Introduction and Overview

Bouncing Through Fractions, Percentages and Probability, which is designed for a sixth grade class of twenty to twenty-five students, is a mathematical program that allows kids to learn fractions, percentages, and probability while studying NCAA female and male basketball players’ statistics. It is designed to bridge the gap between events in the NCAA March Madness tournament and events in the classroom. Often students are intrigued and wrapped up in the big games or which team upset which the night before and it becomes a battle for the teacher to gain their responsiveness and attention. Bouncing Through Fractions, Percentages and Probability will increase student’s specific math skills along with English and verbal skills.

Organization

Bouncing Through Fractions, Percentages and Probability is intended for a period of five weeks during the month of March. Each Bouncing lesson would be taught on the Monday of each week. The reasoning for the Monday lesson would be to open the week by introducing a new topic in a fun and inviting way to intrigue the children about the week to come. Each class will consist of fifty minutes and students will have access to computers during this time. It is understood that students may not have adequate resources at home so homework will not be essential to learn the next lesson. Groups of
students will be randomly chosen not based on gender or basketball skill.

**Objectives**

The four objectives students are to gain in Bouncing Through Fractions, Percentages and Probability are framed from the Connecticut Common Core State Standards. They are also based on the levels of Bloom’s Taxonomy and Connecticut Frameworks Mathematics Curriculum Standards. It is essential for this curriculum to take place in March not only due to the NCAA Tournaments but also because of the timing sixth graders gain these specific mathematical skills.

**Mathematics**

**Objective 1:** Students will learn how to relate their foul shot results into basic fraction concepts.

As verification of this objective, standard 12a. from the Connecticut Frameworks: Mathematics Curriculum Standards states that students will solve problems involving simple ratios. Students will engage in a physical activity where they are converting their foul shot results into fraction form. This objective emphasizes the fact that students will be able to see mathematics in other ways than just on paper. Students will also learn content based on Bloom’s Taxonomy level 2, which includes understanding ratios.

**Objective 2:** Students will assess a female or male basketball player and use their statistics to demonstrate their understanding of percentage skills.
This objective is justified by the Common Core State Standard:

**CCSS.Math.Content.6.RP.A.3c.** This objective states that students must “find a percent of a quantity as a rate per 100, solve problems involving finding the whole, given a part and the percent.” Students will analyze their personal player’s statistics and later compare them to classmate’s players in the form of percentages. Students will learn through collaboration with their classmates in small randomly selected groups for about fifteen minutes. Incorporated in this lesson also is Common Core State Standard **CCSS.Math.Content.6.SP.A.1.** This standard is making sure students are able to “recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.” This allows students to be able to interpret data, solve percentage problems, and be able to solve the unknown variable. The content that students are learning within the second object incorporates level 3 and 4 of Bloom’s Taxonomy, which states that students are to apply ratio and rate language and analyze and find percent of a quantity per 100.

**Objective 3:** *Students will analyze NCAA brackets to supplement probability*

This objective is based off of the Connecticut Frameworks: Mathematics Curriculum Standard 21.b. This standard states that it is necessary for 6th grade students to “solve problems using elementary notions of probability and fairness including justifying solutions.” Students will observe and interpret the entire bracket. Students will demonstrate their understanding of probability by using the bracket to predict game outcomes. This objective will also include standard 25a., which states that students will solve extended numerical and statistical problems. This is significant because it allows students to relate mathematics to the real world.
English Language Arts

Objective 4: Students will defend and judge his/her assigned basketball players through a presentation

By allowing students to deliver a presentation on their assigned NCAA basketball player, it ensures that several Common Core State Standards are met. The standards are:

CCSS.ELA-Literacy.W.6.1-write arguments to support claims with clear reasons and relevant evidence, CCSS.ELA-Literacy.SL.6.2- Interpret information presented in diverse media and formats and explain how it contributes to a topic, text, or issue under study, and CCSS.ELA-Literacy.SL.6.5-Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.

Therefore students will learn to choose a stance and defend what they believe in. They will also learn that a claim is no use without reasoning to back it up.

