Ability to draw and label the four parts of a plant, as well as to draw on the illustration the four things that all plants need: sun, air, water, soil (S.A.W.S.).

Materials Needed:
1. Small flowering plants
2. Soft paint brushes
3. Newspaper
4. Construction paper
5. Science/plant journals

Anticipatory Set:
- Begin the lesson by displaying the different flowering plants to the students. Ask the students, “What are these? How do you know that they are plants? What parts do you see to these plants?”
- Record their responses on a chart entitled “Plant Parts.”

Teaching the Lesson/ Guided Practice:
- Divide the class into small group of 2-4 students. Each group will receive a small flowering plant and a soft paintbrush.
- Instruct students to gently brush away any remaining dirt from around the roots.
- Then together label the various parts of a plant, based on the flower in front of them, on the board.
  - Also, begin the discussion of what the students think the job of each part of the plant might be. Record these predictions on a chart to be referred to later.
- Discuss with students the fact that all plants need sun, air, water, and soil to grow. Record the information on the chalkboard.

Summarize/ Evaluate:
- Students are to use the information compiled on the board, as well as the flower sample on their table, to draw, color, and label the four main parts of a flower as well as to draw on the illustration the four things that all plants need (S.A.W.S.) on the construction paper provided.
Lesson #4 Extension Activity:

Lesson Focus: The four parts of a plant and their jobs

Duration: 3-5 minutes daily throughout the remainder of the unit

Objective: Students will learn the four primary parts of a plant and be able to describe what the job of each part is through practice of the song.

Materials:
- CD with music of The Farmer and the Dell; CD player
- Lyrics to The Parts of a Plant

Activity:
1. Introduce the song to students as a way to learn the parts of a plant and their jobs.
2. Model singing the song to students with the music.
3. Have students sing along with you.
4. Practice singing song 2-3 times daily, until memorized.
The Plant Part Song
Tune: The Farmer in the Dell
written by Mrs. Jones

The **seed** makes a plant.
The seed makes a plant.
With soil and rain and sunny days,
The seed makes a plant.

The **roots** find the water.
The roots find the water.
With soil and rain and sunny days,
The roots find the water.

The **stem** holds it up.
The stem holds it up.
With soil and rain and sunny days,
The stem holds it up.

The **leaves** make the food.
The leaves make the food.
With soil and rain and sunny days,
The leaves make the food.

The **flower** makes the fruit.
The flower makes the fruit.
With soil and rain and sunny days,
The flower makes the fruit.

The **fruit** holds the seeds.
The fruit holds the seeds.
With soil and rain and sunny days,
The fruit holds the seeds.
<table>
<thead>
<tr>
<th>Part</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>flower</td>
<td>hold the plant in the soil</td>
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<tr>
<td>leaves</td>
<td>work with the sun to make food for the plant</td>
</tr>
<tr>
<td>stem</td>
<td>makes seeds</td>
</tr>
<tr>
<td>roots</td>
<td>attracts insects or birds that will carry pollen</td>
</tr>
<tr>
<td></td>
<td>carries water from the roots to other parts of the plant</td>
</tr>
<tr>
<td></td>
<td>take up water and minerals from the soil</td>
</tr>
<tr>
<td></td>
<td>release oxygen</td>
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</tbody>
</table>
Lesson #5

Lesson Focus: Roots and Stems (2 Extension Activities included below)
Grade: 2nd
Duration: 1 lesson; 45 minutes

Objectives: Students will understand and describe functions of a plant’s roots and stem.

Materials Needed:
1. Science/plant journals

Anticipatory Set:
2. Recall previous lesson’s discussion of the four parts of a plant. Ask students to brainstorm what they think the jobs of a plant’s roots and its stem are. Record all student responses on the chalkboard.

Teaching the Lesson/ Guided Practice/ Summarize:
4. Revise student responses on chalkboard regarding the jobs of a plant’s roots and its’ stem.
5. Complete one or all of the following extension activities to reinforce the concepts discussed in this lesson.

