

Statistics for First Grade, What Do You Mean?

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Rationale

This statistics curriculum unit is appropriate for an audience of first graders. Minor changes to the unit will make the lessons appropriate for any elementary grade. This specific curriculum unit was designed for first graders during forty-five minute class periods over seven days. The intent of this unit is to build a strong foundation related to statistics. Statistical knowledge is essential for success in the twenty-first century. However, negative attitudes regarding statistics are rampant in academic life and daily life. To help reverse this trend, this statistics curriculum unit is designed as an introduction and foundation for students early in their education. This unit will reach across the curriculum into such subject areas as math, reading, and writing. Students will be introduced to basic statistical terms such as likely, unlikely, maximum, minimum, range, and median. As these terms are introduced and implemented, students will be expected to use the terms properly in oral language and written language. Students will learn to represent data using concrete graphs, tally charts, bar graphs, and line plots. All lessons will be introduced with literature. Students will share ideas and information regarding data with partners and the class through think-pair-share activities, brainstorming sessions, and writing activities. These lessons will promote a positive attitude regarding statistics and lay the foundation for future success with statistics.

Statistics is a process in which data are analyzed and interpreted. The data are used to find patterns or relationships to inform decisions or predict outcomes. According to the American Statistical Association, statistics is the science of learning from data, and of measuring, controlling, and communicating uncertainty (1). Knowledge of statistics is imperative in our society. Statistics is a main component of numerous occupations. Medicine, economics, agriculture, business, government, law enforcement, weather forecasting, and education are a few examples of occupational fields that implement statistics on a daily basis. Not only is statistics predominant in various occupations, but also in daily life. Standardized tests, the US Census, political polls, tax brackets, on-line shopping, sports results, weather forecasts, and computer software programs are a few examples of using statistics in day to day life. To be a

responsible, knowledgeable, and productive citizen analyzing and interpreting data is crucial. The National Council of Teachers of Mathematics states the need to understand and be able to use mathematics in everyday life and in the workplace had never been greater and will continue to increase (2). Therefore statistics is an essential component of education for today's students.

Most jobs in the twenty-first century are based on at least some technology. To compete in today's job market students must be proficient in math. The National Science Board found that careers with the highest rate of growth will require individuals who are proficient in math and science (3). Weaknesses in math will result in limited job opportunities. Limited job opportunities will negatively affect the socioeconomic status of these math deficient individuals. To provide students with numerous job opportunities in the future, proficient math skills are required.

Despite the need for understanding statistics most people usually don't take a statistics class until college. By this time, preconceived notions about statistics have been formed by most students. Research over many years has established that attitudes play a significant role in learning mathematics (4). These negative attitudes will influence how a statistics problem is approached and the degree of effort put into a statistics problem. Therefore the outcome of the students' performance in statistics correlates strongly to their attitudes about statistics. These negative attitudes concerning statistics are not only confined to students but to teachers as well. Begg and Edwards (1999) found that elementary teachers were not comfortable teaching statistics, and did not see the importance of teaching statistics (5). A lack of statistical knowledge and inexperience teaching statistics contributes to teachers' negative perceptions of this skill. Most teachers have only taken one statistics course in college. In a study conducted by Jamie Mills, teachers reported additional training was needed regarding statistical concepts (6). Educators' negative attitude towards statistics education is not surprising. Statistics has only been promoted as a separate discipline for approximately twenty years. The Undergraduate Statistics Education Initiative, the Center for Statistics Education, the Section of Statistical Education, the Mathematical Association of America, and the National Council of Teachers of Mathematics has been focusing on expanding and improving statistical education(7). However, most teachers were not attending college, but rather a member of the workforce as this new focus on statistics was emerging. In order to improve this situation, statistics workshops should be offered to educators. Researchers determined that one focused professional development geared for elementary teachers is all that is needed for an elementary teacher to return to the class and teach a math skill effectively(8).

In order to improve mathematics education for elementary students and high school students the National Council of Teachers of Mathematics(NCTM) created a standards-based curriculum(9). The content standards identified by the NCTM are:

- Number and Operations
- Algebra
- Geometry
- Measurement
- Data Analysis and Probability.

