



***The Brain, Exercise, and Teaching Students of Poverty***

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Ashley Park PreK-8 School

This curriculum unit is recommended for: Elementary school teachers, specifically first grade teachers, literacy and math elementary school teachers

**Keywords:** the brain, exercise, poverty, literacy, math, movement, health, physical activity, engagement, memory, and growing the brain

**Teaching Standards:** See [Appendix 1](#) for teaching standards addressed in this unit.

**Synopsis:** This curriculum unit will consist of five literacy and five math lessons that teach common core objectives that incorporate movement and physical activity. The intent of this curriculum unit is to bring physical activities that help grow the brain and cognition in to the classroom. These movement and physical activities are designed to improve the academic performance for students in literacy and math, as well as work towards growing the brain of student of poverty. First grade students love to move and they learn best through movement and tactile engagement activities. Movement and physical activities in literacy and math can help students, especially students of poverty, retain information and develop more complex intellectual concepts. In order to increase student understanding and confidence in thinking, this curriculum unit will explore the current researched- based movement activities or exercises that increase active classroom engagement and brain connectivity. This curriculum unit will have two goals. The first goal is to engage students in movement and physically activity that stimulate brain memory and the second goal is to teach and reinforce first grade literacy and math common core objectives. Movement based learning activities can spark and maintain student interest in key subjects such as literacy and math.

*I plan to teach this unit during the coming year in to 24 students in First Grade.*

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# **The Brain, Exercise, and Teaching Students of Poverty**

*Cassandra Black*

## **Introduction**

This curriculum unit will incorporate a study of working with students of poverty to assist with developing interactive lessons to increase student academic achievement. I work at a Title One school and Project L.I.F.T school. The students at my school tend to be very active. It is sometimes hard for them to retain information. More importantly many are seriously overweight and have unhealthy eating habits. Consequently, this curriculum unit will investigate the connections between students of poverty, exercise, and the brain. This curriculum unit will investigate what poverty does to the brain and how classroom room teachers can incorporate exercise and movement activities to stimulate cognition and learning opportunities for these students.

## **Demographic Background**

Ashley Park is a Prek- 8 School that serves approximately 600 children on the west side of Charlotte, North Carolina. The school is a part of the Project L.I.F.T. initiative. L.I.F.T. or Project Leadership & Investment for Transformation is a public and private partnership organized as a non-profit organization, operating as one of eight learning community offices in the Charlotte-Mecklenburg School System. The school and learning community have a focus on the West Corridor student feeder pattern into West Charlotte High School. West Charlotte High School, which had a graduation rate just over 50% in 2012. The learning community consists of nine schools. There are four key areas of intervention in which investments will be targeted: time, talent, technology, and invested parent and community support. 55 million dollars was collectively raised for a five-year pilot in efforts to reform policy that will advance educational outcomes for students served in this area.

My first grade students come from economically disadvantaged homes. 100% participate in the free breakfast and lunch programs funded by the federal government, which also makes us a Title One school. Key factors in working with economically disadvantaged students are to build relationships, boost engagement and develop a growth mindset. Jesse Singal indicates that growing up in poverty or being economically disadvantaged, “affect our ability to make wise decision and saps our cognitive capabilities in general.”<sup>1</sup> Recent studies also indicate that the conditions of poverty such as, “overcrowding, noise, substandard housing, separation from parent(s), exposure to violence, family turmoil, and other forms of extreme stress can be toxic to the developing brain”.<sup>2</sup> Integrating tactile movement within literacy and math lessons can provide

students in this situation with engaging classroom experiences that can increase their overall health, mindset, and cognitive capacities while reducing stress levels.

When teaching student of poverty, it is important to keep expectations of students high. Integrating tactile movement and visual activities can provide students in this situation. “Children of poverty are often at a disadvantage in school, and educators can find it challenging to help such students engage positively in their own learning”.<sup>3</sup> Experts in the field of teaching students of poverty, such as Eric Jenson and Ruby Payne suggest the use of physical activity, music, drawing, role-playing, and positive affirmations to engage students. With the understanding that “children of poverty are being identified and labeled with grossly overgeneralized, deficit-laden characteristics that put them at risk of being viewed as less capable, less cultured, and less worthy as learners”.<sup>4</sup> Cooperative learning groups, role-playing, exercise, discussions, the use of teams, and partner work can also build confidence in students, which helps, increase their academic success. Students from poverty often need more help engaging in the classroom.