Evaluate:
6. Students are to use the information gathered about roots and a stem and write a definition for the job of a plant’s roots and a plant’s stem on the vocabulary list included in the science/plant journal.
**Lesson #5 Extension Activity A:**

**Lesson Focus:** Function of stems

**Duration:** Set-up - 5 minutes; follow-up observation the following day

**Objectives:** Proving the function of stems as carriers of water

**Materials Needed:**
- Two celery stalks
- Two clear glasses of water
- Food coloring

**Anticipatory Set:**
- Ask students to recall what the job of a stem.
- Show the celery stalks to students. Ask students what part of a plant they believe a celery stalk represents.
- Tell students that the experiment will show the job of a stem. Ask students to predict what they think will happen if the celery stalk/ stem is placed in the water overnight.

**Experiment Procedure:**
- Set up two clear glasses of water. Add several drops of food coloring into each glass.
- Place one stalk of celery in each glass.
- Set glasses in sunlight and leave overnight.
- Draw a picture to show how the celery stalk looked before it was placed in the colored water. Color the picture.

**Follow-up:**
- The following day, observe the celery stalks. Draw a picture to show what the celery looked like after it was left in colored water. Color your picture.
- Also, students need to summarize what happened to the celery after it was left in the colored water for a day.
Lesson #5 Extension Activity B:

Lesson Focus: Function of roots

Duration: Set-up- 5 minutes; follow-up observation 10 days later

Objectives: Proving the function of roots as providing water to the plant and holding the plant in the ground.

Materials Needed:
1. Two small plants
2. Scissors

Anticipatory Set:
- Ask students to recall what the job of a plant’s roots.
- Show the two plants to students. Ask students what part of a plant helps to carry water to the stem and also holds the plant in the ground.
- Tell students that the experiment will show the job of a plant’s roots. Ask students to predict what they think will happen if the roots are cut off of one of the plants.

Experiment Procedure:
- Cut the roots off one of the plants. Replant it.
- Set both plants in a place where they will receive sunlight.
- Leave for 10 days, watering only as needed.

Follow-up:
- After 10 days, as a class observe the two plants.
- Ask the students what they think happened to the plants and why they think that it happened. Be sure that students understand the functions of the plant’s roots.
Celery Stem Experiment

Draw a picture of the celery stalk. Observe the plants. Color the change you see on Day 2.

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Day 2</th>
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</table>

Write about what you observed.
Lesson #6

Lesson Focus: Leaves
Grade: 2nd
Duration: 1 lesson; 45 minutes

Objectives: Students will understand and describe functions of a plant’s leaves; define photosynthesis; and explain what chlorophyll does.

Demonstration of Understanding: Satisfactory completion of “Nature’s Food Factory” worksheet.

Materials Needed:
1. The Magic School Bus Gets Planted- the Story of Photosynthesis video
2. “Nature’s Food Factory” worksheet

Anticipatory Set:
- Review that all living things can breathe, grow, move, reproduce, need food and water. Ask student to brainstorm some things that people need to grow. List these items on the chalkboard.
- When food is mentioned, ask students if they believe that plants, being living things, need food to grow. At the response of yes, ask student what type of food they think plants “eat” and how they think that plants get the food that they eat.
- Make some predictions about how students think plants eat. Write responses on the chalkboard.

Teaching the Lesson/ Guided Practice:
- Explain to students that plants eat the food that they are capable of producing themselves.
- Explain to students that the video they are about to watch introduces students to the process of photosynthesis. Tell students that they are responsible for being good listeners during the movie, and that they will need to answer three questions when the movie is over.
  a. What is photosynthesis?
  b. What is chlorophyll?
  c. What is a leaf’s job for the plant?
- After the movie, discuss the three questions posed prior to watching the movie.
- On the chalkboard list leaves as a part of the plant, and list the information that the students learned about the leaf’s job, about photosynthesis, and what chlorophyll is.
Summarize:
- Students will demonstrate their understanding of a leaf’s job, photosynthesis, and chlorophyll, by using the information listed on the chart and write a definition for each on the vocabulary list included in the science/plant journal.

Evaluate:
- Students demonstrate their understanding by completing the student worksheet “Nature’s Food Factory” independently.
- Satisfactory completion of this activity based on a grade of S (80%) or higher.
Nature’s Food Factory

Green plants are special because their leaves contain chlorophyll, a green substance that helps the plant make food. Study the diagram below to learn about the plant’s food factory. Each sentence below explains part of the diagram. Write the numbers from the diagram beside the matching sentences.