These five content standards are emphasized in varying degrees throughout the grade levels. Data Analysis and Probability are mainly emphasized in the elementary grades. Statistics is

addressed in this content standard. This content standard requires students to create questions; then collect, organize, and display data to answer the questions. Educators must teach the students how to do this effectively. Collecting and organizing the data will not pose great difficulty for young children because they are naturally curious about their environment. However, modeling and teaching how to analyze data, make inferences, make predictions, and understand probability will be more challenging. The educator must determine the most effective strategy to present these skills to young students.

The learning environment is an important factor in learning statistics. According to Teaching Today (2005), an effective standards-based math classroom contains six characteristics. These characteristics are:

- lessons with specific standard-based objectives
- student centered learning activities
- inquiry and problem solving focused lessons
- critical thinking and knowledge application skills
- adequate time, space, and materials to complete tasks
- varied continuous assessments designed to evaluate student progress
- teacher effectiveness (10)

Additionally, research has demonstrated the learning environment established by the teacher can have a positive influence on a student's attitude towards statistics (11). The established learning environment should be supportive and nurturing, allowing students to feel safe to take risks. Statistics requires students to explore, make predictions, and ask questions. It is unlikely students will do these things if the environment is not safe and supporting.

Teaching strategies incorporated by the teacher in math lessons also have a powerful impact on learning. Sabeen and Bavaria (2005) have composed a list of best practices for standards-based math lessons. These best practices are:

- high level of student engagement
- tasks based on prior knowledge
- scaffolding concepts, procedures, and understanding
- modeling high level performance
- communicating (orally or written) thinking and meaning
- students self-monitor their progress
- appropriate amount of time designated for task(12)

To have a high level of student engagement, students must construct their own meaning regarding the lesson being taught. This should occur through teacher modeling, guided questioning, and the use of manipulatives. Whenever possible educators should develop lessons based on a student's prior knowledge and implement scaffolding strategies. Activating a child's prior knowledge and scaffolding the old knowledge to new knowledge will enable students to understand and remember the concept being taught by the instructor. Modeling how to approach, collect, analyze and interpret data is an essential teaching strategy. First the teacher models the mathematical concept, then the student practices the mathematical concept with the teacher, next the student completes the mathematical concept with a partner, and finally the concept is completed independently. Regie Routman and others conclude that the gradual release of responsibility from teacher to student is the most effective strategy for learning (13).

Implementing manipulatives in a math lesson also appear to aid in the understanding of mathematical concepts and processes, provide tools for problem-solving, and improve students' attitudes toward math (14). Communicating the concept learned by the student is an essential skill required for effective learning. When students communicate the procedure used to complete the math concept; the proper terminology should be used. The terminology will be introduced during the modeling portion of the lesson. As the math lesson is gradually released to the student, the proper terminology will be emphasized. These skill specific terms will become a part of the student's vocabulary. Communicating the process for a mathematical concept aids the student's ability to self-monitor his/her progress.

Objectives

This statistics curriculum unit is aligned with the National College-Career Ready Common Core Standards and the Pennsylvania Academic Standards. It is designed for a self-contained first grade class during a forty-five minute class period over seven days at the beginning of the school year. Minor adjustments can be made to this unit to implement it anytime during the academic year. These foundational statistics classes will be incorporated into other subject areas such as reading and writing. Students will be actively engaged in collecting and organizing data to create tally charts, tables, bar graphs, and line plots. These graphs will be used by the students to answer simple questions and draw conclusions. The students will also use the data to find landmarks. The maximum, the minimum, the range, and the median, will be identified from a set of data by the students. These lessons will be supported using various materials and activities.

The goal of this unit is to create a strong foundation for statistics. This foundation enables students to build on their prior knowledge to understand more complex statistical facts in the future. The hands-on activities and manipulatives will make learning statistics fun, not intimidating; giving them a positive attitude about this skill.