“Studies show that children from low-income families have smaller brains and lower cognitive abilities”.<sup>5</sup> Brain images indicate difference in brain structure. Students living in poverty are less likely to exercise. “ In poor children’s brains, the hippocampus- the critical structure for new learning and memory - is smaller, with less volume” (Jenson, 2013). There is a correlation between general intelligence and the volume of hippocampus. Growing up in poverty alone can cause students to have poor working memory. Students with low working memory can have “cognitive problems as short attention spans, high levels of distractibility, problems in monitoring the quality of their work, and difficulties in generating new solutions to problems”.<sup>6</sup>

## **Overview and Objectives**

This curriculum unit will incorporate five literacy and five math lessons that teach common core objectives by incorporating movement and physical activity to improve the academic performance and develop cognition during literacy and math instruction. First grade students love to move and they learn well through movement. Movement activities in literacy and math can help students retain information and develop more complex intellectual concepts. In order to increase student understanding and confidence in thinking, this curriculum unit will explore the current researched-based movement activities or exercises that increase active classroom engagement and grow the brain. This curriculum unit has two goals. The first goal is to engage students in physical activity that stimulates brain memory and the second goal is to teach and reinforce first grade literacy and math common core objectives.

Movement-based learning activities can spark and maintain student interest in key subjects such as literacy and math. Movement or physical activity provides a multi-

sensory approach to teaching. This approach to teaching can be motivating and engaging for students. It allows students to be more focused and emphasize “fun” in learning. Movement and exercises can stimulate brain activity and neurogenesis, the birth of new neurons or grow the brain. Lack of motivation and physical activity can be major factors in a student’s inability to learn key concepts and can affect a student’s overall health. Movement within any lesson can increase buy-in from the students, which could also increase a student’s participation in class activities and retention of information presented in lessons. Movement, exercise, and physical activities can be alternatives to worksheets.

Many primary learners or elementary students are kinesthetic learners who learn well through hands-on and movement experiences. By increasing the use of physical exercise and movement in the literacy and math classroom, educators can increase learning opportunities for students, especially students of poverty like those represented in my school and other Title One and Project L.I.F.T schools. Movement in the literacy and math classroom can enrich the common core literacy and math curriculum as well as promote cooperation among students. Consistent exercise in the classroom can enhance skills, promote active lifestyles and increase a student’s ability to communicate what they are learning in class to other students, their teacher, and their parents. Incorporating movement and exercise in literacy and math instruction can offer success and enhance learning beyond the classroom setting by expanding learning opportunities outside the walls of the classroom and even outside the school building.

A growing body of evidence suggests physical activity or exercise can produce new brain cells and that there is a correlation with increased learning and memory.<sup>7</sup> Consequently, as educators it is our job to investigate the best way to get students, especially those in poverty moving. According to Eric Jenson, there are four primary risk factors of children in poverty. These risk factors are emotional and social challenges, acute and chronic stressors, cognitive lags, and health and safety issues. Exercise increases the release of brain-derived neurotropic factors (BDNF), a protein that support learning and memory function, repair and maintenance of neural circuits, and the production of brain cells that are crucial to forming the connections the brain needs to learn. This increased support in learning and memory function is exactly what children of poverty need.

Many research strategies for reducing or eliminating the achievement gap for students who are under resourced or of poverty include incorporating physical activity or exercise. The American Medical Association indicated “children living in poverty generally perform poorly in school, with markedly lower standardized test scores and lower education attainment.<sup>8</sup> This would imply that the longer children live in poverty, the greater their academic deficits. According to researchers, the one component that affects positively memory is exercise.<sup>9</sup> A study examining the exercise routines of mice showed that the mice that routine exercised on a running exercise wheel had increased spatial

learning and memory by performing better on the Morris water maze task than mice that did not have access to the exercise wheel.

Jenson indicates that if students are able to get at least 20 minutes of exercise daily or engage in sensory motor skills. These sensory motor skills include crawling, climbing, or playing Simon Says or other games that their focus and attention will increase.<sup>10</sup> Exercise and physical activities can increase the brain's levels of glucose and key neurotransmitters - including dopamine, norepinephrine, and serotonin. These increases can influence both cognitive and behavioral process. Reynolds states, "children who are physically fit absorb and retain new information more effectively than children who are out of shape, much like students of poverty."<sup>11</sup> If educators want to help students of poverty perform better in school and on standardized test, they should engage students in physical activities to improve concentration and are researched based to foster connections within their brain cells.