Water and minerals from the soil are carried to the leaves through the roots and stem.

Carbon dioxide from the air enters the plant through the leaves.

Energy from the sun is captured by the chlorophyll in the leaves.

The leaves use the sun’s energy to produce food from carbon dioxide, water, and minerals.

The food produced travels through the stem to all parts of the plant. Some of it is used by the plant; the rest is stored.

The food-making process releases oxygen into the air.

Now read the sentences in order. On the blanks below, write the underlined letters as you come to them and discover the name of the food-making process.

Challenge! What might happen if someone pulled all the leaves off a plant?

Fold-Under Answers: 5, 1, 2, 4, 6, 5; photosynthesis; Challenge: The plant would probably die from lack of food.

PLANTS reproducible page
Lesson #7

Lesson Focus: Flowers
Grade: 2nd
Duration: 1 lesson; 45 minutes

Objectives: Students will understand and be able to describe the function of a flower; pollination; and how a seed travels and becomes a flower.

Demonstration of Understanding: Satisfactory completion of the “Parts of a Flower” activity.

Materials Needed:
- Bouquet of fresh-cut common flowers; at least 1 sunflower per group of 4 students
- Science/plant journals
- “Parts of a Flower” worksheet

Anticipatory Set:
- Prior to the lesson beginning, lay a variety of flowers from the bouquet, each assortment including at least one sunflower, on each table with small groups of 4 students.
- Allow the students to quietly investigate each of the flowers (approx. 2 minutes).
- Begin a discussion while students are still looking at and investigating the flowers. Tell students that all of the flowers, even though they are different kinds, are all categorized as flowers. Ask students to begin listing aloud some of the things that all of the flowers have in common. Record student responses on the chalkboard.
- Remind students of the functions of the roots, stem, and leaves. Ask students if they can predict what the job of the final part of a plant, the flower, might be. Record their responses on the chalkboard.
- Direct student attention to the sunflower. Point out the seeds. Ask students if they have any additional ideas about what the purpose of this part of the flower might be.

Teaching the Lesson/ Guided Practice:
- Read the book Magic School Bus: Plants Seeds by Patricia Relf to the students. This book tells the story of seeds and the flowers that make them.
- As the book is read, make note of the various functions that a flower has, as well as the process of pollination and reinforce what has already been learned about how a seed travels.
- Revise the predictions about the function of a flower listed on the chalkboard.

**Summarize:**
- Students are to use the information gathered about flowers and write a definition for the job of a plant’s flowers on the vocabulary list included in the science/plant journal.

**Evaluate:**
- As a summary activity for the four primary parts of a plant, students will assemble the “Parts of a Flower” worksheet to demonstrate student knowledge of the functions of each part of the flower.
Lesson #8

Lesson Focus: Fruits have seeds inside.
Grade: 2nd
Duration: 1 lesson; 45 minutes

Objectives: Understand that fruits contain seeds, although not all fruits have the same number, size or shape of seeds.

Materials Needed:
1. An orange, a bell pepper, a pea pod, an avocado, a melon, an apple, a peach, and a tomato
2. Knife
3. Paper plates, plastic spoons
4. Graph paper and student record sheet

Anticipatory Set:
- Show students two kinds of fruit. Ask the students to tell you what they are. Some might reply with the name of the fruits individually. Prompt with the fact that there is a name for them together. To which they should reply, fruit.
- Ask students to name as many other kinds of fruit that they can think of. List these on the board.
- Tell students that today they will learn why some items are fruits and others are vegetables.

Teaching the Lesson/ Group Practice:
- Cut open both fruits. Ask the students to tell you what they see inside the fruits. Record their observations on the chalkboard. Make sure the students mention the fact that there are seeds inside the fruits.
- Write the following questions on the board, and ask the kids to think about them as they do the following activity.
  a. Do all these items have seeds?
  b. Are the seeds the same in every fruit?
  c. Do all fruits have the same number of seeds?
- Divide the students into groups of 4-6 students. Each group will receive a paper plate with a slice of each of the fruits listed in the materials section of the lesson.
  o Students will first draw a picture of each fruit, including color and placement of the seeds.
  o Then, taking turns, students will use the spoon and carefully remove the seeds from the fruit, counting them, and subsequently recording the total number that they found in each fruit.
  o Finally, after all the seeds are counted, as a group, the students need to graph the information that they gathered from the seed count.
Summarize:
- After the activity is completed, discuss the 3 questions that were on the board for consideration throughout the lesson. Use the student graph and record sheet to discuss which group had a fruit with the most, and with the least seeds. Also, discuss size and shape of the different seeds.

