Integrating Mathematics into Literature

Concepts Covered:

Tables, Fractions, Decimals, Percents, Ratio, Proportion, Probability

Sunshine State Standards:
MA.A.1.2.2
MA.A.1.2.3
MA.D.1.2.1
MA.E.1.2.2
MA.E.2.2.2

Materials for each group:

10 sets of 10 different colored snap cubes
1 box of markers
1 paper lunch bag with candy
10 sticky labels
assorted packs of sticky notes
1 calculator
grid/chart paper

Student Arrangement:

Students should work in groups of 3 or 4.

Procedure:

Day 1: Table

1. Read *Cucumber Soup* by Vickie Leigh Krudwig to students.
2. Have students make representations for the number of each kind of bug found in the book. (For example, 10 ants can be represented with 10 blue snap cubes and 2 praying mantises can be represented with 2 red snap cubes etc…)
3. Label each group of bugs with stickers.

    Discussion:
    How did you construct and organize your models of the insects?
    Why did you arrange them that way?
    What are other methods we could use to organize this information?

Day 2: Multiples

1. Using chart paper, create data tables to organize the information.
2. Share/Explain tables with class, use chart paper.

   Discussion:
   How many bugs are there in all?
   What would happen to the number of bugs if 2 or more cucumbers fell on the anthill?
   How many of each bug would be needed to move the cucumbers? (Fill in table)
   What patterns do you see?
   What kinds of numbers are these?

Day 3: Fractions

1. Direct each student to pick a bug and write its name on a sticky note. Each student in the group must pick a different bug.
2. On your sticky note, write what part of the whole bug group your bug is (For example, in the book there are 9 mosquitoes and 55 bugs all together, so the relationship is $\frac{9}{55}$.)
3. Students share answers in their groups explaining how and why they wrote their answer the way they did.

   Discussion:
   Show each bug's fractional representation of whole bug group on chart paper.
   Discuss need to simplify some of the fractions.

4. Working in pairs, the students should complete a data table on grid paper.
5. Demonstrate how to convert decimals to percentages
6. Complete the data table with the matching decimal and percent. (Students work in pairs to complete their data tables.)
7. Ask students how fractions, decimals, and percents are related.
8. Ask students how fractions, decimals, and percents help them understand data collected.

Day 4: Ratio Part to Whole

1. Lead discussion about the need to compare data, and ways fractions, decimals, percents can be used to help make those comparisons.
2. Another way to compare data.
   Ex. There are 9 mosquitoes for every group of 55 bugs. State this comparison as 9 to 55. Explain this is called a ratio. It can be written in several ways. In words, it can be written as "9 to 55". We also have a symbol to replace the word "to." Ask if anyone already knows this symbol. Show an example of a ratio using the colon (9:55).
3. Add another column to the data table.
4. On the sticky note, write the ratio for the bug group chosen earlier. The ratio should be written in all 3 ways: 9 to 55, 9:55, and $\frac{9}{55}$.
5. Share with your group.
6. Fill in the ratio of bugs in each separate group to the total bugs.
7. Have students add data to data table.
   Discussion:
   What about the fractions we simplified?
   What happened to their ratio?
   What about the equivalent fractions we calculated earlier?
   Will their ratio be any different than the ones we just completed? Why?

Day 5: Ratio Part to Part

1. Discuss possibility of comparing a group of bugs to another group of bugs rather than a group of bugs to the whole group of bugs.
2. Pick two bug groups and predict what the ratio would be.
3. Write the bug group names and the three forms of the ratio on the back of the grid paper.
4. Share answers with class on chart.

Day 6: Probability

Discussion:
1. Which bug would a hungry robin eat if he swooped down on the mixed group of bugs? Why do you think that?
2. Is it guaranteed that the bird will really catch that bug?
3. Discuss terms used when talking about probability.
4. Discuss probability and its mathematical representation
5. Lead the group to discover the fractional representation, decimal, and percent form - the probability of catching a mosquito is $\frac{9}{55}$, or about 0.16, or about 16%.

Probability Activity/Game

Directions:
Pull apart snap cubes and place inside paper bag (Just the right number of cubes for each bug group).
Predict which bug/cube will be pulled from the bag.
Tell the group what the probability is of getting that bug.
Students who successfully predict which bug will be selected may choose one piece of candy
Return all cubes to the bag after each try.

Variation 1:
This time, pick two bugs that you predict will be chosen.
Pick one cube from the bag.

Variation 2:
Predict which bug is likely to be chosen.
Pick two cubes from the bag.

Discussion:

How do probability and ratio tie into fractions, decimals, and percent?