This curriculum unit will examine the types of exercises or movement activities that will enhance the learning of specific literacy and math skills of first grade students. The five literacy lessons will address first grade common core objectives under Reading Literature. Effective elementary literacy programs are vital to lifelong learning success. Elementary literacy involves reading, writing, speaking, and listening skills as well as the ability to take those skill and use then in life. Literacy instruction develops a child's linguistic and cognitive abilities across content areas and throughout activities.

The five math lessons will focus on the first grade common core objectives under operations and algebraic thinking. Operations and algebraic thinking is developing understanding of addition, subtraction and strategies for addition and subtraction within 20. Students will represent and solve problems involving addition and subtraction. They should understand and apply properties of operation and the relationship between addition and subtraction. Students will add and subtract numbers within 20 and work with addition and subtraction equations (<http://www.corestandards.org>).<sup>12</sup> For each common core object, four to five exercises or physical activities are suggested. These exercises and/ or physical activities are research based and targeted to enhance cognitive ability.

Ayan indicates that, "enrolling kids in exercise programs appears to help them to help them excel academically."<sup>13</sup> This based on the body mass index (BMI). If students are physically fit and have regular exercise event in brief periods, it can improve concentration and performance in school. There are strong correlations between higher academic performance on standardized tests and physical fitness. With only 20 minutes of exercise a day, young children can have benefits such an upsurge in learning, creativity, memory, and reduce stress. For students of poverty, reducing stress is an important consideration. A longitudinal study conducted by the Centers for Disease Control and Prevention worked with 5,316 students from grades kindergarten to 5<sup>th</sup>

grades finding significantly higher math and reading scores for girls who participated in physical education programs for 70 or more minutes per day.<sup>14</sup> There are consistent links between better grades and test scores with students who are physically fit compared to inactive students. Even if a teacher is able to give his or her students consistent breaks throughout the day there is an increase of on-task behavior.

In exploring what specific types of brain breaks or activities helps increase brain fitness, it was discovered that any exercise that is good the heart also benefits the brain. There is also an emphasis on incorporating physical and mental demands while exercise like in ballroom dancing can have higher impacts on cognitive functioning. Professionals also encourage exercises that use coordination, rhythm, and strategies. Aerobic exercises are great for the body and the brains and exercising in the morning increase ones retention of information and ability to deal with complex stress related situations. In addition, exercising can also reduce many health issues that are prevalent in communities of poverty such as reducing chances of developing heart disease, stroke, and diabetes. Regular exercising can lower weight and blood pressure and improve mood and sleep. A study at the University of British Columbia found that regular aerobic exercise “appears to boost the size of the hippocampus, the brain area involved in verbal memory and learning”.<sup>15</sup>

Many researchers believe having kinesthetic brain breaks every 25-30 minutes for one to three minutes can be refreshing for both students and teachers. Brain breaks are short periods of exercise geared to improve physical health, and mental awareness. Brain breaks aim to sharpen a student’s focus and ability to stay on task. GoNoodle brain breaks research, “particularly those of moderate and vigorous physical activity, may lead to gains in VO<sub>2</sub> max, or aerobic fitness”.<sup>16</sup> In other words, the “more time you spend moving, the more physically fit you become and the more fit you become, the better your brain functions”.<sup>17</sup> Exercise breaks or acute exercise can boost cognition and brain health. In one study, students performed tests of cognitive control and academic achievement. Then, half of the children walked on a treadmill for 20 minutes. The other children sat quietly. Next, all the children took the tests again. The children with the short exercise break showed improvements in cognitive control, improvements in academic achievement, and changes in brain waves.<sup>18</sup>

### **Strategies and Activities**

Movement activities and musical games are excellent “brilliant neuro-logical exercises”.<sup>19</sup> Obstacle course, sequencing, acting out, and tapping are movement activities that assist students with retention of information.

### **Reading: Literature**

[CSS.ELA-Literacy.RL.1.2-](#)

Retell stories, including key details, and demonstrate understanding of their central message or lesson.

*Activity One: Beginning Middle End*

The teacher will pass out illustrations and phrases that represent the beginning, middle, and end of a story. Students are given only one part of the story (a beginning, middle, or end). It is their job to find the middle and end if they have the beginning and so forth. To make it more difficult the teacher can present several stories so students need to find the beginning, middle and/or end of their particular story amidst the beginnings, middles, and ends of other stories.