Evaluate:
- An informal evaluation of cooperation, listening, and group work skills will be assessed during the course of the lesson.
How Many Seeds?

Draw a picture of each fruit you examine. Count the number of seeds in each. Write the number on the line.

<table>
<thead>
<tr>
<th>Example</th>
<th>Bell Pepper</th>
<th>Pea Pod</th>
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<tbody>
<tr>
<td># seeds: ______</td>
<td># seeds: ______</td>
<td># seeds: ______</td>
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<tr>
<td>Avocado</td>
<td>Melon</td>
<td>Apple</td>
</tr>
<tr>
<td># seeds: ______</td>
<td># seeds: ______</td>
<td># seeds: ______</td>
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<tr>
<td>Peach</td>
<td>Tomato</td>
<td>Orange</td>
</tr>
<tr>
<td># seeds: ______</td>
<td># seeds: ______</td>
<td># seeds: ______</td>
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<td>10 or more</td>
<td>Fruit</td>
<td>Example</td>
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Lesson #9

Lesson Focus: Food Classification
Grade: 2nd grade
Duration: 1 lesson; 25 minutes

Objectives: Students will be able to sort and classify a variety of fruits and vegetables into categories based on prior knowledge of stems, roots, leaves, fruit, flowers, and seeds.

Demonstration of Understanding: Satisfactory completion of the “Great Food Sort” activity.

Materials Needed:
1. Assorted fruits and vegetables
2. “Great Food Sort” cards (index cards featuring photographs, magazine clippings, etc. of various fruits and vegetables), sorting mats, and record sheet

Anticipatory Set:
- Ask students to recall the various parts of a plant that have been learned, including the seeds and fruits. Review the primary functions of each plant part.
- Explain to students that fruits and vegetables can be sorted into different categories based on the part of fruit or vegetable eaten- a stem, a root, leaves, a fruit, a flower, or seeds.

Teaching the Lesson/ Guided Practice:
- Show students a variety of fruits and vegetables that you have collected in a bowl.
- Holding up a head of lettuce, ask students if they can predict what type of plant the lettuce would be classified as (leaves). Remind students that they have already discovered fruits are only those plants that have seeds.
- When students classify lettuce in the leaves category, record the name under the correct heading.
- Continue to practice with 2-3 more fruits of vegetables from the bowl (an avocado- a fruit and a carrot- a stem).

Summarize:
- Students are given a sorting mat divided into six different sections (a stem, a root, leaves, a fruit, a flower, or seeds) and an envelope of 20 cards picturing assorted fruits and vegetables.
- Students are to use their knowledge of plants, plant parts, and fruits to correctly sort the cards of the assorted fruits and vegetables into the stems, roots, leaves, fruits, flowers, or seeds categories.
- Once the students have successfully sorted the cards, students are to correctly record the names of the fruits and vegetables onto the record sheet.

**Evaluate:**

- Satisfactory completion of this activity with a grade of S (80%) or higher.
Great Food Sort Record Sheet
Record the name of each food in the correct category.

<table>
<thead>
<tr>
<th>Stems</th>
<th>Roots</th>
<th>Fruits</th>
</tr>
</thead>
<tbody>
<tr>
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<table>
<thead>
<tr>
<th>Flowers</th>
<th>Seeds</th>
<th>Leaves</th>
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<tbody>
<tr>
<td></td>
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</table>
Great Food Sort Work Mat

<table>
<thead>
<tr>
<th>Stems</th>
<th>Roots</th>
<th>Fruits</th>
</tr>
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<tbody>
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<table>
<thead>
<tr>
<th>Flowers</th>
<th>Seeds</th>
<th>Leaves</th>
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Lesson #10

Lesson Focus: Trees
Grade: 2nd
Duration: 1 lesson; 45 minutes

Objectives: Students will understand all plants, including flowering plants and trees, have the same basic identifiable parts; plants and trees continue to change as they grow; and students will be able to define deciduous and evergreen trees.

