Exercise and the Brain: Examining why it is important to take an active role in learning how exercise and eating healthy can affect the brain.

by Brandy Daniels, 2015 CTI Fellow
Irwin Academic Center

This curriculum unit is recommended for:
Kindergarten and First grade/Reading

Keywords: Brain, exercise, movement, neurobic, neurons, memory, plasticity, frontal lobe, parietal lobe, temporal lobe, occipital lobe, brain stem, cerebellum, amygdala, cerebrum, nutrition

Teaching Standards: See Appendix 1 for teaching standards addressed in this unit.

Synopsis: It is important that children know the benefits of exercise and how it helps improve their brain. Today's children do not spend as much time exercising as in the past. Schools are cutting back on the amount of physical education and recess time that children receive. Even with recess, children do not spend time doing activities that get their heart rate up. Do children know how important exercising is for their brain? Do they know the benefits of exercising can improve their memory, improve learning, creativity, and thinking skills? How important is exercise for maintaining a healthy brain? In an article titled, "Regular exercise changes the brain to improve memory, thinking skills", Heidi Godman summarized the benefits as follows: "Exercise helps memory and thinking through both direct and indirect means. The benefits of exercise come directly from its ability to reduce insulin resistance, reduce inflammation, and stimulate the release of growth factors-chemicals in the brain that affect the health of brain cells, the growth of new blood vessels in the brain, and even the abundance and survival of new brain cells."[i]

I plan to teach and share this unit with the other kindergarten teachers at my school during the current academic year, in 2015-16.

I give permission for the Institute to publish my curriculum unit and synopsis in print and online. I understand that I will be credited as the author of my work.

Examining How Exercise Can Affect the Brain

Brandy Daniels

Introduction

This curriculum unit will educate children at an early age on the importance of exercise and how it affects the functions of the brain and how healthy eating habits are important. It will also get kids moving, collecting personal data, learning vocabulary associated with the brain, and thinking about the benefits of exercise. Students will create a paper mache head with a slit on the top in which they will deposit slips of paper representing the things they do (exercise, nutrition) to increase their "brain power". They will learn that the brain is the organ inside the head that controls thought, memory, feelings, and activity. In his book *Teaching with the Brain in Mind*, Eric Jensen summarized that

> "You've heard for much of your life the human brain is amazing. It's true. That soft, squishy blob between your ears, the blob that runs your life is pretty amazing. sEvery day in classrooms around the world, teachers are amazed by what the human brain can do." [ii]

I look forward to exploring the brain with my students. They will learn about the parts of the brain that controls movements, behavior, creativity problem solving (frontal lobe), comprehension, language, reading, visual and auditory memories (parietal lobe), speech, (temporal lobe), and vision (occipital lobe). In her article *Regular Exercise Boosts Brain Function, Reducing Stress, Improving Memory, And More*, Lizzie Borreli, wrote

> "We all know the physical benefits that come with exercise, from weight maintenance to stronger muscles. Working out, though, nourishes the body mentally as well. In fact, physical activity has a myriad of benefits when it comes to our brain health, ranging from improving learning and mental performance to preventing dementia, Alzheimer's and brain aging. The effects of aerobic activity on the brain should not be overlooked. Aerobic training has been found to increase connectivity in the temporal lobe in a year, in a group of college-aged young adults by simply walking. Meanwhile, a more vigorous intensity aerobic exercise, like running for 30 minutes, led to faster reaction times and vocabulary learning. Women who were aged 65 and over were less likely to develop cognitive decline if they were physically active. The mental benefits of exercise are not just for adults, but for kids, too. Exercise is crucial for kids' developing brains. Those who get more exercise tend to get better grades, have better concentration, and even get a better night's sleep. Overall, the benefits of

> exercise provide neuroprotective benefits that tune up our brain health over the years. Physical activity becomes like a fertilizer for the brain, nourishing it to improve attention, memory, accuracy, and how we process information. When we exercise we're not only strengthening our bodies, but also our brain power.[iii]

My goal is to make a difference in my classroom as well educate my students to be lifelong learners of the concept that a healthy body is important for a strong mind. I want them to embrace the activities we will do at home as well as school. I want them to get their families involved. I want to know that we "feed" our brain with physical activities as well as the healthy food we put in our bodies. By "feeding" our brain we are able to focus, improve our memory, think better, and improve learning. Reynolds wrote,

