



Math in the Gym?

By Benjamin Lewis, 2015 CTI Fellow
Barnette Elementary

This curriculum unit is recommended for:
Physical Education or Math grades K-5

Keywords: Physical Education, Movement, Content Integration, Body Mass Index, VO₂ max, Student Health, Exercise

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

Synopsis: This unit provides Physical Education and classroom teachers with activities for implementing movement into their classroom environment. Movement is a necessary component in each student's life. This unit provides several math activities that use movement as the primary medium for learning and practicing various math concepts. Students will enjoy learning while getting much needed exercise simultaneously. Teachers will see increased engagement through the kinesthetic learning environment.

I plan to teach this unit during the coming year to 650 students in Physical Education courses from Kindergarten through fifth grades.

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

Math in the Gym?

Benjamin Lewis

Introduction

Spend an hour with a child in the age range of two to five years old. Do everything they do. Go ahead, try it. I bet you can't keep up! If you try it, you will realize we were born to move. I have a three-year-old and I teach kindergarten through fifth grade Physical Education. I know how much kids move. However, something happens around six years old. After students have been in school for a year or two, they just do not move as much. Students get conditioned to sit still. Then, after school, they zone out on tablets, computers, and video games. Students need to move more, therefore this curriculum unit is all about movement. This curriculum unit shows students the importance of exercise, incorporates movement into math and reading curricula, and encourages students to track their fitness progress.

Rationale

We sit too much. Cardiologists at UT Southwestern Medical Center found evidence to suggest that two hours of sitting can negate the benefits of twenty minutes of exercise.¹ Lack of exercise and too much screen time is causing negative effects on student's brains.² Our country is increasingly becoming obese, causing an increase in diabetes, heart disease, and a host of other problems.³ A study from Stanford University reported in the *American Journal of Medicine* demonstrates the correlation that a lack of exercise is more to blame for obesity than caloric intake.⁴ If all of this is true, why then do we basically train students to be sedentary by requiring them to sit in chairs and/or desks for several hours a day? Elementary school students are especially sedentary because they do not always move from one classroom to another when switching subjects. We are requiring children to sit, when we should be teaching them ways to be active and healthy.

Students, teachers, and parents need to understand that good physical fitness can improve learning, memory, and academic achievement.⁵ Students, teachers, and parents need to see that our brains are actually connected to what we do physically and that we can use exercise and fitness to improve student achievement. A study at University of Illinois examining white matter in the brain found that students who were more fit had more white brain matter than their less fit peers. "White matter" describes the bundles of axons that carry nerve signals from one brain region to another. More compact white matter is associated with faster and more efficient nerve activity." Why is this important? The study "...suggests that white-matter structure may be one additional mechanism by which higher-fit children outperform their lower-fit peers on cognitive tasks and in the

classroom.”⁶ The study essentially proves to parents, students, teachers, and even congressional representatives that children need more movement in schools to learn. Exercise may be the most important thing students (and adults) do all day!

As a Physical Education (PE) teacher, I aim to teach my students the importance of physical activity and fitness, and how it will help them academically. In this curriculum unit, I integrate Reading and Math curriculum into my Physical Education classroom. I include the importance of physical activity and use technology to track fitness data to demonstrate the importance of physical fitness to students, staff, and parents.

As technology evolves, humans move less and less. The negative side of this circumstance is that students can easily become addicted to their phones, tablets, televisions, and video games. The positive side of this situation is teachers can use technology as a powerful motivator in the classroom. In this curriculum unit, I take advantage of new technologies to improve and track student physical fitness and demonstrate correlations to stronger student assessment scores.

I teach at a school with a very active parent teacher association (PTA). I will tap into the parent involvement by using surveys to engage with parents. I will ask parents to complete a simple survey question three times a year asking, “On average, how many minutes a week does your child spend exercising?” I will provide them with some of the research articles I have cited in this curriculum unit through our PTA Facebook page (<https://www.facebook.com/Barnette-Elementary-PTA-119647688107658/timeline/>) and ask them to try to increase the amount of exercise students do at home.