Demonstration of Understanding: Ability to draw and label the four parts of a deciduous tree and an evergreen tree.

Materials Needed:
1. Our Apple Tree by Görel Kristina Näslund (ISBN 1596430524)
2. Access to observe a deciduous and an evergreen tree outside
3. Construction paper, markers, crayons, pencils
4. Science/plant journal

Anticipatory Set:
- Ask students what the five things that all living things do that non-living things don’t (grow, move, eat and drink water, reproduce). List these on the chalkboard.
- Draw students attention to the fact that plants grow. Discuss that living things never stop growing.

Teaching the Lesson/ Guided Practice:
- Read Our Apple Tree by Görel Kristina Näslund.
  o Discuss the growth and changes that the apple tree undergoes throughout the course of the four seasons. Ask students to examine the pictures in the book and explain the differences in the way the tree looks during each season.
  o Also, ask students to notice the similarities between the tree and a flowering plant. Students should note that trees, like flowering plants, have roots, a stem or trunk, leaves, and flowers or fruit.
  o This is also an opportunity to discuss the differences between trees that shed their leaves each year (deciduous trees) and those that don’t (evergreen trees).
- Take students outside to observe a real tree. It is important to note the way the tree looks in relation to the season it is currently in, as well as pointing out the parts of a tree and reinforcing the functions of each, as being the same as in a flowering plant.
- Point out the differences between trees that shed their leaves each year (deciduous trees) and those that don’t (evergreen trees), and how they look physically different. Ask students to think of examples of trees that fit each category.

**Summarize:**
- Students are to use the information gathered about trees and write a definition for the deciduous and evergreen on the vocabulary list included in the science/plant journal.

**Evaluate:**
- Students are to use the information they learned through the book and the observation of the deciduous and evergreen trees to draw, color, and label the four main parts of a tree on the construction paper provided.
Plants We Eat

Read the paragraph below. Think about the important ideas and then write the topic, main idea, and details.

Grains, or cereal plants, are among the world's most important food crops. Grains are used in making breads, cereals, and macaroni products, and as feed for livestock. Wheat is grown on more of the earth's surface than any other food. It has been farmed for at least 9,000 years. Grains of wheat have even been found in ancient Egyptian tombs. Rice is another important grain. About half of the people in the world eat rice as their main food. Corn is the world's third most important grain crop. Unlike most grains, it can be cooked and eaten without first being milled or processed into meal or flour.

**Topic**

**Main idea**

**Details**

1.

2.

3.

4.

**Brainwork!** When you drink milk, you are indirectly eating grain because cattle are fed grain. What other animal products do you eat that may contain grain?

Answers: Topic: grains. Main idea: Grains are important food crops. Details: Grains are used ... Wheat ... Rice ... Corn ...
(Answers may vary.)
Lesson #11

Lesson Focus: Why do we need plants?
Grade: 2nd
Duration: 1 lesson; 45 minutes

Objectives: Students will understand the important role plants play in our lives, such as providing food, oxygen, and things that we use.

Materials Needed:
1. *The Lorax* by Dr. Seuss (ISBN 0394823370)
2. Construction paper, glue, markers
3. Magazines
4. Science/plant journal
5. “Plants We Eat” worksheet

Anticipatory Set:
- Review with students that one use plants have for humans is that they provide food, ex. fruits, and vegetables. Ask students to look around the classroom find something else, besides food, which came from a plant.
- List examples on the chalk board, such as a desk made from wood or a bouquet of flowers. Encourage students to “explore” the classroom for approximately 5 minutes in order to find as many items as they can that originally came from plants.
- Compile a list of the items students found on the chalkboard.

Teaching the Lesson/ Guided Practice:
- Explain, as they have just discovered, there are many things that plants give to us.
- Read *The Lorax* by Dr. Seuss. Throughout the book, draw student attention to the different things that plants are used for in the book, and what happens when, for example, a forest is completely destroyed- smog, pollution, animals have no shelter, no food, etc.
- Together brainstorm a list of the benefits plants provide (be sure to include oxygen, shelter for animals, etc).
- Students should also copy this list in their science/plant journals

Evaluate:
- Students will complete “Plants We Eat” worksheet.
- Students will complete a collage entitled “Things We Get from Plant” of these items. Instruct students that they will now search through numerous magazines for items people use that were originally from plants. If students do not finish in class, assignment is to be completed at home for homework.
Lesson #12

Lesson Focus: Importance of the rainforest
Grade: 2nd
Duration: 1-3 lessons; 45 minutes

Objectives: To increase student awareness of the importance of the rainforest for people and animals, as well as to discourage the destruction of the rainforest.