> "Encourage young boys and girls to run, jump, squeal, hop, chase after each other or after erratically kicked balls, and you substantially improve their ability to think, according to the most ambitious study ever conducted of physical activity and cognitive performance in children. The results underscore, yet again, the importance of physical activity for children's brain health and development, especially in terms of the particular thinking skills that most affect academic performance. The news that children think better if they move is hardly new. Recent studies have shown that children's scores on math and reading tests rise if they go for a walk beforehand, even if the children are overweight and unfit. Other studies have correlations between children's aerobic fitness and their brain structure, with areas of the brain devoted to thinking and learning being generally larger among youngsters who are more fit."[iv]

Background Information

I love teaching and I love children. I attended the University of Wisconsin Whitewater where I earned a bachelor's degree in Science and Education. I received my Master's degree in Curriculum Instruction from National Louis University in Illinois. I have been teaching for 28 years. I have taught four year old kindergarten for two years, five year old kindergarten for fifteen years and first grade for eleven years.

I am presently a kindergarten teacher in a full magnet school. The magnet program has a Learning Immersion K-5 program and Talent Development 3-5 program. We have eleven Learning Immersion classes in grades kindergarten through fifth grade. Learning Immersion is teaching at a faster more advanced level. As an example, I teach a lot of the first grade curriculum to my kindergarten students. The students tend to come to school already reading and writing. Their math skills are stronger than the average kindergarteners entering school. They are self-motivated and ready to learn. We have six Talent Development classes in grades third through fifth.

My school is located in uptown area of Charlotte NC. We are a late school starting at 9:15 and ending at 4:15. Our students can get home between 5:00 to 6:00 P.M. The

students who attend my school come from the neighborhood other Charlotte neighborhoods and as far away as suburbs such as Huntersville. The students come from diverse economic backgrounds. Their parents chose this school for its high academic achievement. The school has a high population on African Americans followed by European Americans, Asian Americans, Indian Americans, and Hispanic Americans.

My class this year consists of twenty-four students with fifteen boys and nine girls with seventeen African American children, two European American children, and five Asian American children (parents not born in America.). All the children speak English. I have eight students below grade level, twelve students at grade level, and four students above grade level. One student has an IEP. The norm for my class is about 80% of students above grade level with 10% of students at grade level and 10% below grade level.

This year comes with a challenge. As described above the norm for my class is that children tend to come to school already reading and writing with high math skills and are self- motivated and ready to learn. There is no test to decide who gets in my school. The goal remains the same to get 80% of my students above grade level. The challenge for me this year is to get all my students at or above grade level in reading and math. Movement in the kindergarten is a necessary part of the curriculum. My class is very young this year and the day is very long for them. I have noticed this year my students are very motivated by music and song and are a very talkative class. One student needs to take breaks from the class because he makes noise that he is unaware of and struggles with communication with his peers and adults. My classroom this year made me think about, how I need to get children moving through- out the day. I want my students to take an active role in knowing that increasing their physical activity can improve their ability to learn and increase their memory.

Rationale

Do you remember sitting in your class as a student yourself and not being able to move? Do you remember that most of your movements were controlled by the teacher? I remember those days quite well. Back when I was in school that was the way things appeared in the classroom. My classroom teachers controlled when and how we moved. And then I had my own children. My son constantly fell out of his chair in class and had to take his spelling test in the hall because he "wiggled too much in his seat," which disturbed other children.

Today's children come to school with so some much "baggage". My class definitely holds true to that. I have students with undiagnosed ADHD and social and emotional disorders, who need a lot of small group as well as one and one instruction.