Most importantly, I will become a resource to the classroom teachers in my school. I will provide them with as many ways as possible to bring movement into their classrooms. I believe it will help student attention, memory, and improve academics. I believe that for too long, the answer to low student achievement has been to increase the amount of time students spend on reading and math content. As educators, we have a duty to teach the whole child. Students spend a large portion of their day in school, so we have a duty to them to provide a well-rounded curriculum that includes physical activity. As we continue to live in a nation where obesity in adolescents has quadrupled in the last thirty years, I feel like physical activity is the most important thing we can provide in a student’s school day.⁷

Background

After I found out that fitter students are likely to be better students, I decided to collect some data about my school. I wanted to find out if our smarter classes, were also our fittest classes. In Physical Education classes, students take a variety of FITNESSGRAM® assessments provided by the Presidential Youth Fitness Program.⁸ One such assessment, the Pacer Test, is a good indicator of physical fitness. The Pacer

Test is a widely used assessment for cardiovascular fitness. The test involves running back and forth between two markers, set fifteen or twenty meters apart, at an increasing pace indicated by audio beeps. A student's fitness level will then be calculated based on how long they can keep the pace. For the PACER, laps completed, age, and sex are required in order to receive an estimate of VO₂ max.⁹ VO₂ max is the maximal oxygen uptake or the maximum volume of oxygen that can be utilized in one minute during maximal or exhaustive exercise. I use FITNESSGRAM® to assess student's body mass index (BMI), flexibility, and muscular strength. In addition to FITNESSGRAM® assessments, I will also determine heart rate for each student. Students will use pre-test data to set goals for themselves for the end of year FITNESSGRAM® assessments.

I have analyzed some of the results of these assessments this school year. After students took the Pacer assessment, I found partial evidence that VO₂ max correlates with a higher Reading MAP® percentile score. Measures of Academic Progress® (MAP®) is a test that students in my school district take three times a year. MAP® tests give teachers information about student learning. Teachers are able to see how student assessment scores grow throughout the year. Teachers are also able to use provided normative data, to see how their student's compare to other students of their age from all over the country.¹⁰

After my students took the Pacer test, I was able to obtain their estimated VO₂ max. I then calculated the average VO₂ max for each class that took the assessment. Next, I found the average MAP® reading percentile score for each class. My hypothesis, was that as VO₂ max went up, reading percentiles would also go up.

In third grade, I have five classes whose scores on the two assessments can be seen below. They are in order from highest VO₂ max to lowest. Class one had the highest VO₂ average, but did not have the highest reading percentile average. Class two was the only class that fell in line with my hypothesis. Class two had a higher VO₂ and also had a higher reading average than class three. However, none of the other classes followed my hypothesis.

Third Grade	Class 1	Class 2	Class 3	Class 4	Class 5
Average MAP Reading Percentile	64.7	64.8	63.7	65.9	78.7
Average VO₂ Max	44.3	44.2	43.9	43.7	43.4

When looking at my three, fourth grade classes, I noticed that the class with the highest VO₂ max average also had the highest reading average. However, the other two classes do not support a connection between reading percentile and VO₂ max.

Fourth Grade	Class 1	Class 2	Class 3
Average MAP Reading Percentile	80.6	57.5	71.6
Average VO₂ Max	45.4	44.3	44.2

In my fifth grade classes, four of four classes demonstrated my hypothesis clearly. They higher the VO₂ max was, the higher the reading percentile. In my opinion, the data did not clearly demonstrate a correlation between VO₂ max and reading scores. However, things changed when I began to dissect the student Body Mass Index data.

Fifth Grade	Class 1	Class 2	Class 3	Class 4
Average MAP Reading Percentile	78.1	72.3	55.3	41.8
Average VO₂ Max	44.7	43.9	43.3	40.5

Body mass index (BMI), is a measure of body fat based on height and weight. Understanding BMI is important, because the higher a BMI, the higher the risk for certain diseases such as heart disease, high blood pressure, type 2 diabetes, gallstones, breathing problems, and certain cancers.¹¹

I followed the same process analyzing BMI data for students, as I did with VO₂ max data. After finding the BMI of each student in grades third through fifth, I found the average BMI of each class. Then, I put the classes in order from lowest BMI average to greatest. I hypothesized that as BMI average went up, reading MAP percentile averages would go down.

In third grade, four out of the five classes demonstrated that I was correct in my thinking. The first three classes demonstrate a low BMI, to higher test score correlation. Class number four had a higher BMI, but also a slightly higher reading score. However, class five, with the highest BMI average indeed had the lowest reading average.