*Activity Two: Human Puppets*

Students can use their creative talents to make themselves into life-size puppets. Students can create masks and act out a popular fairy tale or story.

[CCSS.ELA-Literacy.RL.1.3-](#)

Describe characters, settings, and major events in a story, using key details.

*Activity One: Relay*

After reading several stories under a particular theme (fables, folktales, fairy tales) create cards that have the characters, setting, major events, and key details of the story on separate index cards. Divide the class according to the number of stories read. For example, if five stories were read create five teams. Scatter the characters, settings, major events, and key details of the story on the floor or outside on the ground using the same number of cards per story. Teams will be handed a story title. They then relay race (one at a time) to the pile to find characters, setting, major events and key details of their story title. They can only pick up one card at a time. The next person cannot go to the pile until the person in front of him or her has a card that is apart of their story. The first team with the complete index cards of characters, settings, major events and key details is the winner.

*Activity Two: Obstacle Course or Maze*

Read the *Biography Harriett Tubman* by David Adler. Discuss and describe the main character and her accomplishments as a “conductor” on the Underground Railroad. Have students participate in an obstacle or maze course to simulate the risk used by Harriet Tubman to escape from slavery showing the Underground Railroad. Students could also design quilt patterns used by many during the Underground Railroad journey as a secret code to let slaves know what path to do take along the obstacle or maze course.

[CCSS.ELA-Literacy.RL.1.7-](#)

Use illustrations and details in a story to describe its characters, setting, or events.

*Activity One: Scavenger Hunt*

Students go on scavenger hunt around the classroom finding things that tell about the characters, setting, and events of a story read in class. For example, students may hear the story read or listen to the story *The Hungry Caterpillar* by Eric Carle. Students will explore the classroom for items to represent part of the story. Some examples include: an apple on the teacher's desk, numbers to present the number of items eaten each day, days of the week presented in the story, etc.

*Activity Two: Four Corners*

The teacher will read a description for a story read in class. If the teacher is describing a character, students will go to corner #1. If the teacher is describing a setting, students will go to corner #2. If the teacher is describing a problem students will go to corner #3. If the teacher is describing a solution, students will go to corner #4. So that all students are not up at the same time, the teacher may wish to select five to six students at a time. Alternatively, students at their seat can hold up one, two, three, or four fingers to represent the corner being described by the teacher.

*Activity Three: Sorting*

After reading a series of stories under the same theme have students sort pictures by putting the characters, setting, and event together. The teacher will distribute picture cards with illustration of the different stories. Students will move around the room finding the characters, setting and event pictures that belong to the same story.

[CCSS.ELA-Literacy.RL.1.9-](#)

Compare and contrast the adventures and experiences of characters in stories.

*Activity One: Sports Games*

Read *A Picture book of Jackie Robinson* by David Adler and *Wilma Unlimited: How Wilma Rudolph Became the World's Fastest Woman* by Kathleen Krull. After reading and discussing these two stories ask students to compare and contrast the different sports the two characters participated in from the stories. Wilma Rudolph played basketball and ran track. Jackie Robinson played four sports. Organize a football, baseball, or basketball game within in the class or have students participate in track and field events.

*Activity Two: Healthy Couple*



Read *Who is Barack Obama?* by Roberta Edwards and *Who is Michelle Obama?* by Megan Stine. President Obama fought hard to have the Affordable Health Care Act passed. In addition the First Lady, Michelle Obama is an advocate for health and exercise for everyone. Students can visit her website Michelle Obama's Let's Move and do some of the activities. (<http://www.letsmove.gov/>). Students may wish to participate in a running or walking club at school.

## **Operations and Algebraic Thinking**

### [CCSS.Math.Content.1.OA.A.1](#)

Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

#### *Activity One: Let's Dance*

For addition, students will create a movement activity in pairs (two people) that creates a combination of ten counts. For example: A student may rock back and forth 1, 2, 3, 4 and a second student will do toe touches for 5, 6, 7, 8, 9, 10. The understanding would be that 4 rocks back and fourth + 6 toe touches = 10 movements.

#### *Activity Two: Dance Routine*

For addition, create a dance routine that uses five counts of four (20 counts total). You must change what you are doing every four counts. For example: rock for four counts; Charlie Brown for four counts, side step for four counts, Nay-Nay for four counts, and then cabbage patch for four counts. Be prepared to perform your routine in class.