In his article, *Healthier Students Are Better Learners: A Missing Link in School Reforms to Close the Achievement Gap*, Charles E. Basch of Columbia University's Teacher's College wrote,

"No matter how well teachers are prepared to teach, no matter what accountability measures are put in place, no matter what governing structures are established for schools, educational progress will be profoundly limited if students are not motivated and able to learn. Health-related problems play a major role in limiting the motivation and ability to learn of urban minority youth, and interventions to address those problems can improve educational as well as health outcomes. Healthier students are better learners."[v]

There are so many factors that affect today's children. I cannot solve all the causes that affect our educational system but, I look forward to making a difference in my classroom. My goal in this unit is to look at the physical activity of my students in my class. I plan to increase movement, which will improve learning while they are in my care. I will incorporate stretching activities, cross-lateral movements, walks which take place before we start our day, quick games, drama and role playing, and brain break videos daily throughout the day. I set behavior expectations before we begin. Everyone must participate and do their best. I have learned that students should have a kinesthetic brain break every 25 -30 minutes. Most brain breaks take 1-3 minutes of class time to complete so they enhance but do not distract from the learning tasks at hand. It is important that students understand the purpose of brain breaks and they are research based and the results have been scientifically proven.

Many neuroscientists and early childhood experts agree that movement and learning are connected. Charles Hillman, published the article Physical Activity Linked to Children's Brain and Cognitive Development, scholastic achievement, in 2014.

"While there is a variation across states and schools, overall, opportunities to engage in physical activity have diminished. Current U.S. Department of Health and Human Services guidelines call for children to have a minimum of 60 minutes of intermittent physical activity per day. However, in 2012, according to the Centers of Disease Control and Prevention, only 30 percent of children attended a school in which they were offered physical education daily. The majority of students do not engage I any form of planned physical activity during the school week."

Yet physically active children tend to outperform their inactive peers in the classroom and on tests of achievement. The research presented I the monograph helps to make clear why. When compared to their less fit peers, those who engage in more physical activity have larger brain volumes in the basal ganglia and hippocampus, areas associated with cognitive control and memory. Cognitive control refers to the control of thought, action, behavior, and decision-making."[vi]

Lyelle Palmer of Winona State University in a 20 year study, has documented significant gains in attention and reading from stimulating activities study wrote:

"Early motor stimulation leads to better learning and academic success: including enhanced attention, listening skills, reading scores and writing skills. Our motor sensory systems, especially auditory, visual, and motor systems are developed through exploration I the first two years of life. Our vestibular system (system in inner ear that controls our sense of balance and movement) strongly influences the other sensory systems."[vii]

Eric Jensen wrote in his book *Teaching with the Brain in Mind,*

"Because movement is a natural part of the school day, that movement will influence the brains of students. It is essential that we explore the ways are shaping students brains."[viii]

Another component to my unit will be about nutrition. I plan to teach my students the importance of healthy eating. We will discuss the importance of the most important meal of the day, which is breakfast. They all know that it is free at school. I will encourage them to eat breakfast at home or school. My class has a snack time that takes place every day. We discussed early in the year that candy is not a snack. I am now going to inform them of healthy choices for snack such as popcorn, carrots, raisins, yogurt, nuts, energy bars, rice cakes, fresh fruit, and veggies. I provide snacks for students who do not bring a snack. I will be more conscious of what I bring as well, making sure my personal snack is a "model" snack for my students to see. Throughout the year my students will "feed the brain". They receive color-coded paper for eating healthy food and increasing their physical activity in which they put into the back of a paper mache head.

Objectives

My objective for this curriculum unit is for kindergarten students to recognize the importance of how physical activity can affect the brain. Irwin Academic Center is a Talent Development Magnet school focused on providing their students with an accelerated curriculum. Within this curriculum the students are given many opportunities to work collaboratively. The Common Core and 21st Century Skills are an important part of why developing healthy habits and given more opportunities to move around while learning early in life are important. The students will be involved in a variety physical activities such as walking, skipping, stretching, cross-lateral movements, dancing, and running. The 21st Century Skills, Creativity, Collaboration, Communication, and Critical Thinking are important for allowing students to work collaboratively for a common goal. They will be given opportunities to communicate. They will be thinking creatively to elaborate, refine, analyze, and evaluate exercise. They will interpret information, draw conclusions, and reflect critically on learning experiences and processes. My goal is for my students to identify the characteristics of living healthy and the importance of

exercise. The Common Core in CMS guides us with teaching the skills necessary for students to be successful.

