



# B3: BRAIN, BODY, BEHAVIOR COMPANION MANUAL

This manual was developed as a resource and "How to" guide for implementing B3: Brain, Body, Behavior activities into any school learning environment.

This manual contains the following sessions:

SESSION			
Session 1: Introduction to B3			
Session 2: What Is B3?			
Session 3: Why B3?			
Session 4: Whom to Serve? Delivering B3 with Intention and Purpose			
Session 5: How to Use the B3 Cards Session 6: How to Create a B3 Classroom or Lab			
			BONUS: Principal and Teacher Testimonies

#### **SESSION 1: INTRODUCTION TO B3**

# Goals of the Session

- 1. Meet Your Facilitators
- 2. Introduction to B3
- 3. Suggested Course Materials
- 4. How to Navigate Through the Course

# **Meet Your Facilitators**

While working together in a large urban school district, Dr. Kim Morton, Keith Kraemer, and Andrew Romberger recognized the need for students to move more. Through their conversations with classroom teachers and principals, and hearing many of them state that "Students have a hard time sitting still, focusing, and self-regulating their emotions," B3 (Brain, Body, Behavior) began to evolve.

#### Introduction to B3

Do you know kids who fidget, wiggle, or chew their shirts? How about students who are angry, frustrated, irritable, or "shut down" due to academic pressures? Due to the increase of technological recreation and the lack of active play, students may be entering schools with bodies underdeveloped for learning. By incorporating B3 activities into a classroom, gymnasium, or lab, schools can help students develop the fundamental motor skills to spark their **brain**, build their **bodies**, and improve their **behavior** to increase academic performance.



B3 activities are designed to be easily implemented in any classroom, hallway, media center, small tutor room, mobile unit, gymnasium, stage, or principal's office. Additionally, many of the B3 activities require little to no equipment.

# **Suggested Course Materials**

- 1. Pen, pencil, or markers
- 2. Sketchbook, notepad, sticky notes
- 3. Headphones
- 4. Timer
- 5. Comfortable learning space

# **How to Navigate Through the Course**

This course is broken into six mini-training sessions. Session 7 is a "bonus session" dedicated to a principal and classroom teacher sharing their personal experiences implementing B3 and the impact it has had on their students and school.

The course was designed to allow you to become the "driver of the slides." Therefore, you can stop, pause, replay, or simply take a break and come back any time. By the end of the training, we hope you understand the following:

- 1. What is B3?
- 2. Why B3?
- 3. How to implement B3

#### **SESSION 2: WHAT IS B3?**

#### Goals of the Session

- 1. What Is B3?
- 2. How Did B3 Start?

#### What Is B3?

B3: Brain, Body, Behavior physical activities are highly practical, inexpensive, and teacher-and-learner tested. Based on brain-body research, B3 physical activities can help enhance cognitive function, mental health, motor-skill development, social-emotional well-being, and common sensory problems (Ratey, 2013).

B3 task cards were developed to be used by professionals and educators who work with children on a daily basis. Every B3 task card includes an image and written cues on how to perform the activity. Additionally, each card identifies which sensory system(s) (visual, tactile, proprioceptive, auditory and vestibular) the activity can help develop when performed consistently.

# **How Did B3 Start?**

In recent years, an increasing number of children are being referred to occupational therapists for sensory and motor issues. A child may be referred to occupational or physical therapy services when there is a problem with attention, balance, strength, coordination, or sensory processing (Hanscom, 2016). Common sensory problems in children range from poor spatial awareness to excessive crying to frequently putting objects in the mouth.



Educators have also noticed a slow decline in students' gross and fine motor ability, safety awareness, self-control, attention, and coordination (Hanscom, 2016). Many elementary classroom teachers often report their students are exhibiting the following behaviors:

- slouching in their chairs
- falling out of their chairs
- difficulty playing on their own
- overactivity and difficulty focusing in school
- inability to sit still
- trouble paying attention
- emotional outbursts
- fidgeting
- clumsiness and getting hurt
- aggression
- excessive biting or chewing on objects
- rocking in their chairs

The increase of referrals to student support services and excessive classroom distractions due to common sensory and motor skill deficiencies were alarming, and there was a sense of urgency among teachers seeking help.

Through our own professional training, conversations with teachers, classroom observations, and the research supporting the importance of physical activity, B3 was born.

Although B3 does not claim to be the panacea for all sensory and motor skill problems, or necessarily be a replacement for other therapies, it can serve as a powerful and inexpensive solution to make a difference in a child's life.