Third Grade	Class 1	Class 2	Class 3	Class 4	Class 5
MAP Percentile	78.7	64.8	64.6	65.9	63.7
Average BMI	16.9	17.1	17.4	17.7	18.0

The evidence that demonstrates a correlation between BMI and reading scores becomes even clearer in fourth and fifth grades. All seven remaining classes demonstrate that as average BMI goes up, reading scores come down.

Fourth Grade	Class 1	Class 2	Class 3
Average MAP Reading Percentile	80.6	57.5	71.6
Average VO₂ Max	17.2	18.6	17.5s

Fifth Grade	Class 1	Class 2	Class 3	Class 4
Average MAP Reading Percentile	78.1	72.3	55.3	41.8
Average VO₂ Max	18.3	18.6	19.1	22.5

I really feel that these data are very important. BMI is something that is very changeable. These data show us as teachers that BMI is at the very least, an important factor to consider in the education of a child. In my school district, there is a strong push to improve reading test scores. The answer from district executives and administration is usually to find more time and more ways to insert more reading time into a student's day. I feel these data show a need for more physical movement in a student's day instead. I will use this information to demonstrate to staff and parents how important physical fitness is in a student's physical health, schoolwork, and mental health. I will collect these data each year, to help teachers at my school track student fitness.

Strategies

Kinesthetic Movement

This unit uses a variety of strategies to hit auditory, visual, and kinesthetic learners with strong emphasis on kinesthetic movement as the primary strategy. I have designed activities appropriate for a gymnasium, though classroom teachers could deploy these activities on a big playground or field. While I acknowledge that students learn from both specific, and a mixture of learning styles, I think students need to move more during learning. Each activity in this unit will use movement while learning or reviewing a skill.

Integrating Content into Physical Education

This unit brings math into a Physical Education setting. There are several reasons I feel this is important. First, it gets students to understand that math is not something that is separate from everything else. Students should understand that all subjects taught in schools are connected. Students will see that even though math class has technically ended, they are accountable for internalizing the information that was taught, in other areas of life. Second, this unit allows students to practice skills that their general education teacher may have finished teaching for the year. School can be a fast paced setting, and when some students have not mastered a skill, sometimes the teacher moves on anyway. This unit provides a way for students to catch up on old skills, as well as learn new skills. The final reason I feel integrating content is important, is it allows other teachers in the school to know they have support. Teachers are held accountable to their student's test scores, therefore, it is a good idea to support what they are teaching in the general education classroom, to hopefully improve student test scores.

Data Tracking and Goal Setting

As part of this curriculum unit, students will also use technology to track their performance in more informal ways such as before/after video shots of specific motor and locomotor skills inside of P.E. After watching videos of themselves, students can assess their performances to see how they have improved. I believe that by getting students to assess themselves, they will "buy in" to fitness. They will begin to set goals for themselves that I hope will contribute positively to improvements in student behavior, test scores, and/or attitude.

In addition to data tracking, my curriculum contains ways to bring math and reading into my P.E. curriculum. Some classroom teachers are eager to teach using movement, but do not always have the space to do so. I am blessed with a massive gymnasium and will be offering the space to teachers at times so they can incorporate movement into their curriculum as well.

Assessment

While this unit does not contain a typical assessment, I will be using a variety of data to see what impact my unit has on the school as a whole. It is my goal that through my instruction of this unit, and as more teachers in my school implement movement into their classrooms, we should see several changes in the data we collect. At the beginning of the year, after students take pre-assessments in FITNESSGRAM®, they will create goals for themselves for the end of year. Welnet is a program our school system has purchased (<https://www.focusedfitness.org>). It allows students to track see their performance data in all the FITNESSGRAM® assessments and set goals for themselves following the pre-assessments. I will also have students write down goals in journals.

Writing down goals will allow them to see, remember, and think about their goals as they progress through the school year. I predict students will be motivated by tracking their own fitness, and will want to increase their activity and amount of time spent exercising both in and out of school.

I will use FITNESSGRAM® testing to determine if VO2 max data increases schoolwide. The student's BMI data should decrease. I will be looking to see if the correlations between fitness scores and MAP scores become clearer. In the short term, I am looking for MAP reading scores to go up. I will also be tracking and analyzing more long-term data. After each school year, I will be looking for any changes in End of Grade state assessment data. EOG data is used throughout our district to demonstrate how effective schools are at teaching. It sure would be something to prove to our district that movement plays a vital role in the education of a child.