- Speaking S.L.K.1 state students will participate in collaborative conversations with diverse partners about topics and texts.
- Visual Literacy Standard K.V.2.1 state that students recognize that artists may view or interpret art different media, sculpture, and ceramics to create art. K.V.2.3 states create original art that does not rely on copying or tracing, K.V.3.2 Use a variety of media art, K.V.3.3 Use the processes of drawing, painting, weaving, printing, collage, mixed media, sculpture, and ceramics to create art. These are the standards we will use to create the paper mache head and the clay model of the brain.
- Healthful Living and Physical Education standards PE.K.S.1.1, PE.K.MS.1.1, PE.K.MC.2.1, PE.K.HF.3.2, PE.K.HF.3.3 K.DM.1.1, K.DM.1.2, K.DM.1.5, state that applying competent motor skills and movement patterns needed to perform a variety of physical activities.
- Writing standards W.K.2 and W.K.3 state that students will use a combination of drawing, dictating and writing to compose informative/explanatory and narrative texts.

This unit is intended for kindergarten and first grade students although the concept of exercise and the brain is important for all ages. The curriculum unit will cover (1) healthy eating, (2) how exercise can improve learning, (3) new vocabulary, (4) creating a model of a brain, and (5) increasing movement in my class. I will start the unit by using a KWL chart to assess what my students know and want to learn about the brain. The students will learn by completing activities that teach them the benefits of exercise and how it can improve how they learn. They will walk daily. My hope at the end of the unit is that the children will see the benefits from eating healthy foods and exercise from the data they will collect. My goal is to incorporate it first as a unit and then have it revisited throughout the school year.

I have learned many fascinating things about the brain. I always thought that the early years between birth and age six was the time you would see a lot of growth in children and it was important that you took advantage of that time by focusing on their learning. By age 5, the brain has learned a language, has developed sensory motor skills, and is concerned with active exploration. The term plasticity is a new word for my vocabulary that introduced me to the fact that the brain has the ability to continue to mold and change based on an individuals experiences and environment. The more "plastic" the brain becomes, the more it is able to reorganize itself. Consequently, if children experience a rich nurturing environment they will continue to learn. Along with plasticity is the term neurogenesis, the creation of new neurons a process that can be stimulated by physical exercise. Consequently, increasing the physical activity in my classroom with brain breaks occurring at least every 30 minutes throughout the day and encouraging healthy eating habits will strengthen the neurons, the cells that transmit messages between the brain and other parts of the body. Facts to share with my students

are that the brain weighs about three pounds, which is the same as a steam iron. The brain is an organ that is made up of cells and tissue. The brain controls everything you do, everything you think, feel, and dream.

All the research I have read points to the fact that regular exercise helps improve memory, thinking skills, reduces stress, improves mood, enhances cognitive function, raises test scores, improves attitude, and stimulates brain plasticity (the capacity of being molded). As educators we need to be aware that the brain is like a muscle, if we do not use it we lose it. If we do not encourage or give children opportunities to use their brain to its best capacity then our students will miss out on a lot of learning opportunities. We need to get them moving throughout the day so that they become better listeners and learners.

Nutrition is an area where we can easily make a positive difference. Offer nutritious snacks like popcorn, carrots, raisins, rice cakes, nuts, veggie sticks, and yogurt. Researchers found that vitamin A, supports learning and memory. Push water instead of soft drinks. Hydration is important to the brain's normal development and functioning.

Assessment

Before I start the unit I will have my students to journal about how they feel about exercise. They will be given the same journal page at the end of the year because the activities and brain breaks will continue throughout the year. I will collect data on my student's behavior, listening, and ability to attend for long periods of time by having days in which they do not have a brain breaks. I will be looking to see if their ability to attend is different on days or in sessions with and without brain breaks. I will know this is successful if I see fewer behavior issues, improvement in listening, and attending for longer periods of time.

Teaching Strategies

Visuals: Bringing two or three-dimensional visuals into the classroom to enhance teacher instruction in the content area.

Cooperative Learning: A range of team based learning approaches where students work together to complete a task.

Turn and Talk: Have the students turn to the person that is the closest to them and share what they just learned or sharing a favorite part of a story.

Thinking Maps: Having students use a graphic organizer to organize information.

KWL Chart: Is a graphic organizer designed to help in learning. The letters KWL are an acronym for what students in the course of a lesson, already know, want to know, and

ultimately learn. Before you begin the unit chart what you know and what you want to know. Fill in the last column learned after completing the unit.