## **SESSION 3: WHY B3?**

# Goal of the Session

1. Why B3?

# **Essential Questions**

- 1. Why is play important for development?
- 2. Why is movement critical for learning to take place?
- 3. What is BDNF?
- 4. How does exercise and stress affect our bodies and brains?

# Why Is Play Important?

Take a moment and answer the following question: "When you were a kid, what did you like to do for fun?"

Most likely, you responded by naming an outdoor physical activity or some form of creative play. We used our childhood imaginations to win the "big game," venture off to faraway lands, or invent a new way to play a game. We climbed, we rolled, we swung, we swayed, we dodged, we chased, we fled, we dug, we rode, and we got dirty. Through play, we had to problem solve, use critical thinking skills, communicate verbally and nonverbally, understand personal boundaries,



cooperate with our peers, and be a good teammate, win or lose. These childhood moments contributed to our cognitive, physical, social, emotional, and mental development.

Today, many children prefer technological recreation over outdoor recreation. Due to the decline of childhood outdoor play, students are entering schools with bodies and sensory systems underdeveloped for learning. Students have difficulty self-regulating their emotions, sitting still, controlling their behaviors, and completing class assignments.

Often, when children are confronted with a difficult challenge, they give up easily if they fail to do it correctly the first time. Their lack of patience, grit, and coping and problem-solving skills, has caused many students to feel angry, frustrated, and stressed out. Eventually, these students will disassociate themselves from the task and stop trying.

The lack of childhood play and movement are two reasons students may struggle to perform basic everyday classroom tasks (sit in a chair, walk in a straight line, pay attention, listen to directions, etc.). Often, educators may punish children and take away recess because they failed to complete their assignments or misbehaved. Students should never "earn the right" to participate in recess. Instead of denying recess to children who underperform, educators should seek the underlying reasons for their challenges and find strategies such as B3 to address them.

When recess is withheld as a punishment teachers and students suffer. Kids spend a lot of time doing scheduled activities at school and are expected to adhere to adult authority. Children need free time to explore their own ideas, process information and clear their minds. Recess allows students and teachers to interact and communicate outside the classroom. Recess provides an opportunity for kids to get to know each other and build positive relationships.

Some might argue that recess may be the most important time in a child's school day. It is crucial for educators to view recess as a valued and essential component to student learning. Instead of taking time away from recess, teachers should be advocating for more recess since many behavioral issues could be solved by allowing students to have frequent movement and physical activity breaks. Teachers who know the benefits of recess would never withhold it from a child.

# Why Is Movement Critical for Learning?

Teachers are under enormous pressure to "cover" their state standards and district mandated curriculums. Therefore, many educators are concerned that taking a break from academics will not allow enough time to cover all of the instructional content.

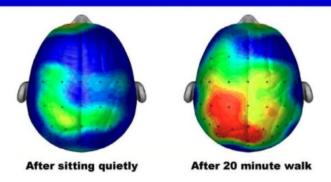
However, if teachers are focused on covering more content as fast as they can, the information may not be understood or retained. Students need frequent movement boots ("brain breaks') to prevent academic overload and reenergize the brain for learning (Kuczala & Lengel, 2018).

Many believe we only use 10% of our brains. However, this myth has been debunked by many neurologists and neuroscientists who state that the brain is active all the time. In fact, the brain is active even when we sleep. Like other organs, our brains are affected by our lifestyles and the amount we exercise.

For more evidence to support exercise and classroom-based movement, take a look at two popular brain scans from Dr. Charles Hillman illustrating the effects of movement on the brain:



# Average composite imaging: Brains of 20 students taking same test



Research/imaging, courtesy, Dr. Charles Hillman, University of Illinois

Note: Areas highlighted in color indicates increased oxygen levels and blood flow

The U.S. Department of Health and Human Services, Centers for Disease Control and Prevention produced a report titled "The Association Between School-Based Physical Activity, Including Physical Education, and Academic Performance." This 2010 report concluded that there is substantial evidence that physical activity and physical education can improve academic achievement and have an impact on cognitive skills, attitudes, and academic behavior (CDC, 2010).