Activities

Week 1

This first lesson will serve as an introduction to the fractions using basketball. In order to capture the children’s attention we will begin the unit in the gym for twenty-five minutes. Each student will be required to bring a piece of paper and pencil to the gym. Students will be split up into random group with about five students per basket. Each group will receive one basketball, and will be told to line up around their basket and asked to take two foul shots and rotate among their group, until everyone has taken ten shots. Students will record their results and we will go back to the classroom as a group.
Once the class has settled in, the teacher will have about twenty minutes left and he/she will be show students how to “manipulate” their results into fraction form. For example, the teacher will choose one student and ask him/her how many foul shots they made out of ten. The teacher will explain that the shots made are equivalent to a numerator, and that the shots attempted (ten) is equivalent to the denominator. The teacher will then ask the students what the fraction would be and then tell the rest of the class to figure out their personal fractions. The class will conclude with this concept and with about ten minutes left, students will be shown a short clip introducing the Men’s and Women’s NCAA tournament. This will segway into the future lessons and on their way out, students will chose a college basketball player’s name from a hat. Their chosen player will be the one that each student will follow and analyze throughout the remainder of the unit. It is important to note that regardless of their gender, students will have the opportunity to watch the men’s and women’s NCAA tournament. It has been taken into consideration that as the tournament progresses, players will be eliminated. In this case, statistics will be made up by the teacher- if necessary.

**Week 2**

This week’s class will start in the computer lab, where students will be asked to print out their player’s individual statistics for their last game. Once each student has acquired his/her statistics worksheet, they will head back to their room all together. The teacher will review basic terms on the worksheet, for example- FGM (field goals made), Asst. (Assists), and MPG (minutes per game). The teacher will then introduce the concept of percentages by explaining to the class if X Player played ten minutes in a forty-minute game, then player X played twenty five percent of the game. The teacher
will continue giving students scenarios and will continue to seek percentage answers. She will then explain a particular scenario in the game and use it to compute a percentage.

Once the basic lesson is learned the students will split up into groups of three to four students and the groups will be chosen randomly. Once in the groups the students will be instructed to make flashcards testing their knowledge of percentages. They must include at least two word problems pertaining to the tournament. It is important to the lesson because it allows the students to decide what is important for them selves. This debunks the Banking theory of learning, as told by Paulo Freire. He states that, “instead of communicating, the teacher issues communiqués and makes deposits which the students patiently receive, memorize, and repeat” (Freire p. 58).

Week 3

During week three’s class, students are to receive a copy of the entire NCAA bracket for the men and women. They will learn what probability means and what it means to have a chance to win the tournament. A lesson will be taught but instead of numbers every concept will be referring to the bracket itself. A quick five-minute video will be shown to sum up the basic principle of probability without taking into account other factors. The teacher will propose a contest. The teacher will tell the class that the first person to figure out the probability of his/her player’s team winning the entire tournament can win his/her own basketball.

Once the contest is over, students will be asked to work with one other partner and together they will fill out a fun worksheet. The worksheet will serve to basically sum
up the day’s lesson. Once the worksheet is completed, a script will be given and the students will take turns teaching each other repeated concepts about probability. There will be no quiz following the partnership learning but it still is modeled after the Structured Dyadic Method.

**Week 4**

Students will compose their own study guide comprised of questions dealing with fractions, percentages, and probability. There must be a certain amount of word problems dealing with his/her own specific player. The creation of the study guide will ensure the children understand what they are learning. It should take approximately twenty-five minutes and the remaining twenty-five minutes will be dedicated to students being assigned a partner and exchanging study guides. Without about five minutes left the teacher will announce the final project. The teacher will briefly speak about the expectations and overview of the project. On the way out, the children will be receiving a rubric as to how they will be graded and will have a week to complete the project. The job of the presentation is for the student to argue whether or not his/her player should be drafted into the NBA/WNBA. It is all based on mathematical reasoning.

**Week 5**

The last week of the curriculum will begin with a surprise guest speaker. All-American Wendy Davis who played at UConn and is the head women’s basketball coach at Trinity College. She will speak about the importance of education and the link it has with basketball. After her speech, the presentations will begin. Each child will have only a limited amount of time and will present in front of the teacher and Coach Davis.
Evaluation

Students will be graded based on their understanding/content, communication/presentation skills, creativity, and most importantly whether they displayed proper math concepts. It is not enough for the students to just list statistics. Basic statistics are found online on team websites. Students must manipulate his/her player’s results in an attempt to persuade the audience. For each category, the students will rated on a scale of 1 through 4 on their effectiveness to create and present a successful and persuasive advertisement. Students will be given a score of 1 in any of the categories if they did not participate in the project, did not complete their project to the best of their ability, if they refused to take part in the “Drafting” of the NCAA basketball player, or if they plagiarized the statistics from an online website. They will receive a score of 2 in any of the categories if they attempted to complete their projects, but did not finish it, if their data does not seem to show a clear understanding of statistics, and lastly if their visual presentation is not neatly organized. Scores of 3 and 4 are given to those students who either showed complete understanding, who were active in their presentation sequences, and those who were able to persuade their classmates. The grading rubric provides a more detailed scale of scoring/rating for the students.
Resources


+ Gym (Provided by the school; if the school does not have the facilities, locate the nearest public basketball court)

+ Youtube.com (NCAA Introductory Clip/Probability Clip)
  + [http://www.youtube.com/watch?v=O7xJs19orm0](http://www.youtube.com/watch?v=O7xJs19orm0)
  + [http://www.youtube.com/watch?v=QpfMwA0z_1Y](http://www.youtube.com/watch?v=QpfMwA0z_1Y)

+ Connecticut Frameworks for Mathematics

+ Common Core State Standards

+ Bloom’s Taxonomy

+ NCAA.com

+ Coach Wendy Davis, Former Player at Uconn and head coach of Trinity College Women’s Basketball
Christina and Ambar are playing H-O-R-S-E, a basketball game. Each girl is trying to prove that she is the better shooter.