Retell: Students verbally rehearse story information by retelling a story to a partner or group.

Oral Sharing: Students share their written or prepared responses.

Pre-Reading Strategies: Giving overview of unit, previewing main ideas, and connecting it to the background of the students.

Pre-Teach Vocabulary: teaching key vocabulary words prior to working with the lesson of unit.

Activity # 1 Paper Mache Head

Objectives

SL.K.6 Speak audibly and express thoughts, feelings**,** and ideas clearly. S.L.K.1 Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups.
WK.2 Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic.
K.V.3.2 Use a variety of media to create art.
K.NPA.2.2 Summarize the importance of a healthy breakfast and lunch.

Purpose: Encourage students to share what they know and have done to exercise their brain. To have students create a paper mache head to track their knowledge about the unit.

Essential Questions: What is meant by the word exercise? Why is it important?

Teaching Strategies: Cooperative learning, re-looping of previously learned material

Teacher Input: The class will discuss how exercise and eating right are important to the brain's function and health. They will collaborate to create a paper mache head with a slit on the back located in the occipital lobe in which they will fill with color coded paper slips representing exercise, and healthy food choices. They will write and draw pictures representing what they learned and put those papers in the brain. They will put in color paper slips that represent the things they are learning about the brain. This head will be available throughout the year to encourage students to continue to exercise and eat healthy food. The teacher will ask the students questions about what exercising the brain means to them.

Vocabulary: brain, exercise, nutrition**,** occipital lobe

Guided Practice: The teacher will record on several slips of paper listing her physical activities as well as the food she has eaten.

Assessment: Listen and watch to make sure students are listing appropriate responses.

Independent Practice: Students will fill the head with the activities they do through-out the year.

Suggested Books and Materials: *Start Smart* by Pam Schiller

Summary: Students will share their thoughts about the brain.

Activity # 2 Journal Writing

Objectives

SL.K.6 Speak audibly and express thoughts, feelings**,** and ideas clearly.
S.L.K.1 Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups.

SL.K5 Add drawing or other visual displays to descriptions as desired to provide additional detail.
WK.2 Use a combination of drawing, dictating, and writing to compose informative/explanatory texts I which they name what they are writing about and supply some information about the topic.
RI.K7 With prompting and support, describe the relationship between illustrations and the text in which they appear.

Purpose: Help students understand, log, and express what they are learning by keeping a journal.

Essential Questions: What are we learning?

Teaching Strategies: Oral sharing, response journal, summarize

Teacher Input**:** Explain to students that as they learn about the brain they will record in their journal. Lead a discussion as to what is going on in class. (Why they are doing the things they are doing in terms of brain breaks, exercising and eating healthy food.) Students will write and draw pictures to represent their favorite brain break, a healthy snack, a picture of what the brain looks like and activities.

Guided Practice: Model their first entry. Use words and pictures. Share your journal entry.

Assessment: Observation

Independent Practice: Students will write in their journals weekly for about fifteen minutes. They will record their activities and learning.

Summary: Students will journal weekly what they are learning. They will share their entries with each other. A new journal will be provided monthly so that parents can see what they are learning.

Activity # 3 Vocabulary

Objectives

WK.2 Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic.
RI.K7 With prompting and support, describe the relationship between illustrations and the text in which they appear.
Purpose: For students to record the vocabulary they are learning within the unit.

Essential Questions: How do words help us learn?

Teaching Strategies: summarize, sharing, pre-teach vocabulary, retell,

Teacher Input**:** As the students are introduced to the unit they will record new words learned in a special vocabulary book that allows for them to draw pictures as well. A model of the brain will be provided for them when learning about the bold vocabulary below.

Vocabulary: frontal lobe, temporal lobe, brain stem, parietal lobe, occipital lobe, cerebellum, brain, neurons, memory, exercise, plasticity, skull, cell

Guided Practice: Guide students will the writing and drawing of pictures in their vocabulary book.

Assessment: Observe students as they write and draw pictures using the vocabulary words.

Independent Practice: Students will write down a vocabulary word. They will draw a picture and write a sentence using the word. They will share the sentences they wrote using the vocabulary word.