If we have not already convinced you why movement is good for learning, here are 10 reasons "movement is a must":

- 1. Facilitates cognition
- 2. Develops body/brain balance
- 3. Anchors learning
- 4. Improves working memory
- 5. Regulates mood
- 6. Helps students be less fidgety, more focused
- 7. Decreases learned helplessness
- 8. Reduces stress
- 9. Builds class cohesion
- 10. Increases BDNF

#### What Is BDNF?

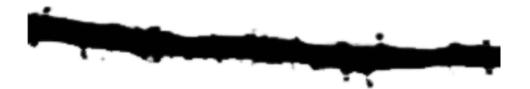
BDNF stands for Brain Derived Neurotrophic Factor; otherwise known as, "Miracle Gro" for the brain. BDNF is a vital protein fertilizing brain cells to keep them functioning and growing. Scientists have discovered that when we engage in physical activity, we increase the production of BDNF. When we increase our BDNF, we stimulate new brain cell growth, slow down the aging process in our cells, repair failing brain cells, and shield ourselves from disease.

In addition to protecting and growing new brain cells, BDNF strengthens the connection between brain cells, which is important for learning and memory (Hansen, 2016). In fact, the hippocampus, which is the brain's memory center, produces the most BDNF when we are physically active.

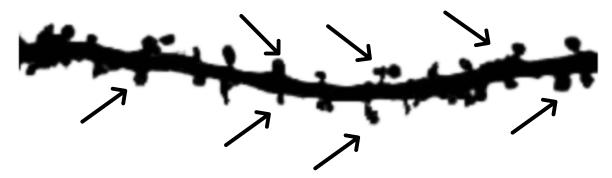


Below are two scans of a neuron taken by magnetic resonance imaging (MRI) before and after exercise:

MRI image of a neuron **BEFORE** exercise: (Lacking BDNF)

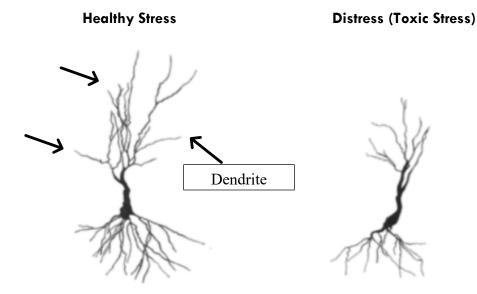


MRI image of a neuron AFTER exercise: (Evidence of Dendritic Growth)



# How Does Exercise and Stress Affect Our Bodies and Brains?

When kids are under stress they achieve less. Take a look of the images below of two neurons highlighting the impact of toxic stress:



The healthy neuron on the left displays long, "tree-like" branches called dendrites. The unhealthy neuron on the right illustrates the impact toxic stress has by inhibiting dendritic growth. Dendrites grow from neurons like branches of a tree and are responsible for passing information (signals) between neurons. In other words, as we grow our network of dendrites, we are able to collect and retain information.



Our memory storage is affected when stress inhibits information from being passed properly. This can cause someone to be forgetful or to have a "foggy brain." When we are under stress or feeling overwhelmed, we lack focus and concentration. Have you ever misplaced your keys or phone, forgot items at the grocery store, or had writer's block? Quite possibly you play music, draw, mediate, dance, draw, socialize, or go for a walk when you are stressed or overwhelmed, or simply need to take a break. If these activities are good for adults, don't you think our students need these stress-releasing opportunities as well?

#### Conclusion

If you are interested in raising academic achievement, it is critical to implement regular classroom-based physical activity. It is evident that research and science support how movement enhances the brain's ability to learn and retain information. Additionally, there are numerous case studies where schools have shown incredible academic gains through daily physical education, increased recess time, action-based learning labs, and kinesthetic classrooms.

We assume if you are reading this manual you are already interested in creating a movement-based school culture. We encourage you to watch and share the following TEDx talks with your colleagues and school staff to better understand the brain-body connection:

- 1. Mike Kuczala: "The Kinesthetic Classroom: Teaching and Learning Through Movement" https://youtu.be/41gtxgDfY4s
- Paul Zientarski: "Want Smarter, Healthier Kids? Try Physical Education!" https://youtu.be/V81cO8xyMal
- 3. Barbara Oakley: "Learning How to Learn" https://youtu.be/096fE1E-rf8
- 4. William Simon Jr.: "Why Is Physical Education a Student's Most important Subject?" https://youtu.be/azuBmRnRYpo

# SESSION 4: WHOM TO SERVE? Delivering B3 with Intention and Purpose

# Goal of the Session

1. Whom Should You Serve in B3?

# **Essential Questions**

- 1. Whom does B3 impact most?
- 2. What are the four sensory components to B3?