Activities

Activity 1: Steal the Bacon

Purpose: This game allows the teacher to teach or review a variety of math concepts through movement.

Suggested Grade Level: Kindergarten through fifth grade.

Materials: ball, large open space

Procedure/Description: This popular game places students on two teams, each student receives a number. When their number is called, they race to the middle of the room and try and steal the "bacon," which can be any item such as a ball, toy, etc. The first team to bring the "bacon" back to their side wins a point. It is important to discuss safety before this activity. Often times, students may try so hard to get to the "bacon," they bump heads. Discuss ways to stay safe and keep their heads away from the "bacon." Math can be incorporated into this by replacing the number with a key math concept. See below for ways in which this game can be leveled by grade level and math concept.

Kindergarten: Assign and call out multiples of 10.

First Grade: Assign students two-digit numbers. Tell them that when a number is called, it will be 10 higher than the number you are really calling. Therefore, they must mentally subtract 10. For example, if a student's number is 14, then the teacher calls out 24. The student who was assigned number 14 would run.

Second Grade: Assign the students two digit numbers. Instead of calling out their number, call out the place values of each student's two-digit number. For example, if the number assigned to a student is 14, call out "1 ten, and 4 ones."

Third or fourth grade: Assign multiples of a number (instead of calling the number four, I could call any multiple of four). The teacher may also create and shout out math

problems where four is the answer (two times two, twelve divided by three, etc.) could be called to help students practice multiplication skills.

Fifth grade: Equivalent and simplified fractions could be used as their number.

Example: I call out $\frac{2}{4}$ when the student was actually assigned $\frac{1}{2}$.

Activity 2: Number Zombies

Purpose: This tag game can be used to teach or review multiplication facts, or addition/subtraction facts.

Suggested Grade Levels: Third, fourth, and fifth grades.

Materials: list of multiplication equations where practice is needed, large open space

Procedure/Description: The students line up on a line and are given a number, which is actually the product of a multiplication equation. Two kids start out in the middle of a given area and are “zombies.” The zombie’s objective is to catch all of the other players. The teacher calls out a math equation (ex: $4 \times 6 = ?$), and the students with the number is equal to the equation called, runs to a line on the other side of the area without being caught by a zombie. If the students make it to the other side of the play area without being caught, they stay alive. If they are caught by a zombie, they too become a zombie for the next round, and attempt to catch other players. Play continues back and forth from line to line until everyone is a zombie. I would use this game to review three products at a time. For example, if the numbers 24, 36, and 48 were the only products give out, there are multiple equations that can be shouted out by the teacher.

Activity 3: What Time is it Mr. Crocodile?

Purpose: This activity helps students practice demonstrating “time” on an analog clock in second grade. To tie in Literacy and Math, I have developed a tag game based on the book *What Time is it Mr. Crocodile?* by Judy Sierra.

Suggested Grade Level: First, Second, and Third Grades.

Materials: the book *What Time is it Mr. Crocodile?* by Judy Sierra, poly spots, orange cones, index cards, large open space

Procedure/Description: In this game, the teacher is the Crocodile and the students are the monkeys. This game will help second grade students practice telling time on an analog clock, which is one of their Math Common Core standards. First we will read the book together. I will map out an analog clock on the gymnasium floor using poly spots and cones with numbers on them. I will create digital time “playing cards.” I hold up the digital time playing card, and ask the class “What time is it Mr. Crocodile?” The students

must run to a poly spot that matches the same time on our “gym clock.” The digital playing cards will have different times on them from the book. However, one card will read “Dinner Time.” When that card is called the students must run from the Crocodile/Teacher, and it becomes a standard game of tag, whereas if the students are caught by the Crocodile (could be the teacher or an assigned student), they are considered “eaten.” After three to five rounds of the game, a debriefing discussion will take place.

Reflection Questions to Ask: Why is it important to learn to tell time? What is the difference between a digital clock, and an analog clock? How was our game similar to the book? How was our game different from the book? (The crocodile does not eat the monkeys in the book.) Why didn’t the crocodile eat the monkeys?

Activity 4: Three Little Pigs

Purpose: This activity allows students to use cooperation and teamwork to build toward a common goal. Students will need to brainstorm good construction techniques. They will need to build the strongest house they can, to keep the Big Bad Wolf from knocking the house over.

Suggested Grade Level: Kindergarten, first, and second grades.