Let's Play Ball
Ambar starts the game by shooting the basketball from such a tough position; she's betting that Christina can't shoot it from there. Ambar makes the shot, but Christina misses. Consequently, Christina earns an "H".

Now, it's Ambar's turn. She shoots, the ball smacks the backboard, and Ambar is disappointed that the ball ricochets to her feet. Ambar earns an "H". Christina actually makes the shot.

Christina and Ambar continue this back and forth until one of them spells H-O-R-S-E. The first person to spell H-O-R-S-E loses, and the winner is the one who doesn't have H-O-R-S-E.

Game Results
- Game 1: Christina: H-O-R-S-E Ambar: H-O-R| **Winner: Ambar**
- Game 3: Christina: H-O| Ambar: H-O-R-S-E| **Winner: Christina**
- Game 4: Christina: H-O-R-S-E| Ambar: H-O-R-S| **Winner: Ambar**
- Game 5: Christina: H| Ambar: H-O-R-S-E| **Winner: Christina**
- Game 7: Christina: H-O-R-S| Ambar: H-O-R-S-E| **Winner: Ambar**
- Game 8: Christina: H-O-R-S-E| Ambar: H-O-R-S| **Winner: Ambar**
- Game 10: Christina: H-O-R| Ambar: H-O-R-S-E| **Winner: Christina**
Questions

1. How many games did Christina win?

2. How many games did Ambar win?

3. What percentage of games did Christina win?

4. What percentage of games did Ambar win?

5. Using this data, how many games would Christina win out of 100?

6. Using this data, how many games would Ambar win out of 100?

*Adapted from Experimental Probability Worksheet: www.about.com/mathematics*
Name: ___________________________________
NCAA Basketball Player: __________________________________

Basketball Player Advertisement Rubric

<table>
<thead>
<tr>
<th>Understanding of the Content</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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</thead>
<tbody>
<tr>
<td>This person’s understanding of the topic is incomplete/incorrect. The student does not understand the topic. Person took statistics straight from the website.</td>
<td>Person has an incomplete understanding of the topic; misconception of the information. Person took some statistics from the website.</td>
<td>The person has a complete understanding of the information important to the advertisement but not in great detail. Student attempted to provide some of their own statistics.</td>
<td>The person has demonstrated a complete understanding of the topic. Student was able to present their player’s statistics and show how they derived to their answers.</td>
<td></td>
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<table>
<thead>
<tr>
<th>Communicates Effectively in Written Form</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>The communication demonstrates little or no attention to the use of necessary writing conventions; many grammatical errors on poster/advertisement.</td>
<td>The person does not use required conventions of writing or demonstrates small errors that are distracting in their poster/advertisement.</td>
<td>The person uses all necessary conventions of writing in his/her poster/advertisement.</td>
<td>The person uses all necessary conventions of writing without error in his/her poster/advertisement.</td>
<td></td>
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<table>
<thead>
<tr>
<th>Assignment</th>
<th>1</th>
<th>2</th>
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<tbody>
<tr>
<td>The person is not punctual; does not participate in the assigned task; does not follow the format; person is not persuasive.</td>
<td>The Person has not completed his/her Advertisement on his/her assigned player, does not follow the format; person does not attempt to persuade.</td>
<td>The assignment is neatly done but does not follow the suggested format (missing parts of the advertisement). Person is punctual and ready to present; person is persuasive - does not necessarily use statistics in their argument.</td>
<td>The assignment is neatly typed and follows the suggested format. Assignment is turned in on time, and person is punctual and ready to present. Person uses statistics to back up their argument in presentation.</td>
<td></td>
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<table>
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<tr>
<th>Creativity</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment lacks creativity/ Ad does not have a title/headline.</td>
<td>Assignment has title/headline/ Ad looks sloppy, not properly organized.</td>
<td>Assignment is completed with title/headline and a couple of images and other visuals to engage the viewer.</td>
<td>Assignment is completed with title/headline - Has over 5 images, and table with different statistics to engage the viewer.</td>
<td></td>
</tr>
</tbody>
</table>