# Whom Does B3 Impact the Most?

We all know students who chew on everything, cannot sit still, are constantly fidgeting or bouncing. We also know students who cannot sit upright in school, have poor endurance, and exhibit inefficient body coordination. Due to the lack of movement opportunities, many children walk around with an underdeveloped sensory system (Hanscom, 2016). Sensory deficits can interfere with many aspects of a child's life (Hanscom, 2016).

# What are the Four Sensory Components to B3?

B3 activities helps to develop the tactile, proprioception, vestibular, and visual sensory systems. The following checklist can be used as a guide to help identify children who may be experiencing sensory challenges.



# **SENSORY CHECKLIST**

# **Tactile**

	Is often touching someone or something			
	Touches harder than necessary			
	Chews or sucks on clothing, hands, pencils, other objects			
	Distracted by clothing or shoes; wants them off if "not right"			
	Craves excessive physical contact with others			
	Avoids casual touch from classmates or teachers			
	Becomes "silly" or annoyed when touched			
	Gets upset when hands or face are dirty			
	Dislikes certain textures in materials, paper, toys, food, etc.			
Proprioception				
	Tends to be more accident prone			
	Craves heavy lifting			
	Has difficulty with use of force; breaks crayons, pencil points, toys			
	Has a hard time regulating how much force to use when walking, hugging jumping, etc.			
	Does everything with 100% force			
	Pushes others and/or plays aggressively			
	Bumps into classmates, furniture, walls			
	Has poor handwriting and difficulty forming letters; presses too hard or too soft			
П	Shows poor body awareness			



# **SENSORY CHECKLIST** (continued)

☐ Makes little eye contact

# Vestibular ☐ Is excessively cautious on stairs ☐ Has difficulty maintaining balance when walking and during gross motor play ☐ Slumps in chairs; sits in "W" position; needs support for floor sitting ☐ Rocks in chair; wraps legs around chair legs ☐ Fidgets constantly; is always moving or spinning ☐ Runs into things ☐ Stands too close and personal when talking with others ☐ Falls frequently Craves swinging or spinning □ Bounces a lot ☐ Touches furniture or walls when walking ☐ Has difficulty using playground equipment such as slides, swings, ladders Visual ☐ Has difficulty with eye-hand coordination ☐ Squints, blinks or rubs eyes frequently ☐ Distracted by glare, bright light, fluorescent lighting ☐ Struggles with reading ☐ May hold head at odd angles ☐ May cover one eye when reading and writing ☐ Has difficulty distinguishing distance and size of performance task ☐ May not understand what they read ☐ Has difficulty copying from the board



Let's look at some examples from the sensory checklist. When children have difficulty with their sense of touch, they may overreact to tactile experiences (Hanscom, 2016). For example, students may avoid being touched, dislike brushing their teeth, and may dislike certain textures. To strengthen the tactile system, we need to limit screen time and encourage hands-on play. We need to allow students to grasp and play with real-life objects. Creating tactile walls or sensory trays with different textures and allowing "messy play" (shaving foam, slime, sand, water, etc.) are fantastic for tactile development.

Proprioception regulates how much force we need to use when performing a task, such as peeling an orange without crushing it, opening a milk carton without squeezing too hard, or controlling a knife to cut food. Proprioceptive-deficit students have poor postural strength, tend to be clumsy, and have poor handwriting skills. To strengthen the proprioceptive system, we need to allow students participate in activities requiring pushing, pulling, and carrying heavy objects (Hanscom, 2016).

Of all the senses, the vestibular system is the most overlooked, yet it is arguably the most essential. Also known as the balance sense, this system provides us with awareness of where our body is in space and helps us to effectively navigate and move in our environment with ease and control. Students with strong vestibular systems will most likely have good coordination, accurate body awareness, and efficient balance control (Hanscom, 2016).

According to Dr. Jean Ayres, a renowned pediatric occupational therapist known for her work on sensory integration, "The vestibular system is the unifying system. When the vestibular system does not function in a consistent and accurate way all other senses are affected, making life more challenging" (Hanscom, 2016). Children develop a strong vestibular system by having frequent opportunities to move, particularly in physical activities that go against gravity. To strengthen the vestibular system, children will benefit from spinning, tumbling, swinging, dancing, rolling down hills, and participating in simple balance tasks.