#### *Activity Three: Locomotor Movements*

For subtraction, students will create subtraction word problems and then act out their word problems using locomotor movements. For example, Santana skipped forward 16 times. He then skipped back six times. How far did Santana skip from the starting point? Students may choose to do this activity outside and skip down a sidewalk using the squares to assist with answer. 16 skips forward – 6 skips backwards = 10 skips from the starting point. The word problems created can be put in individual work centers.

#### *Activity Four: Movement*

For subtraction, students will create subtraction word problems and then act out their word problems using locomotor movements. Joe rolls to the right five times. He rolls to the left one time. How many times did he roll from the starting point? 5 rolls forward – 1

roll back = 4 rolls from the starting point. The word problems can be put in individual work centers or stations.

*Activity Five: Sing and Act Out*

For subtraction, there was ten in the bed and the little one said, “Roll over, roll over” they all rolled over and one fell out. Now, there are nine in the bed and the little one said roll over, roll over. They all rolled over and one fell out. Now, there’s eight in the bed and the little one said..... This sing and act out activity is subtraction one from the previous number of little ones in the bed.

[CCSS.Math.Content.1.OA.A.2](#)

Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

*Activity One: Trio*

For addition, students will create a movement activity in a small group of three students that create a combination of ten counts. For example: Student A will rock back and forth 1, 2, 3, 4 and Student B will do toe touches for 5, 4, 7, 8, and finally Student C will do lunges for 9, 10. The understanding would be that 4 rocks back and fourth + 4 toe touches + 2 lunges = 10 movements.

*Activity Two: Addition*

For addition, students will create a movement activity in pairs (two people) or in a small group that creates combinations of twenty counts. For example: a student may rock back and forth 1, 2, 3, 4, 5, and a second student will do toe touches for 6, 7, 8, 9, 10. Finally a third students reach to the sky alternating hands and finish the movement activity with the counts 11 to 20. The understanding would be that 5 rocks back and fourth + 5 toe touches + 10 sky reaching = 20 movements.

[CCSS.Math.Content.1.OA.C.6](#)

Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g.,  $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$ ); decomposing a number leading to a ten (e.g.,  $13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$ ); using the relationship between addition and subtraction (e.g., knowing that  $8 + 4 = 12$ , one knows  $12 - 8 = 4$ ); and creating equivalent but easier or known sums (e.g., adding  $6 + 7$  by creating the known equivalent  $6 + 6 + 1 = 12 + 1 = 13$ ).

*Activity One: Bean Bag Toss*

Students will toss beanbags into number circles. The number circles will have the numbers one to nine and be taped to the floor. Students will toss two beanbags and add the numbers on which they land.

#### *Activity Two: Combinations of 10*

The teacher pass out number cards, zero to nine to students. Students will walk around the room creating combinations of ten using addition with the number cards. Students will also be encouraged to use the commutative property of addition. The commutative property of addition indicates that the order of an addition equation does not matter. For example  $2 + 8$  equal ten and  $8 + 2$  equals 10. This activity can be done with number less or greater than 10.

#### [CCSS.Math.Content.1.OA.D.7](#)

Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. For example, which of the following equations are true and which are false?  $6 = 6$ ,  $7 = 8 - 1$ ,  $5 + 2 = 2 + 5$ ,  $4 + 1 = 5 + 2$ .

#### *Activity One: Equal Equations*

Give students a number, such as six and have students work in teams to come up with equations that are equal to that number. For example  $3 + 3$  or  $7 - 1$  would be equations equal to six. Put numbers and equations on index cards. Repeat this process with five to eight numbers. After all the index cards are created, the teacher will hold up a number and equations and students will go to the right side of the classroom if the card held up are true and to the left side of the classroom if the card held up are not true or false. Allowing the students come up with equations creates buy-in among the students.

#### *Activity Two: Flash Card Search*

Pass out addition and subtraction flash cards. Have students walk around the classroom and group themselves into groups that have the same sum or difference. For example, one group may have  $5 + 5$ ,  $10 - 5$ ,  $7 + 3$ , and  $6 - 1$ . Students have to solve their own addition or subtractions problem first and then make sure they are only grouping themselves with others whose equations have the same sum or difference.