Suggested Books: *Your Fantastic Elastic Brain* by JoAnn Deak

Summary: Students will record and share information learned with each other.

Activity # 4 Create a brain using clay

Objectives

SL.K.6 Speak audibly and express thoughts, feelings**,** and ideas clearly.
S.L.K.1 Participate in collaborative conversations with diverse partners about topics and texts with peers and adults in small and larger groups.
SL.K5 Add drawing or other visual displays to descriptions as desired to provide additional detail.
K.V.1.2 Create original art that represents ideals.
K.V.2.3 Crate original art that does not rely on copying or tracing.
K.V.3.2 Use a variety of media to create art.
K.V.3.3 Use the processes of drawing, painting, weaving, printing, collage, mixed media, sculpture, and ceramics to create art.
Purpose: The students will re-create a brain using colored clay explain personal art in terms of media and process.

Teaching Strategies: Sharing, visuals, and cooperative learning

Teacher Input: Review with the students what they have learned about the brain. Review the vocabulary about the parts of the brain models. Discuss with students how they will use different colored clay to create their own brain. Review and list the parts of the brain,

label the brain models using toothpicks sticking out of each section. Provide the students with the parts typed on paper for the students to label.

Vocabulary: frontal lobe, temporal lobe, brain stem, parietal lobe, occipital lobe, cerebellum

Guided Practice**:** Create a list of the parts needed to create the brain. Using the model of the brain show your students how each part fits together.

Assessment: Observe students as they create and join together the parts to complete their model.

Independent Practice: Students will create their own brain from clay.

Suggested Materials: Ein-O's Human Brain Box Kit (purchased on Amazon $9.54)

Summary: In this lesson students will complete a model of a brain and label its parts.

Activity # 5 Tracking and Recording Data

Objectives

S.L.K.1 Participate in collaborative conversations with diverse partners about topics and texts with peers and adults in small and larger groups.
WK.2 Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic.
WK.3 Use a combination of drawing, dictating, and writing to narrate a single event or several loosely linked events, tell about the events in the order in which they occurred, and provide a reaction to what happened.
K.MD.2 Students will directly compare two objects with a measureable attribute in common, to see which objects has "more of / less of" the attribute, and describe the difference.

Purpose: Introduce students to tracking/recording their own data.

Essential Questions: How data help us learn?

Teaching Strategies: Visuals, cooperative learning, demonstration, hands on

Teacher Input: Tell the students they will keep track of how often they walk around the track daily. They will write down the number of how many steps taken by wearing a pedometer. The students will record the information in their data tracker journal (blank calendar pages).

Vocabulary: data

Guided Practice: Guide students with the activity by demonstrating how to record the number of times around the track on one page and the pedometer number on the second page. Discuss how they should record the two data collections in the correct places/logs/calendars.

Assessment: Observe students writing down their data in the correct places.

Independent Practice: Students will enter their data in their data tracker journal daily.

Summary: The students will track their daily activities.

Activity #6 Brain Breaks and Physical Activities

Objectives

K.C.P.1.2 Execute spontaneous movement during improvisational explorations.
K.C.P.2.1 Understand how to control body and voice in personal space.
K.DM.1.1 Illustrate the difference between whole body movement and isolation of body parts.
K.DM1.2 Discriminate between moving and stillness.
K.DM.1.5 Use directions, levels, and pathways in general space.
K.C.1.1 Use dance to illustrate how people express themselves differently.
PE.K.MS1.1 Execute recognizable forms of the basic loco motor skills.
PE.K.MC.2.1Understand the meaning of words and terms associated with movement.
PE.K.HF.3.2 Identify opportunities for increased physical activity.
PE.K.HF.3.3 Select moderate to vigorous physical activity (MVPA) and sustain for periods of accumulated time.

Purpose: To introduce the students to Brain Breaks and physical activity before school starts.

Essential Questions: How do I get my heart rate up?