The visual system allows us to process and interpret where objects are in space. Sight is one of the most important senses for survival. Our visual system allows us to connect with our surroundings and keeps us safe. For example, we use our sight to assess the distance and speed of vehicles traveling down a road to determine when it is safe to cross a street. We also use our visual system to differentiate complex shapes and colors and to scan objects in our space. Therefore, full-body movement, as well as good eye and neck strength are essential for normal development and maintenance of the visual system (Hanscom, 2016). Children with visual difficulties may have poor eye-hand coordination, struggle with reading, hold the head at odd angles, cover one eye when reading, have trouble distinguishing distance and size of things, have difficulty copying things off the board, squint to see, and exhibit poor eye contact.

To strengthen the visual system, allow for plenty of play opportunities and eye-tracking activities. Have students toss a ball back and forth, play on playgrounds, swing, jump rope, trace lines with a finger, tap a balloon into the air, trace letters with chalk, or even create a racetrack on the floor and then follow the cars with their eyes.



# **SESSION 5: HOW TO USE THE B3 CARDS**

#### Goal of the Session

1. How to Use the B3 Cards

#### **Essential Questions**

- 1. How are the B3 cards designed?
- 2. How do I use the B3 cards?

# **How Are the B3 Cards Designed?**

When we designed the B3 cards we wanted to be sure they were student and teacher friendly. Each card includes a picture of a student completing the task, along with written cues on how to perform the task.

The cards are color-coded to highlight the different types of activities:

- 1. Green cards=Balance and Flexibility
- 2. Yellow=Sport Training
- 3. Red=Cardiovascular Strength and Endurance
- 4. Blue=Muscular Strength and Endurance

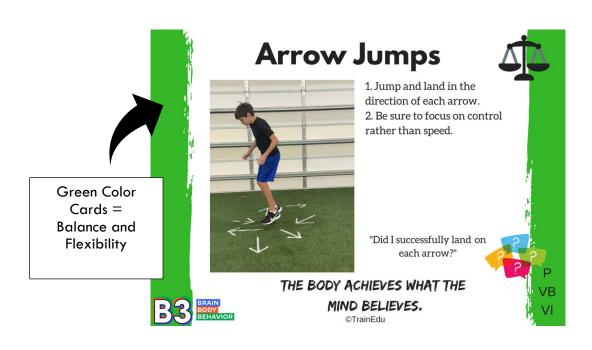
The cards include a symbol in the upper-right corner. This symbol also highlights the type of movement activity the card addresses. The balance and flexibility cards show a weighted scale. Sport training shows a soccer ball, basketball and football. A heart is used to indicate the cardiovascular strength and endurance cards; and the muscular strength and endurance cards are represented by a dumbbell.

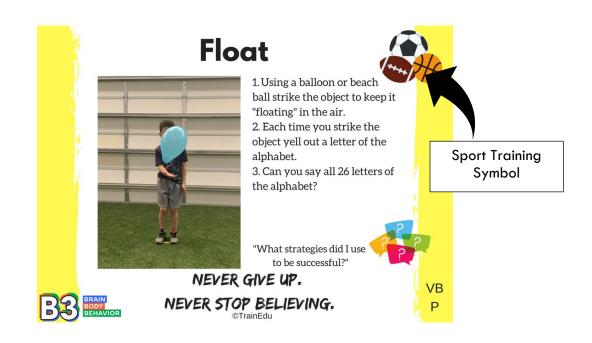
A self-assessment or reflection question is included on every card. Teachers may choose to have their students answer the self-assessment question when they are done completing the task.

The lower-right corner of the card includes letters that indicate which sensory system(s) the activity helps to develop: VB indicates the vestibular system, P the proprioceptive system, T the tactile system, and VI the visual system.

Examples of each type of card are provided below.















#### How Do I Use the B3 Cards?

We have had schools implement B3 cards in a variety of settings. The first setting can be in a classroom where a teacher can choose to project a B3 card on a screen and allow students to perform the intended activity as a whole group.

A teacher could also set up B3 stations throughout the classroom and allow students to rotate to the different cards. Some teachers post the B3 cards on the wall or furniture to allow students to rotate to the different stations. A great way to prepare students for learning is to allow them to practice the B3 activities first thing in the morning before the bell rings.

Physical Education teachers can post the B3 cards on the gym walls or hang them on cones to allow students to go through the different B3 activities during PE class. Every week the PE teacher can change the cards to challenge students and keep them engaged. We would suggest that PE teachers set up the cards in a A,B,C,D pattern to allow students to go through a cardiovascular endurance card, a balance and flexibility card, a muscular strength card, and a sport training card, and then repeat that same pattern throughout the gym space.