Demonstration of Understanding: Satisfactory completion of persuasive/descriptive paragraph and poster.

Materials Needed:
2. Construction paper
3. Supplemental video, if time allows- Fern Gully

Anticipatory Set:
- Ask students to draw on the previous discussion of why plants are important.
  Have students list some of the things that we get from plants, trees, and forests.
- Explain that today we will be learning about another type of forest, a rain forest, and that we will be learning why the rainforest is so important and why it is currently being destroyed.

Teaching the Lesson/ Guided Practice:
- On a map, point out the areas that have significant amount of rainforest (Brazil, Costa Rica). Explain what makes the rainforest unique (ecosystem, include animals found there, the environmental benefits of a rainforest, as well as the fact that the rainforests are currently threatened.)
- Explain why the rainforest is being destroyed and what is being done to try to stop it.
- Read *The Great Kapok Tree* by Lynne Cherry,
- List the facts presented about the rainforest in the book.
- Discuss why the rainforest is being destroyed and why it is a harmful to not only the plants and animals inhabiting the rainforest, but also people.
- Brainstorm ideas about what can be done to stop this. Prompt students until awareness and activism are mentioned.

Summarize/ Evaluate:
- Students will be asked to respond to the following prompt.
  a. “Imagine you are an animal living in the rainforest. Describe the animal you would choose to be, why, and what you would say to someone trying to destroy part of the rainforest.”
b. Remind students to remember to make the reader see what you are seeing, feel what you are feeling, and decide not to harm the rainforest because you changed their mind.

2. Upon completion of the paragraph, students will develop a poster to discourage the destruction of the rainforests using their written response to the prompt as a part of their design.

3. Satisfactory completion of this activity with a cumulative grade of S.
Assessments

The development of this curricular unit focused on the integration of Gardner’s MI theory as a means of meeting the varying needs and learning differences of the ADHD child in the classroom through class discussions, groups and individual activities. Throughout the teaching of the unit, the teacher should periodically assess student understanding of the material presented through student completion of assigned projects and activities, as well as through cooperation and group work skills. Additionally, upon the completion of the teaching of the unit, students can be formally assessed to determine the effectiveness of student learning based on lessons taught through the integration of Gardner’s MI theory. The procedures used to assess the students’ performance in this unit will be a combination of the following: (a) informal assessment and observation of student contribution and participation in class discussion and group activities, (b) the satisfactory completion of the student science journal, and (c) student projects and activities.

Chapter Summary

The materials presented in this chapter demonstrate the results of the author’s efforts to develop a curricular unit focused on the integration of Gardner’s MI theory as a means of meeting the varying needs and learning differences of the ADHD child in the classroom through class discussions, groups and individual activities. The instructional sequence and lesson plans provide a step by step process for a teacher to implement the second grade plant unit presented here. Blackline masters and thorough explanations of
materials and preparation necessary for the execution of each lesson is provided. Chapter 5 includes a discussion of the results of the project in relation to the defined purpose and objectives.
Chapter 5

DISCUSSION

The goal of this project was to develop a curricular unit of instruction that would focus on the integration of Gardner’s MI theory as a means of meeting the varying needs and learning differences of the ADHD child in the classroom. Utilization of Gardner’s (1999) multiple intelligence (MI) theory was presented as a viable method by which teachers are able to accurately assess individual student intelligences and develop differentiated instructional methods to meet these individual student needs. A review of literature was conducted to examine the background of ADHD and Gardner’s (1999) MI theory and to consider the potential benefits of utilizing Gardner’s theory in the classroom. Current research indicated that children with ADHD respond best to a hands-on, active learning environment that is stimulating, relevant, developmentally appropriate, and focused on the learning strengths of the students. The literature and research presented suggest that one of the most effective ways to establish an effective learning environment for the ADHD student is through teaching to various learning styles and intelligences, which are focused on student strengths and abilities.