Strategies

Lesson 1:

The statistics unit will begin with a lesson utilizing the terms likely and unlikely. The narrative *Cloudy with a Chance of Meatballs* by Judith Barrett and a T-chart labeled likely and unlikely will be displayed. In order to engage children in their thinking, the strategy Think-Pair-Share will be incorporated into this lesson. The students will turn to their neighbor and share one type of weather. Once the students have shared with their neighbor, they will share with the class. As students share the varieties of weather, the teacher will record the weather under "*likely*" on the T-chart while stating, "It is *likely* we have all seen rain." After this brainstorming session is completed, *Cloudy with a Chance of Meatballs* will be read to the class. Students will share the types of weather experienced by the characters in the story. The teacher records this weather under "*unlikely*" on the T-chart while stating, "It is *unlikely* we have seen it rain meatballs." Using the T-chart the students will determine that *likely* means it will probably happen and *unlikely* means it will probably not happen. Students will fold a piece of paper in half and illustrate a likely weather event and an unlikely weather event. Under each illustration the

student will write It is likely to _____, and It is unlikely to _____. Each student will share his/her illustration and explain the terms *likely* and *unlikely*. The illustrations from the story and the students' illustrations provide concrete examples for the terms *likely* and *unlikely*.

Lesson 2:

Four Seasons Make a Year by Anne F. Rockwell will be read to the children. Chart paper will be labeled with the each season. Index cards will be distributed to each student. The class will be instructed to write the name of his/her favorite season. Each child will come to the chart paper and draw a tally mark next to his/her favorite season. The class will then count the tally marks and write the corresponding number on the chart. The students will then learn the information gathered from their classmates and organized on the tally chart is called data. The data will then be used to answer questions. The questions are:

1. Using the *data* on the *tally chart*, how many people like fall(winter, spring, summer)?
2. Using the *data* on the *tally chart*, which season was liked the most(least)?
3. Using the *data* on the *tally chart*, predict which season other first graders are *likely* to choose as their favorite season.
4. Using the *data* on the *tally chart*, predict which season other first graders are *unlikely* to choose as their favorite season.

It is important to use the terms data, tally chart, likely, and unlikely. This is language used often in statistics. Using this language on a daily basis will improve statistical vocabulary and enhance the students' understanding of statistics.

Lesson 3:

The Favorite Seasons tally chart from the previous lesson will be used to create a bar graph and find landmarks (maximum, minimum, and range). The Favorite Seasons tally chart will be displayed. Students will be given color coded post-it notes according to his/her favorite season. Students will be asked to share his/her favorite season with the class. The teacher will then provide an orange post-it note for the fall season, a blue post-it note for the winter season, a green post-it note for spring, or a yellow post-it note for summer. Each student will write his/her name on the post-it note. The teacher will announce a season, the students will place their post-it note above the name of the season on the chart paper. Students may need teacher assistance to place the post-it notes on the chart paper correctly. Once the bar graph is completed, students will be asked to infer why this chart is named a bar graph. The teacher will guide the students in comparing the tally chart and the bar graph. Students will be given one piece of one inch graph paper titled number of students and fall, winter, spring and summer along the x and y axis. Students will color in the appropriate number of boxes above each season. The students will then be asked to identify the highest value and lowest value on the bar graph. The teacher will inform students the highest value is called the *maximum* value and the lowest value is called the *minimum* value. The students will then subtract the minimum value from the maximum value to find the *range*. The class will review the terms bar graph, maximum, minimum, and range.

Lesson 4:

Students will be directed to think about one thing to share about his/her hair (color, short, long, straight, curly). They will share with his/her neighbor and then with the class. The teacher will display *Aaron's Hair* by Robert Munsch. The students will make predictions about the narrative. After listening to the story the class will make a concrete graph of each student's hair color. Each student will be directed to take a unifix block (black, brown, yellow, orange) that matches the color of his/her hair. One piece of chart paper with the x axis labeled as number of students and the y axis labeled as black, yellow, brown, and orange will be placed on a flat surface (table, floor). The teacher will call each color as students place the colored unifix cube above the appropriate color on the chart paper. The teacher will then ask:

1. Using the *data* on the graph, how many students have black hair?
2. Using the *data* on the graph, how many students have blonde hair?
3. Using the *data* on the graph, how many students have brown hair?
4. Using the *data* on the graph, how many students have red hair?
5. Using the *data* on the graph, predict which hair color most first graders are *likely* to have.
6. Using the *data* on the graph, predict which hair color most first graders are *unlikely* to have.
7. Using the *data* on the graph, find the *maximum* value with your partner.
8. Using the *data* on the graph, find the *minimum* value with your partner.
9. Using the *data* on the graph, find the *range* with your partner.
10. Is there another way to display the same *data*?