We have also observed schools use hallways as an extension of the classroom. In other words, teachers can take advantage of the space outside their classrooms for instructional purposes. Teachers can hang the B3 cards on the walls, lockers or cones and allow students to practice the B3 activities in the hallway.

One of our favorite locations to set up the B3 cards is outside the principal's office. If students need help "cooling down," a principal or counselor can have them go through the B3 activities to help them regulate their emotions. This has been an effective method to get students to open up and talk about what is bothering them. This allows the adults to have a better understanding of the root cause of the student's behavior and why they are acting out.



# SESSION 6: HOW TO CREATE A B3 CLASSROOM OR LAB

#### Goal of the Session

1. How to Create a B3 Classroom or Lab

# **Essential Questions**

- 1. How do I get started?
- 2. What equipment do I need?
- 3. How do I build a lab?

# **How Do I Get Started?**

It takes minimal equipment and space to implement B3: Brain, Body, Behavior. We suggest the following 4-step framework to help you start B3:

- 1. Start small and implement frequent movement "brain boosts."
- 2. Create a consistent B3 routine. If students recognize the activities and breaks as part of their classroom routine, teachers experience fewer distractions and interruptions.
- 3. If possible, participate with the students and model that you value movement for yourself.
- 4. Allow students to have choice and show ownership of their understanding of the benefits of the physical activity. Most likely, students will choose a B3 activity their body is craving!

# **What Equipment Do I Need?**

As we were developing B3, our goal was to create activities that could be implemented using household items and minimal sports equipment. Below is a list of common B3 equipment items:

Painters Tape	Dice	Exercise Mats
Cones	Hula-Hoops	Beanbags
Laundry Baskets or Cardboard Boxes	Playground Ball	Balance Boards
Index Cards (to create sight words, letters, numbers, etc.)	Basketball (playground ball could be used as substitute)	Rope or Pool Noodle
Weighted Milk Jug (empty milk jug fill with sand)	Uno Cards	Medicine Ball (weighted milk jug can be used as substitute)
Playing Cards	Soccer Ball (playground ball could be used as substitute)	Scarf or Plastic Grocery Bag
Stability Ball	Balloons	Yarn Ball (homemade sock ball can be used as substitute)
Paddle or Racquet	Scoop	Ribbon Wands (attach ribbon to a ruler for homemade ribbon wands)

NOTE: In our experience, painters' tape has been the most essential item.

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# How Do I Build a B3 Lab?

We suggest the following 3-step process when creating a B3 lab in your school:

- 1. Secure a location. Is there an empty classroom or mobile unit?
- 2. Plan how many activities you can comfortably put in the room without the activities running into each other.
- 3. Create a schoolwide calendar to schedule when classes can use the lab. Many schools have created a Google Calendar to allow teachers to sign up.

#### **B3 TESTIMONIES**

# Larenda Denien: Principal of a Title I Elementary School

- "Movement is learning; it IS instruction."
- "Physical activity not only gives kids healthy bodies, it gives them healthy minds."
- "Movement allows students the opportunity to engage more and be deeper thinkers in the classroom."
- "Movement is not destructive or distracting to learning."
- "It brings me so much joy to see kids being physically active and having teachers implement the B3 activities inside the classrooms."
- "Teachers have embedded movement into their instructional playlists."
- "The physical activity movement has changed our entire school environment."
- "Students even take the movement home and participate with their families."
- "We had a 60% decrease in office referrals when we implemented more movement and B3."

# **Darnell Murillo: Kindergarten Classroom Teacher**

- "Adding movement and B3 is the most valuable shift in your teaching style you will make. Your classroom will be transformed."
- "B3 is not difficult to implement and does not require expensive materials."
- "As you're planning your lesson, think about how your students can learn the concept without a worksheet—instead, use their bodies."
- "Having the whole class move together allows the whole class to be involved in the learning."
- "By integrating B3 into your lessons, students are working on academics while
  moving their bodies, while releasing cooped-up energy, and they don't even
  realize they are doing the required schoolwork."
- "Movement will increase student participation, student motivation to complete the work, and joyful learning."
- "Your students will be making memories as they learn, and that is the key for the information go into long-term memory."
- "If all your lessons, activities and independent work involve movement, then the students just view it as a natural way to learn, and they will continue to move and be active after school hours."













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