#### [CCSS.Math.Content.1.OA.D.8](#)

Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations  $8 + ? = 11$ ,  $5 = \_ - 3$ ,  $6 + 6 = \_$ .*

#### *Activity One: Subtraction*

For subtraction, student will create additive subtraction word problems. For example, Mary has to skip ten times to reach the park. She has skipped three times. How many more skips does she need to do to reach the park?  $3 + \underline{\quad} = 10$ . Students will use subtraction to help them solve or additive subtraction. To incorporate movement, students are required to act out their word problems created. The word problems can be placed in individual work centers.

### *Activity Two: Number Lines*

Teachers may wish to tape a number line to the floor or outside on the sidewalk. Have students use the number line to get to one number to the next. For example, one student will stand on the number six on the number line. Another student will stand on the ten. Students will then count along the number line to see how many jumps it will take to get to ten. The equations is  $6 + \underline{\quad} = 10$ .

### **Assessment**

Assessment is an integral part of learning and instruction. Assessments help educators determine whether or not the goals and objects are met. Assessments determine grades, placements, and advancements for students. Nearly all schools implement reading and math assessments. Assessments should be used to increase student learning and improve teaching. With this in mind, students participating in exercise, physical activities, and movement activities should show increase performance on reading and math assessment. Teachers may choose a variety of assessment tools to implement. Standardized and authentic assessments can be used with this curriculum unit. As students participate in the movement activities in reading and math, teacher my chose to use observations, performance tasks, interviews, portfolios, or paper/ pencil test to determine mastery of the indicated objective.

### **Conclusion**

Student growing up in poverty should participate in physical activity and movement activities. Boosting the participation and engagement in classroom learning activities can increase learning. Providing physical activities and movements activities within the classroom and throughout the school day can increase a student's ability to think, increase their working memory, and increase their cognitive capacity.

## Appendix 1

The common core curriculum and North Carolina standards addressed in this unit include:

Reading: Literature

### [CSS.ELA-Literacy.RL.1.2-](#)

Retell stories, including key details, and demonstrate understanding of their central message or lesson.

### [CCSS.ELA-Literacy.RL.1.3-](#)

Describe characters, settings, and major events in a story, using key details.

### [CCSS.ELA-Literacy.RL.1.7-](#)

Use illustrations and details in a story to describe its characters, setting, or events.

### [CCSS.ELA-Literacy.RL.1.9-](#)

Compare and contrast the adventures and experiences of characters in stories.

Operations and Algebraic Thinking

### [CCSS.Math.Content.1.OA.A.1](#)

Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

### [CCSS.Math.Content.1.OA.A.2](#)

Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

### [CCSS.Math.Content.1.OA.C.6](#)

Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g.,  $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$ ); decomposing a number leading to a ten (e.g.,  $13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$ ); using the relationship between addition and subtraction (e.g., knowing that  $8 + 4 = 12$ , one knows  $12 - 8 = 4$ ); and creating equivalent but easier or known sums (e.g., adding  $6 + 7$  by creating the known equivalent  $6 + 6 + 1 = 12 + 1 = 13$ ).

### [CCSS.Math.Content.1.OA.D.7](#)

Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. For example, which of the following equations are true and which are false?  $6 = 6$ ,  $7 = 8 - 1$ ,  $5 + 2 = 2 + 5$ ,  $4 + 1 = 5 + 2$ .

### [CCSS.Math.Content.1.OA.D.8](#)

Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations  $8 + ? = 11$ ,  $5 = \_ - 3$ ,  $6 + 6 = \_$ .*

## **Annotated Bibliography for Teachers**

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Gonoodle. [www.gonoodle.com](http://www.gonoodle.com) 2014. This website has fun, interactive ways to get kids moving. This is a free resource for teachers and parents.

Hair, Nicole, Hanson, Jamie, Wolfe, Barbara and Pollak, Seth. "*Association of Child Poverty, Brain Development, and Academic Achievement.*" American Medical Association. July 20, 2015. Assessed July 25, 2015. <https://archpedi.jan=manetwork.com/>. This article discusses the patterns that persist in adulthood of children whom live in poverty. This is a great resource for teachers who teach at-risk students.

Hillman, C. H., & Kramer, A. F. (2013). "*The effects of physical activity on functional MRI activation associated with cognitive control in children: A randomized controlled intervention.*" *Frontiers in Human Neuroscience*, 7, 2-13. This article examines the effect of exercise on cognition. This article examines how exercise can improve brain functions across a child's lifespan.