Materials: teacher’s favorite version of The Three Little Pigs book, hoola hoops, cones, gymnastic mats, one large ball (Gatorskin ball), large open space

Procedure/Description: I will read a version of The Three Little Pigs to students. Students will be divided into groups of four to six depending on materials and amount of play space. Students will collaborate to build a house out of hula hoops, cones, and gymnastics mats. I will explain to students that in this version of the story, the Big Bad Wolf is the teacher. Instead of blowing the house down, the teacher will throw a soft, but large ball (Gatorskin Balls) at the house to determine the strongest house. The teacher will determine the strongest house by how quickly the house falls down. For instance, it may take one throw for the weakest house, but multiple throws for stronger houses. A variation of this game would be to give each group a different amount of materials, so the houses are more likely to be stronger if students use more materials.

Reflection Questions to Ask: What groups were able to make the strongest house? Why do you think their house was strongest? How was your team able to work collaboratively? What types of materials were best for making a house? Who thinks they can make the strongest house if all students are given the same materials?

Activity 5: Fill in the Blank

Purpose: This activity is a great opportunity to either review, or introduce new content vocabulary. It would work well with any content area.

Suggested Grade Level: First through fifth grades. In this unit, there is an attached resource for use in fourth grade.

Materials: Fill in the blank worksheet (attached), large open space

Procedure/Description: Students sit in groups of four. The teacher will hand a sentence strip to the first person in the group. The sentence should have a fill in the blank sentence written on it. Each group should have a pile or envelope filled with words/answers placed forty paces away. When the teacher says “go,” the group discusses their sentence and possible answers. Then, the first student runs to their pile of words/possible answers and chooses one to bring back to the group. When the student returns, the teacher gives each group another fill in the blank sentence strip. The group discusses possible answers and the second runner runs to the pile and selects a word from the pile they believe fits. Play continues until each runner has gone. Review answers and determine which group has the most correct answers. This activity could be used to review content specific vocabulary. It would also work well to teach synonyms in reading. For example, if the sentence said, “Jimmy was _____, so he decided to put his jacket on.” The students would need to look in the pile for a word that meant the same as “cold.”

Appendix 1 - Implementing Common Core Standards

This unit covers a variety of Math, Reading, and Physical Education Objectives on several different grade levels.

Common Core Standards by activity.

Activity 1: Steal the Bacon

CCSS.MATH.CONTENT.K.CC.A.1

Count to 100 by ones and by tens.

CCSS.MATH.CONTENT.1.NBT.C.5

Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.

CCSS.MATH.CONTENT.2.NBT.A.1

Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones.

CCSS.MATH.CONTENT.3.OA.C.7

Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

CCSS.MATH.CONTENT.4.OA.B.4

Find all factor pairs for a whole number in the range 1-100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1-100 is prime or composite.

CCSS.MATH.CONTENT.5.OA.A.2

Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them

During Activity 1, students on each grade level will review key math concepts from the standards listed above. In the game, a number or equation is called out to signal to students that it is their turn to go.

Activity 2: Number Zombies

CCSS.MATH.CONTENT.3.OA.C.7

Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Number Zombies gives a great chance to practice multiplication skills in third grade. From my experience, fourth and fifth grade students often need to review these skills.

Activity 3: What Time is it Mr. Crocodile?

CCSS.MATH.CONTENT.1.MD.B.3

Tell and write time in hours and half-hours using analog and digital clocks.

CCSS.MATH.CONTENT.2.MD.C.7

Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.

Students will need to recognize time on an analog clock so they do not get “eaten” by the crocodile in activity three.

Activity 4: Three Little Pigs

PE.K.PR.4.1 Use basic strategies and concepts for working cooperatively in group settings.

PE.2.PR.4.1 Explain the value of working cooperatively in group settings.

PE.5.PR.4.2 Use cooperation and communication skills to achieve common goals.

Students will work together toward the common goal of building a strong house. This takes physical and social effort.

Activity 5: Fill in the Blank

CCSS.ELA-LITERACY.L.4.5.C

Demonstrate understanding of words by relating them to their opposites (antonyms) and to words with similar but not identical meanings (synonyms).

Students will work in teams to determine the appropriate word to fill in the blank of a sentence. Students will need to think about what synonyms might fit, and then find the word that best fits.