Since the previous lessons featured tally charts and bar graphs, most children will probably suggest a tally chart or bar graph to display data. The teacher will suggest that each student in class create a bar graph to display this data using one inch grid paper. The students will be instructed to explain how to create the bar graph, one step at a time, to the teacher. This will allow the teacher to guide the students' thinking and produce an accurate bar graph. Please note, another story may be chosen if a variety of hair colors does not occur in your classroom.

Lesson 5:

Ask the students to raise their hand if they have a brother or sister. Read the story *My Brothers and Sisters* by E. Sebastian. Each student will receive a post-it note and will be instructed to write the number of siblings in their family. Students will be asked to share the names of the graphs that have been created in previous lessons (tally charts and bar graphs). The teacher informs students a line plot will be created in this lesson. On chart paper, draw and label the x axis as, 0 siblings, 1 sibling, 2 siblings, 3 siblings, 4 sibling, and 5 or more siblings. Students will place an x above the correct label on the x axis. The teacher will then ask:

1. Using the *data* on the line plot, how many students have 0 siblings?
2. Using the *data* on the line plot, how many students have 1 sibling?
3. Using the *data* on the line plot, how many students have 2 siblings?
4. Using the *data* on the line plot, how many students have 3 siblings?
5. Using the *data* on the line plot, how many students have 4 siblings?
6. Using the *data* on the line plot, how many students have 5 or more siblings?
7. Using the *data* on the line plot, how many siblings are most first graders *likely* to have?

8. Using the *data* on the line plot, how many siblings are most first graders *unlikely* to have?
9. Using the *data* on the line plot, find the *maximum* value with your partner.
10. Using the *data* on the line plot, find the *minimum* value with your partner.
11. Using the *data* on the line plot, find the *range* with your partner.

The median value will be introduced to the class. The median value is the middle value. Instruct students to pick up his/her post-it note, line the students up according to the number of siblings written on the post-it note. Emphasize the median value is the middle value. Instruct each student at the beginning and end of the line to have a seat. Continue in this manner until the median value is found. Since first graders have not learned to find the average, it is acceptable to have two medians. Ask the students:

12. Using the *data* on the line plot, find the *median* value.

Lesson 6:

Each student will share the month of his/her birthday, then write it on a post-it note. The teacher will read *It's My Birthday, Too!* by Lynne Jonell. Ask students to recall the name of the graph created in the previous lesson (line plot). The teacher will inform the students a line plot about birthdays will be created in this lesson. On chart paper, draw and label the x axis with all twelve months written beneath the line. Students place an x above the appropriate month for his/her birthday. The teacher will then ask

1. Using the *data* on the line plot, how many students have a birthday in January?
(February, March...)
2. Using the *data* on the line plot, find the *maximum* value with your partner.
3. Using the *data* on the line plot, find the *minimum* value with your partner.
4. Using the *data* on the line plot, find the *range* with your partner.

The teacher will instruct the students to recall the meaning of the median value (middle value). The students will recall how the median value was determined in the previous lesson. The teacher will call each month; the students will line-up accordingly with his/her post-it note. Emphasize the median value is the middle value. Instruct each student at the beginning and end of the line to have a seat. Continue in this manner until the median value is found. Since first graders have not learned to find the average, it is acceptable to have two medians. Ask the students:

5. Using the *data* on the line plot, find the *median* value.

Lesson 7:

Students will brainstorm what they have learned in the previous six lessons. The teacher will record this on chart paper, prompting the students to use the correct vocabulary. After the background knowledge has been shared, each student will be instructed to write and illustrate what he/she has learned from these lessons.

Classroom Activities

Lesson One: Is it likely or unlikely? (45 minute class period)

I. Objectives

- A. Students will illustrate types of weather *likely* to be experienced and *unlikely* to be experienced.