Jensen, Eric. "*Engaging Students with Poverty in Mind: Practical Strategies for Raising Achievement.*" Association for Supervision and Curriculum Development. 2013. This book discusses specific engagement activities for students of poverty. This book provides engagement strategies that teacher can use to expand their student's cognitive capacity.

Jensen, Eric. "*Teaching with Poverty in Mind What Being Poor Does to Kids' Brains and What Schools Can Do about It.*" Alexandria, Va.: Association for Supervision and Curriculum Development, 2009. This book discusses how schools can improve the academic success of students who lives in poverty. This book explains what poverty is and how it effects student's academic performance.

Krull, Kathleen, and David Diaz. "*Wilma Unlimited: How Wilma Rudolph Became the World's Fastest Woman.*" San Diego: Harcourt Brace, 1996. This book is about the struggles of Wilma Rudolph. It tells about her childhood, having polio and then becoming an Olympic champion.

Ostrander, Madeline. "What Poverty Does to the Young Brain" The New Yorker. June 4, 2015. Accessed September 26, 2015. <http://www.newyorker.com/tech/elements/what-poverty-does-to-the-young-brain>. This article examines the affect on the brain of infant and children living in poverty. It shares how low income and the stress associated with living in poverty can have long term effects.

Payne, Ruby K. "A Framework for Understanding Poverty." 4th Rev. ed. Highlands, Tex.: Aha! Process, 2005. This book includes a collection of resources and articles by Ruby Payne. It explains how living in poverty put the individual and families in survival mentality and distracts them for seek opportunities.

Pica, Rae. "Learning by leaps and Bounds." National Association for the Education of Young Children. 2010. Assessed November 7, 2015. <http://www.naeyc.org/files/yc/file/201011/Leaps&BoundsOnline1110.pdf> This article discuss the importance of movement education. It also indicates that it is important to get young children moving to support development.

Raine, Lauren, Lee, Hyun, Saliba, Brian, Chaddock0Heyman, Laura, Hillman, Charles, and Kramer, Arthur, "The Influence of Childhood Aerobic Fitness on Learning and Memory." PLOS One. September, 2013. This article discusses the influence of aerobic exercise on learning. It indicates that exercise can increase a person's working memory.

Reardon, Sara. "Poverty Shrinks Brains from Birth: Nature News & Comment." Nature News. March 30, 2015. Accessed September 26, 2015. <http://www.nature.com/news/poverty-shrinks-brains-from-birth-1.17227>. This articles presents research on the brain development of children. It examines specifically children born and living in poverty.

Reynolds, Gretchen. "How Physical Fitness May Promote School Success - Well." September 18, 2013. Accessed September 26, 2015. <http://well.blogs.nytimes.com/2013/09/18/how-physical-fitness-may-promote-school-success/>. This article suggests that students who are physically active are able to better retain information. It indicates that physically active students do better in school.

Sato, Mistilina. "Poverty and Payne Supporting Teachers to Work with Children of Poverty." Poverty and Payne Supporting Teachers to Work with Children of Poverty. January 1, 2009. Accessed November 19, 2014. This article explores the work of Ruby Payne. It prepares teacher to support students who live in poverty.

Singal, Jesse. "What Poverty Does to Your Brain -- Science of Us." Science of Us. May 15, 2015. Accessed September 26, 2015. <http://nymag.com/scienceofus/2015/05/what-poverty-does-to-your-brain.html>.



Stine, Megan. “*Who is Michelle Obama?*” August 15, 2013. This is a chapter book about the life of Michelle Obama. This can be used as a read aloud for young children.

Trost, Stewart and Mars, Hans van der. “*Why We Should Not Cut P.E. Educational Leadership. Health and Learning.*” December, 2009. This article serves as an advocate for keeping physical education classes in schools.

### **List of Materials for Classroom Use**

*A Picture book of Jackie Robinson* by David Adler

*Barack Obama United States President* by Roberta Edwards

*Biography Harriett Tubman* by David Adler

*The Hungry Caterpillar* by Eric Carle

*Who is Michelle Obama?* by Megan Stine

*Wilma Unlimited: How Wilma Rudolph Became the World’s Fastest Woman* by Kathleen Krull

### **Websites for Teachers**

Brain Breaks: <https://brain-breaks.com/>

Let Move: Michelle Obama: <http://www.letsmove.gov/>

## End Notes

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<sup>1</sup> Singal, Jesse. "What Poverty Does to Your Brain -- Science of Us." Science of Us. May 15, 2015. Accessed September 26, 2015. <http://nymag.com/scienceofus/2015/05/what-poverty-does-to-your-brain.html>.