This author utilized the components of MI theory to develop a 12 lesson Plant unit that addressed the second grade Colorado Model Content Standards for: (a) Science, (b) Geography, (c) Math, and (d) Reading and Writing. The unit was designed so that each of the lessons were taught utilizing a variety of different intelligences and approaches to teaching. This author included an outline of the Colorado Model Content Standards,
which specified the specific learning objectives of the unit, as defined by grade level expectations, a curriculum wheel and brief summarization of each lesson’s objectives and activities, as well as an instructional sequence, which outlines daily lesson plans for the curricular unit. The materials developed for this unit include multiple blackline masters to be copied and used for student work and teacher assessment purposes. Each component of the unit was designed to provide teachers with the necessary tools to educate each student in the classroom, regardless of a diagnosis of ADHD through the utilization of Gardner’s (1999) MI theory.

Conclusions

This author is confident that teachers who use this unit in the classroom will be able to create a hands-on and engaging learning environment that will prove beneficial for all students, especially those with ADHD. The curricular unit was taught to a second grade class in the spring of 2006 and it is the sentiment of this author that the implementation of multiple teaching strategies which focused on various student intelligences and learning styles was beneficial and effective for the students. This author believes students in all grades and subject areas would benefit from the use of the varied teaching strategies and focus on each student’s multiple intelligences, as implemented in this unit.

Limitations

This author identified two limitations to the pursuit of the project goal. First, this author discovered that there was a limited amount of research studies attesting to the
effectiveness of utilizing Gardner’s (1999) MI theory specifically with ADHD students in the classroom. This required a greater effort in the examination and exploration of articles that presented efforts by teachers and psychologists to determine the most effective means by which to meet the educational needs of students in the classroom with ADHD. Another difficulty experienced by this author during the teaching of the unit was the time and preparation needed on a daily basis for the effective implementation of the lesson. In order to achieve the lessons’ objectives through the utilization of Gardner’s (1999) MI theory, a thorough understanding of not only the material being taught, but also Gardner’s (1999) MI theory are necessary.

Reccomendations for Further Study

The recommendations provided for further study were compiled as a result of this author’s teaching of the unit in regard to the purpose and objectives. The first suggestion for the beginning of instruction that would generate student interest in the upcoming unit would be to begin with a What We Know, What We Want to Know, and What We Learned (KWL) activity. It is this author’s position that beginning the unit with the KWL activity would allow the students to demonstrate for the teacher the information already known and understood, as well as present the teacher with areas of interest for further study and integration into the lessons ahead. This activity would give the students ownership over the unit and heighten the overall interest level.

Another area of further study for this project is identifying student literature that could be integrated with the unit. Gardner’s (1999) MI theory is based on the idea that
students learn best based on their strengths and through engaging learning experiences. The ability for students to learn about and discuss concepts presented in this unit during a reading group would be beneficial for students. The ability to teach the information targets across the curriculum would benefit student learning.

Project Summary

This author is certain that the goal of this project, which was clearly identified, has been accomplished. The decision to utilize Gardner’s (1999) MI theory in the instruction of students, particularly those with ADHD, was justified in the literature review, and the method to develop a curricular unit of study was fully explained. The result of this project as a 12 lesson Plant unit, in which students attained learner objectives through the use of multiple teaching strategies that focused on varied student intelligences and learning styles. The collection of instructional materials compiled and organized by this author are comprehensive and effective as seen by this author during the teaching of the unit.
REFERENCES


APPENDIX

Blackline Masters
This is what I learned about plants today:
Name: __________________________________________

Experiment: ______________________________________

Hypothesis: ______________________________________

Procedure: ______________________________________

Conclusion: ______________________________________
Plant Vocabulary

Roots: __________________________________________

________________________________________________________________________

Stems: _______________________________________

________________________________________________________________________

Leaves: _______________________________________

________________________________________________________________________

Flowers: _______________________________________

________________________________________________________________________

Fruits: _______________________________________

________________________________________________________________________

Seeds: _______________________________________

________________________________________________________________________

Chlorophyll: __________________________________

________________________________________________________________________
Photosynthesis: ________________________________

______________________________

Deciduous: _______________________

______________________________

Evergreen: _______________________

______________________________