Appendix 2

Word Bank Synonyms for Activity 5

Exhausted, tiny, frustrated, filthy, giggling, enjoyable, intelligent, perhaps, damp, hilarious

Sentence strips for Activity 5

1. The runner was _____ after running the marathon.
2. An ant is a very _____ insect.
3. She could tell he was _____ because he was yelling.
4. Parker had to clean his _____ bedroom.
5. The boys were having so much fun they were _____.
6. Playing in the park was an _____ experience.
7. Elizabeth's grades proved she was an _____ student.
8. _____ we can go outside if it is not raining.
9. Put the _____ towel on the clothesline to dry.
10. Carla knows so many _____ jokes.

Teacher and Student Resources

Ratey, John J., and Eric Hagerman. *Spark: The Revolutionary New Science of Exercise and the Brain*. New York: Little, Brown, 2008.

This book demonstrates how exercise helps the brain in a variety of ways. The author uses a case study to highlight the effect of good fitness on academic test scores. The book also touches on exercises benefits regarding ADD, addiction, and Alzheimer's.

Ayan, Steve. "Smart Jocks." *Scientific American Mind Sci Am Mind* 21, no. 4 (2010): 42-47. doi:10.1038/scientificamericanmind0910-42.

This journal article does a great job explaining how exercise is affecting student academic scores positively.

"News Bureau | University of Illinois." Physically Fit Kids Have Beefier Brain White Matter than Their Less-fit Peers. Accessed November 25, 2015.

https://news.illinois.edu/news/14/0819whitematter_laurachaddockheyman_charleshillman_arthurkramer.html.

This article would be interesting to talk about with upper elementary school students, and teachers. Students may be motivated to exercise more due to the title. Teachers will see the science and reasons for encouraging students to exercise.

"Why Aren't Schools Taking Health And Fitness Seriously?" Medical Daily. September 20, 2015. Accessed November 25, 2015. <http://www.medicaldaily.com/physical-education-schools-afterthought-just-important-math-or-science-353316>.

This article does a great job explaining to teachers the importance of Physical Education and exercise in a student's life.

"For Better Grades, Try Gym Class." Well For Better Grades Try Gym Class Comments. August 10, 2011. Accessed November 25, 2015.

http://well.blogs.nytimes.com/2011/08/10/how-gym-class-can-help-students-excel/?_r=0.

This article demonstrates to students and teachers the importance of physical education. Students and teachers could even test out to see if they do better on assessments after exercise.

Notes

¹ ScienceDaily. Accessed November 20, 2015.

<http://www.sciencedaily.com/releases/2014/07/140707141622.htm>.

² "Gray Matters: Too Much Screen Time Damages the Brain." Psychology Today.

Accessed November 18, 2015. <https://www.psychologytoday.com/blog/mental-wealth/201402/gray-matters-too-much-screen-time-damages-the-brain>.

³ "What Are the Health Risks of Overweight and Obesity?" - NHLBI, NIH. Accessed November 22, 2015. <http://www.nhlbi.nih.gov/health/health-topics/topics/obe/risks>.

⁴ Medical News Today. Accessed November 25, 2015.

<http://www.medicalnewstoday.com/articles/279281.php>.

⁵ "The Influence of Childhood Aerobic Fitness on Learning and Memory." PLOS ONE. Accessed November 17, 2015.

<http://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0072666>.

⁶ "News Bureau | University of Illinois." Physically Fit Kids Have Beefier Brain White Matter than Their Less-fit Peers. Accessed November 22, 2015.

https://news.illinois.edu/news/14/0819whitematter_laurachaddockheyman_charleshillman_arthurkramer.html.

⁷ "Why Aren't Schools Taking Health And Fitness Seriously?" Medical Daily. September 20, 2015. Accessed November 22, 2015.

<http://www.medicaldaily.com/physical-education-schools-afterthought-just-important-math-or-science-353316>.

⁸ "FitnessGram." FitnessGram. Accessed November 25, 2015. <http://fitnessgram.net/>.

⁹ "FitnessGram." FitnessGram. Accessed November 25, 2015. <http://fitnessgram.net/>.

¹⁰ "Educational Assessment That Helps Kids Learn | NWEA." NWEA. Accessed November 25, 2015.

<https://www.nwea.org/>.

¹¹ "Assessing Your Weight and Health Risk." Assessing Your Weight and Health Risk. Accessed November 22, 2015.

http://www.nhlbi.nih.gov/health/educational/lose_wt/risk.htm.