<sup>2</sup> Ostrander, Madeline. "What Poverty Does to the Young Brain" - The New Yorker. June 4, 2015. Accessed September 26, 2015. <http://www.newyorker.com/tech/elements/what-poverty-does-to-the-young-brain>.

<sup>3</sup> Gajowski, Carrie. "Teaching with Poverty in Mind: How to Help At-Risk Students Succeed." Scientific Learning. April 24, 2012. Accessed November 19, 2014. <http://www.scilearn.com/blog/how-to-help-at-risk-students-succeed>.

<sup>4</sup> Sato, Mistilina. "Poverty and Payne Supporting Teachers to Work with Children of Poverty." Poverty and Payne Supporting Teachers to Work with Children of Poverty. January 1, 2009. Accessed November 19, 2014.

<sup>5</sup> Reardon, Sara. "Poverty Shrinks Brains from Birth : Nature News & Comment." Nature News. March 30, 2015. Accessed September 26, 2015. <http://www.nature.com/news/poverty-shrinks-brains-from-birth-1.17227>.

<sup>6</sup> Jensen, Eric. "Engaging Students with Poverty in Mind: Practical Strategies for Raising Achievement." Association for Supervision and Curriculum Development. 2013.

<sup>7</sup> Ayon, S. *Smart Jocks*. 2010. Accessed. October 25, 2015. <http://www2.sunysuffolk.edu/benharm/Articles/smart%20jocks%20-%20ayan.pdf>

<sup>8</sup> Hair, Nicole, Hanson, Jamie, Wolfe, Barbara and Pollak, Seth. "Association of Child Poverty, Brain Development, and Academic Achievement." American Medical Association. July 20, 2015. Assessed July 25, 2015. <https://archpedi.jan=manetwork.com/>

<sup>9</sup> Raine, Lauren, Lee, Hyun, Saliba, Brian, Chaddock0Heyman, Laura, Hillman, Charles, and Kramer, Arthur, "The Influence of Childhood Aerobic Fitness on Learning and Memory." PLOS One. September, 2013.

<sup>10</sup> Jensen, Eric. "Engaging Students with Poverty in Mind: Practical Strategies for Raising Achievement." Association for Supervision and Curriculum Development. 2013

<sup>11</sup> Reynolds, Gretchen. "How Physical Fitness May Promote School Success - Well." September 18, 2013. Accessed September 26, 2015. <http://well.blogs.nytimes.com/2013/09/18/how-physical-fitness-may-promote-school-success/>.

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<sup>12</sup> North Carolina Standard Course of Study: Math and Literacy Common Core Standards  
<http://www.corestandards.org>

<sup>13</sup> Ayan, S. *Smart Jocks*. 2010. Accessed. October 25, 2015.  
<http://www2.sunysuffolk.edu/benharm/Articles/smart%20jocks%20-%20ayan.pdf>

<sup>14</sup> Trost, Stewart and Mars, Hans van der. “*Why We Should Not Cut P.E. Educational Leadership*.” Health and Learning. December, 2009.

<sup>15</sup> Godman, Heidi. “*Regular exercise changes the brain to improve memory, thinking skills*.” Harvard Health Letter. April 9, 2014. Accessed October 25, 2015.  
<http://www.health.harvard.edu/blog/regular-exercise-changes-brain-improve-memory-thinking-skills-201404097110>.

<sup>16</sup> Gonoodle. [www.gonoodle.com](http://www.gonoodle.com) 2014. This website has fun, interactive ways to get kids moving. This is a free resource for teachers and parents.

<sup>17</sup> Gonoodle. [www.gonoodle.com](http://www.gonoodle.com) 2014. This website has fun, interactive ways to get kids moving. This is a free resource for teachers and parents.

<sup>18</sup> Hillman, C. H., & Kramer, A. F. (2013). “*The effects of physical activity on functional MRI activation associated with cognitive control in children: A randomized controlled intervention*.” *Frontiers in Human Neuroscience*, 7, 2-13.

<sup>19</sup> Pica, Rae. “*Learning by Leaps and Bounds*.” National Association for the Education of Young Children. 2010. Assessed November 7, 2015.  
<http://www.naeyc.org/files/yc/file/201011/Leaps&BoundsOnline1110.pdf>