II. Content

A. Pennsylvania Standards

1. Math

a. 2.4 Data Analysis and Probability

- 1. Represent and interpret data using tables/charts

b. 2.1 Number and Operations in Base Ten

- 1. Extend the counting sequence to read and write numerals to represent objects

2. Literacy

a. 1.1 Learning to Read Independently

- 1. Identify new vocabulary learned in various subject areas

b. 1.6 Speaking and Listening

- 1. Use correct vocabulary and word usage when speaking
- 2. Participation in small and large group discussions with assigned roles

III. Materials

A. *Cloudy with a Chance of Meatballs* by Judith Barrett

B. Chart Paper

C. Markers, paper, and crayons

IV. Activities

A. Display book and T chart (label likely and unlikely)

B. Think-Pair-Share one type of weather

C. Share varieties of weather with the class

D. As students share, ask the class if they have ever seen rain, or played in snow... each time they answer emphasize the type of weather by saying, "it is *likely* we have all played in the snow" etc.

E. Write the types of weather under the title likely on the T-chart.

F. Read *Cloudy with a Chance of Meatballs*

G. Share weather from the story and list under the title unlikely

H. Have students explain the difference between likely (will happen) and unlikely (won't happen)

J. Students will fold a paper in half. On one side they will illustrate one type of weather and write, It is likely to_____. On the other side of the paper they will illustrate a type of weather from the story and write, It is unlikely to _____.

Lesson Two: Tally Chart and Data (45 minute class period)

I. Objectives

- A. Students will identify and create a tally chart displaying their favorite season.
Students will use data to answer questions about seasons.
Students will use the terms tally chart and data correctly.

II. Content

A. Pennsylvania Standards

1. Math
 - a. 2.4 Data Analysis and Probability
 1. Represent and interpret data using tables/charts
 - b. 2.1 Number and Operations in Base Ten
 1. Extend the counting sequence to read and write numerals to represent objects
 2. Literacy
 - a. 1.1 Learning to Read Independently
 1. Identify new vocabulary learned in various subject areas
 - b. 1.6 Speaking and Listening
 1. Use correct vocabulary and word usage when speaking
 2. Participation in small and large group discussions with assigned roles
- III. Materials
- A. *Four Seasons Make a Year* by Anne F. Rockwell
 - B. Chart Paper
 - C. Markers, index cards, and crayons
- IV. Activities
- A. Display book and tally chart
 - B. Read *Four Seasons Make a Year* by Anne F. Rockwell
 - C. Students vote for their favorite season by writing a tally mark next to their favorite season on the tally chart.
 - D. As a class discuss the data (information organized and gathered from the tally chart)
 - How many people liked fall (winter, spring, summer)?
 - Which season was liked the most (least)?
 - Predict which season other first graders are likely to choose as their favorite season.
 - Predict which season other first graders are unlikely to choose as their favorite season.
 - E. Review terms tally chart and data
 - F. Review likely and unlikely
 - e.g. Is it more likely or more unlikely to snow in the summer?

Lesson Three: Bar Graph and Data (45 minute class period)

- I. Objectives
 - A. Students will identify and create a bar graph displaying their favorite season. Students will use data to identify the maximum, the minimum, and the range. Students will use the terms data, bar graph, maximum, minimum, and range correctly.
- II. Content
 - A. Pennsylvania Standards
 1. Math
 - a. 2.4 Data Analysis and Probability
 1. Represent and interpret data using tables/charts
 - b. 2.1 Number and Operations in Base Ten

1. Extend the counting sequence to read and write numerals to represent objects

III. Materials

- A. Favorite Seasons Tally Chart
- B. Chart Paper
- C. Post-it notes
- D. One-inch graph paper, pencils, and crayons

IV. Activities

- A. Display seasons tally chart
- B. Distribute color coded post-it notes to students. Direct students to write his/her name on the post-it note.
- C. Using chart paper and labeled post-it notes, create a bar graph
- D. As a class compare the tally chart and the bar graph
- E. Have each student copy and complete the bar graph on one inch graph paper
- F. Find the Maximum (highest number), find the Minimum (lowest value), and find the Range (Maximum-Minimum)
- G. Review terms bar graph, data, maximum, minimum, and range

Lesson Four: Bar Graph and Data (45 minute class period)

I. Objectives

- A. Students will identify and create a bar graph displaying their hair color.
Students will use data to answer questions about hair color.
Students will identify the maximum, the minimum, and the range using the data.