Teaching Strategies: Hands on, cooperative learning, pre-teach

Teacher Input: Explain to the students why engaging in physical activity is good for the brain. By exercising we increase the flow of blood, which delivers oxygen (fuel) to the brain. Regular exercise helps improve short-term memory, stress, improve concentration, focus, higher levels of creativity, and exhibit faster reaction time. Tell students they will engage in some form of physical activity each day. Explain to children that adrenaline is a stress hormone that opens air passages that gives you more oxygen that makes you more alert and gives you energy. Inform the students that they will start their day by walking around the play equipment on the playground. They will collect a chip (or any small item they can carry in their hand) for each time they walk around the track. They will use the chip to keep track of how many times they walk. They will record the

information in their data tracker journal (calendar). They will wear their pedometer and record that number in their data tracker journal. The students will engage in various brain break videos as well as dance to music throughout the day.

Vocabulary: Adrenaline

Guided Practice: Introduce students to the various physical activities and brain breaks they will do throughout the day.

Technology: www.gonoodle.com, www.teachtrainlove.com, www.youtube.com/playlist?list=PLa42 , www.learningstationmusic.com

Independent Practice: Students will walk around the play equipment outside and keep track of how many times they walk or run. They will participate with the various Brain Break activities.

Summary: This lesson gets the students introduces and gets the students moving.

Conclusion of Unit

The purpose of this unit was to introduce my students to what does your brain do and gain from exercise. The benefits of exercising your brain increases your attention span, better memory, faster thinker, builds self confidence, good mood, improves learning, and keeps the brain fit. The unit is meant to keep the students excited about exercise and eating healthy. By the end of the unit students will know the parts of the brain and their functions. They will know how physical activities affect many of their body system. They will be able to explain, apply, and enjoy what they enjoyed learning about the brain. They will keep data on their physical exercise. Furthermore, the unit includes math, science, literacy, and music integration. At the conclusion of the unit students will come away from this unit well informed with the brain and exercise.

Notes

[i] Heidi Godman. "Regular exercise changes the brain to improve memory, thinking skills, "*Harvard Health Letter*, May 2014

[ii] Eric Jensen,"Teaching with the Brain in Mind 2nd edition

[iii] Lizzie Borreli. PhD, "Regular Exercise Boosts Brain Function, Reducing Stress, Improving Memory, And More", *Medical Daily*, May 2015

[iv]Gretchen Reynolds. "How Exercise Can Boost Young Brains," *The New York Times,* October 14, 2014

[v] Charles Basch. "Healthier Students Are Better Learners: A Missing Link in School Reforms to Close the Achievement Gap," *Equity Matters Research Review No.6,* March 2101.

[vi] Charles Hillman. "Physical activity linked to children's brain and cognitive development, scholastic achievement", *News Medical Life Sciences and Medicine*, December 3, 2014

[vii] Lyelle Palmer, "Why include Movement in every lesson!" Karen Walstra Consulting , July 16, 2003.

[viii] Eric Jensen," Teaching with the Brain in Mind 2nd edition

Appendix 1
Implementing Common Core Standards

Speaking and Language

S.L.K.1 Students will participate in collaborative conversations with diverse partners about topics and texts about the brain and nutrition.

Visual Literacy

K.V.2.1 Students will recognize that artists may view or interpret art different media, sculpture, and ceramics to create art as they use clay to mold their model.
K.V.2.3 Students will create original art that does not rely on copying or tracing as they mold their clay brain model
K.V.3.2 Students will use a variety of media art such as drawing pictures of the brain.
K.V.3.3 Students will use the processes of drawing, painting, weaving, printing, collage, mixed media, sculpture, and ceramics to create art. These are the standards we will use to create the paper mache head and the clay model of the brain.

Motor Skill Development

PE.K.MS.1.1 Students will execute recognizable forms of the basic loco motor skills during brain breaks.

PE.K.M.C.2.1 Students will understand the meaning of words and terms associated with movement while doing brain breaks
PE.K.M.2.3 Students will use teacher feedback to improve basic motor performance while learning about different brain breaks.

Health-Related Fitness

PE.K HF.3.2 Students will identify opportunities for increased physical activity daily
PE.K.HF.3.3 Students will select moderate-to-vigorous physical activity (MVPA) and sustain for periods of accumulated time while collecting brain break data.

Dance Movement Skills

K.DM1.1 Students will illustrate the difference between whole body movement and isolation of body parts.
K.DM.1.2 Students will discriminate between moving and stillness while doing brain breaks.
K.DM.1.5 students will use directions, levels, and pathways in general space while exercising.