II. Content

A. Pennsylvania Standards

1. Math

a. 2.4 Data Analysis and Probability

1. Represent and interpret data using tables/charts

b. 2.1 Number and Operations in Base Ten

1. Extend the counting sequence to read and write numerals to represent objects

2. Literacy

a. 1.1 Learning to Read Independently

1. Identify new vocabulary learned in various subject areas

b. 1.6 Speaking and Listening

1. Use correct vocabulary and word usage when speaking
2. Participation in small and large group discussions with assigned roles

III. Materials

- A. *Aaron's Hair* by Robert Munsch
- B. Unifix blocks (black, brown, yellow, orange)
- C. Chart paper
- D. One inch graph paper for each student

IV. Activities

- A. Display *Aaron's Hair* by Robert Munsch. Predict what the story is about.
- B. Read *Aaron's Hair*. Each student shares the color of his/her hair.
- C. Direct students to take a unifix block that matches the color of his/her hair.

Line unifix blocks on chart paper according to color (have students determine how the data/blocks should be organized)

- D. Students will use data to create a bar graph using one inch graph paper.
- E. Students will inform teacher how the bar graph should be made. Teacher will give appropriate feedback.
- F. Teacher and students will create graph together.
- G. Find the Maximum(highest number), find the Minimum (lowest value), and find the Range (Maximum-Minimum)

Lesson Five: Line Plot (45 minute class period)

I. Objectives

- A. Students will create and use a line plot to display number of siblings.
Students will use data to identify the maximum, the minimum, the range and the median.

II. Content

A. Pennsylvania Standards

1. Math

a. 2.4 Data Analysis and Probability

2. Represent and interpret data using tables/charts

c. 2.1 Number and Operations in Base Ten

2. Extend the counting sequence to read and write numerals to represent objects

2. Literacy

a. 1.1 Learning to Read Independently

1. Identify new vocabulary learned in various subject areas

b. 1.6 Speaking and Listening

1. Use correct vocabulary and word usage when speaking

2. Participation in small and large group discussions with assigned roles

III. Materials

- A. *My Brothers and Sisters* by E. Sebastian.
- B. Chart paper (2)
- C. Post-it notes

IV. Activities

- A. Read *My Brothers and Sisters* by E. Sebastian.
- B. Students are given a post-it note; students write the number of siblings they have.
- C. Students will create a class line plot of siblings.
- D. Find the Maximum(highest number), find the Minimum(lowest value), and find the Range(Maximum-Minimum).
- E. Introduce Median(middle value)
- F. Students will make a concrete graph by lining up according to the number of siblings they have. One student from either end of the graph will go back to his/her seat until the middle value is found.

*If there are two numbers in the middle, children may use the two medians.

Children at this age are unable to find the average of two numbers.

Lesson Six: Tally Chart and Line Plot (45 minute class period)

I. Objectives

- A. Students will create and use a line plot to display birthdays.
Students will use data to identify the maximum, the minimum, the range and the median.

II. Content

A. Pennsylvania Standards

1. Math

a. 2.4 Data Analysis and Probability

- 1. Represent and interpret data using tables/charts

b. 2.1 Number and Operations in Base Ten

- 1. Extend the counting sequence to read and write numerals to represent objects

2. Literacy

a. 1.1 Learning to Read Independently

- 1. Identify new vocabulary learned in various subject areas

b. 1.6 Speaking and Listening

- 1. Use correct vocabulary and word usage when speaking
- 2. Participation in small and large group discussions with assigned roles

III. Materials

- A. *It's My Birthday, Too!* by Lynne Jonell
- B. Chart paper(2)
- C. Post-it notes

IV. Activities

- A. Read *It's My Birthday, Too!* by Lynne Jonell
- B. Each student is given a post-it note; each student writes his/her birthday on the post-it note.
- C. Students will create a class line plot of birthdays.
- D. Find the maximum, the minimum, and the range.
- E. Find the Median (middle value).

Lesson Seven: Writing (45 minute class period)

I. Objectives

- A. Students will write at least two details about data.
Students will illustrate and share with the class.