Writing Standards

W.K.1 Students will use a combination of drawing, dictating, and writing to compose opinion pieces in which they tell a reader the journal they are writing about.
WK.2 Students will use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing and supply information about the topic of the brain.
WK.3 Students will use a combination of drawing, dictating, and writing to narrate a single event or several loosely linked events, tell about the events in the order in which they occurred, and provide a reaction to what happened learning about the brain unit.

Appendix 2

Implementing the Vocabulary

Brain - An organ of soft tissue contained in the skull of vertebrates, functioning as the coordinating center of sensation and intellectual and nervous activity**.**

Brainstem - The brainstem is the stem-like part of the brain that is connected to the spinal cord. The brain stem controls the flow of messages between the brain and the rest of the body, and it also controls basic body functions such as breathing, swallowing, heart rate, blood pressure, consciousness, and whether one is awake or sleepy.

Cerebrum - The principal and most anterior part of the brain in vertebrates, located in the front area of the skull and consisting of two hemispheres, left and right, separated by a tissue.

Amygdala - An almond-shape set of neurons located deep in the brain medial temporal lobe. The brain structure responsible for autonomic responses associated with fear and fear conditioning.

Cerebellum - Is a region of the brain that plays an important role in motor control.

Memory - Is the process in which information is encoded, stored, and retrieved.

Plasticity - The capability of being molded, receiving shape, or being made to assume a desired form.

Frontal Lobe - Is one of the four major lobes of the cerebral cortex in the brain of mammals. The part of the brain that controls important cognitive skills in humans, such as emotional expression, problem solving, memory, language, and judgment.

Parietal Lobe - Is one of the four major lobes of the cerebral cortex in the brain of mammals. The parietal lobe functions in processing sensory information from the various parts of the body.

Temporal Lobe - Is one of the four major lobes of the cerebral cortex in the brain of mammals. The temporal lobe is involved in processing sensory input into derived meaning for the appropriate retention of visual memories, language comprehension and emotion association.

Occipital Lobe - Is one of the four major lobes of the cerebral cortex in the brain of mammals. The occipital lobe contains different areas pertaining to visual communication.

Neurons - A cell of the nervous system. It carries messages between the brain and other parts of the body and that is the basic unit of the nervous system.

Neurogenesis - Is the process by which new nerve cells are generated.

Hippocampus - Is at the center of your brain. It works like a file cabinet to help you store and fine memories.

Prefrontal Cortex – Is the part of your brain behind your forehead. It lets you make plans and decisions.

Resources

List of Materials for Classroom use

colored clay
large balloon
paint
flour
water
writing paper
construction paper
blank calendar pages
Ein-O's Human Brain Box Kit (purchased on Amazon $9.54)

Reading List for Students

Deak, JoAnn. *Your Fantastic Elastic Brain*. San Francisco: Little Pickle Press, 2010. This book is a fun and engaging way to teach children that they have the ability to stretch and grow their own brains. It is kid friendly with high vocabulary.

Bibliography for Teachers

Deak, JoAnn. *Your Fantastic Elastic Brain*. San Francisco: Little Pickle Press, 2010. This book is a fun and engaging way to teach children that they have the ability to stretch and grow their own brains.

Fogarty, Robin. *Brain Compatible Classrooms 2nd Edition.* Arlington: Skylight Professional Development, 2002. This is a book that summarizes research from theorists such as Robert J. Marzano and Daniel Goleman. The book helps educators to understand and utilize brain research to build high-achievement classrooms

Jensen, Eric. *Teaching with the Brain in Mind / Edition 2.* Alexandria: Association for Supervision and Curriculum Development, 2005. This book is an easy to understand, engaging language book. Jensen provides a basic orientation to the brain and its various systems and explains how they affect learning.

Jensen, Eric. *Teaching with Poverty in Mind.* Alexandria: Association for Supervision and Curriculum Development, 2009. This book takes an unflinching look at how poverty hurts children, families, and communities across the United States and demonstrates how schools can improve the academic and life readiness of economically disadvantaged students.

Sousa, David A. *How the Brain Learns Fourth Edition*. Thousand Oaks: Corwin A Sage Company, 2011.This is a book that examines new research on brain functioning and translates this information into effective classroom strategies and activities.