II. Content

A. Pennsylvania Standards

1. Literacy

a. 1.1 Learning to Read Independently

- 1. Identify new vocabulary learned in various subject areas

b. 1.6 Speaking and Listening

- 1. Use correct vocabulary and word usage when speaking
- 2. Participation in small and large group discussions with assigned roles

2. Writing

- a. 1.4 Students write for different purposes and audiences. Students write clear and focused text to convey a well-defined perspective and appropriate content

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Annotated Bibliography

Annotated Teacher's Bibliography

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This document addresses research based math lessons for all classrooms, but specifically for a virtual classroom. Information is arranged in easy to read tables.

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This study compares the success rate of students who are instructed in the standards-based curriculum Everyday Mathematics. This math program promotes its focus on assisting math thinking and sharing ideas with peers.

4. Kamii C., Rummelsburg J. Arithmetic for First Graders Lacking Number Concepts. *Teaching Children Mathematics*. March 2008.

Young struggling mathematics learners from a Title I school are instructed on number concepts according to Piaget's theory. This theory states children

independently develop number concepts over five or six years beginning as infants.

5. Mvududu N. (2003). A cross-cultural study of the connection between students' attitudes toward statistics and the use of constructivist strategies in the course. *Journal of Statistics Education*, Volume 11, Number 3.

Undergraduate students participated in a study investigating a constructivist learning environment and the students' attitude towards statistics.

6. National Association for the Education of Young Children(2010). Early Childhood Mathematics Early Beginnings.

The National Association for the Education of Young Children and the National Council Of Teachers of Mathematics maintain quality mathematics education for young children is essential for mathematics learning in the future.

7. Nisbet S., Williams A. Improving Students' Attitudes to Chance with Games and Activities. *Australian Mathematics Teacher* 65 (3) 2009.

This paper researches a learner's attitude and its impact on learning math. Previous studies have demonstrated a positive correlation to a positive attitude and success in learning math facts.

8. Protheroe N. (2007). What Does Good Math Instruction Look Like? *Principal*, September/October.

Research-based math knowledge presenting skills, strategies, and various instructional methods for school personnel.

Annotated Student Bibliography

1. Barrett, J. *Cloudy with a Chance of Meatballs*. New York; Aladdin Paperbacks; 1978

Chewandswallow is an interesting town, where it rains soup and juice and storms consist of mashed potatoes and hamburgers. The weather is not as wonderful as it sounds. The townspeople need to find a solution to the weather problem.

2. Rockwell, Anne F. *Four Seasons Make a Year* . Walker & Co. March 2004

Children will experience the change of each season on the farm. The author and illustrator provide facts and graphics every child should know about the four seasons.

3. Munsch, R. Aaron's Hair. USA; Scholastic Inc.; March 2002

Aaron wants to look like his father, so he grows his hair long. However, he soon finds out his long unruly hair is difficult to care for properly. Aaron screams "Hair, I hate you!" Surprisingly Aaron's hair jumps off his head and takes him on an adventure through the neighborhood.

4. Sebastian, E. My Brothers and Sisters. Rosen Pub Group; Aug 2010

A narrative that introduces a variety of siblings children may have in their family.

5. Jonell, L. It's My Birthday Too!. USA, G.P. Putnam's Sons; 1999

When Christopher's younger brother ruins his birthday party, he wishes for a dog instead of a brother. Christopher's younger brother does something silly and Christopher changes his mind about his wish.

Content Standards

Math

2.4 Data Analysis and Probability

-Gather, organize and display data using pictures, tallies, charts, bar graphs and pictographs

2.1 Number and Operations in Base Ten

- Extend the counting sequence to read and write numerals to represent objects

Literacy

1.1 Learning to Read Independently

-Identify new vocabulary learned in various subject areas
-Answer questions based on material read

1.2 Reading Critically in All Content Areas

- discuss content of informational items in text

1.6 Speaking and listening

- listen to others when they are speaking and demonstrate an understanding of the message

- listen to selections of literature
- use correct vocabulary and word usage when speaking
- relate real experiences to a specific topic
- participate in small and large group discussions with assigned roles.