Digging Deeper Into Story Problems using digital cameras

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(Adapted from Draw a Math Story by Renee Goularte on ReadWriteThink.org website)

Grade Band
K-3

Estimated Lesson Time
Three 40-minute sessions

Overview
This activity begins with the reading aloud of a math-oriented story, Ten Sly Piranhas by William Wise, brainstorms synonyms for addition and subtraction on a concept map, models math story writing and then gives students an opportunity to write addition and subtraction stories. Students will then illustrate their stories with pictures using a digital camera. Students are first grouped and use a story board to write an addition or subtraction story. The students in the group plan what they will photograph by drawing a representation on the story board. Then students use the digital camera to record the pictures. Next, students make a stapleless book on line and print out a copy for each student in the group. The students follow the directions online to fold their books. The last step is to print out copies of the pictures and each student will glue them in the books. The pictures can also be projected for the class to see while the group shares their story problem. The class can then solve the story problem.

From Theory to Practice
As cited by Johnson (2003), Ann Thompson and Joe Garafalo challenge traditional strategies for teaching mathematics, some of which they consider ineffective. They advocate a classroom atmosphere “that is alert to the continual challenge of solving interesting mathematics problems and finding mathematics problems in the events of everyday life.” These two mathematics educators are excited about the potential of arming students with digital cameras and sending them forth, using digital storytelling strategies with the hope that they will be motivated to engage in both creating and solving authentic yet challenging mathematics problems.

Robyn Silbey (2003) states that speaking and writing in math offer students an opportunity to synthesize their thinking and articulate it for others to hear, read, and
review. Moreover, speaking and writing in math provide teachers with insights into students’ thinking, that in some cases, are not otherwise accessible.

Writing problems for others to solve helps students pay attention to the known and unknown information in a problem and explore and experiment with the problem’s wording and structure. It challenges the students to figure out what information to give and to leave out. It also encourages the students to provide enough information without taking away the challenge or giving away the answers. (Crespo, 2003)

**Student Objectives**

Students will

- identify and use key mathematical terms in discussion and in writing
- tell and write a sequential story incorporating the addition or subtraction operation
- plan and photograph illustrations for their stories using a digital camera
- make a stapleless book using the computer and following the online directions
- state and write equations that correspond to their stories

**Resources**

- Making Books Web Site
- Stapleless Book Interactive

**Instructional Plan**

**Resources**

- Storyboard sheet for each group
- Classroom computers connected to a printer or a computer lab with printers

**Instruction and Activities**

*Session One*

1. Gather students together to listen to the read aloud. Tell the students to be listening for words that are synonyms of addition or subtraction. Read the story and then discuss and ask questions about the story.
2. Using Kidspiration or a piece of chart paper, make a concept map with addition in the middle. Have the students recall words from the story and brainstorm synonyms for addition. Next do the same with subtraction.
**Session Two**

1. Review the concept maps made in session one. Tell the students that everyone is going to participate in telling a story and that the story will have some math in it. Tell them they can use the words from the concept maps. Begin by generating ideas as to who the characters in the story will be and what they might be doing.

2. Ask for a volunteer to suggest a character. Ask another volunteer to suggest a setting and a third to tell what the character is doing.

3. Then ask prompting questions of the students to make sure a number of objects is established. For example, if the story is about a boy and a girl on a picnic, you might ask what they will be eating and how many food items they have. Place a copy of the storyboard under the document camera to project for the class to see and start filling in the spaces with the information the students are giving you.

4. Continue by asking students what might happen next. Encourage them to use words from the math concept maps. Questions could include:
   - How do the characters get more or less items?
   - How many more?
   - How many less?

5. As students develop the sequence of the story, keep in mind that this is essentially an expanded story problem, so it should be simple and kept to four or five steps/pages.

6. Tell the students to plan how to illustrate the story. Explain how the pictures will show what you plan to photograph with the digital camera. (You will need to have a lesson on using digital cameras before the next lesson.)

7. When the story is complete, have students retell it, using math vocabulary and focusing on the quantities of objects and how they change.

**Session Three**

1. Before doing session three, you will need to make digital pictures to go with the class story problem.

2. Gather students together and model how you made your pictures, loaded them on the computer and then can now view them. Show them how you followed the plan on the storyboard and that they will be expected to follow their plan.

3. Tell the students to get in their groups, gather any materials needed for the pictures and proceed to make their pictures.

4. As students work, circulate among the groups and assist when needed. As groups finish their illustrated stories, you can go ahead and load them on your computer and print out the small pictures (enough for every child to make a stapleless book.)
5. Students go to the computer lab and go to the website: http://www.readwritethink.org/materials/stapleless/index.html
   ReadWriteThink Stapleless Book Student Interactive. Students type their story and follow the instructions on the website to make the books. Explain that they will need to print out enough pages for each member of the group to make a book.

6. Have the pictures ready for the students to glue in their books when they return from the computer lab.

7. Project each group’s pictures as the group reads their story problem from their own little book. Ask for volunteers to answer the problem. Be sure the answer is written in a complete sentence.

 Variations and Extensions

1. Instead of having students use a digital camera to illustrate their stories, have them draw first and then write.

2. Have each student draw and write their own story on index cards and make an Index Card Book out of the story, following directions at the Making Books Website.

 Web Resources

 Math-Literature Read Alouds
 http://www.share2learn.com/mathliterature.html

 Stapleless Book
 http://www.readwritethink.org/materials/stapleless/index..html
 ReadWriteThink Stapleless Book Student Interactive

 Index Card Book
 http://www.makingbooks.com/indexcard.html
 Directions for making an Index Card Book

 Student Assessment/Reflections
 Assessments, formal and informal, can be determined based on your students’ needs. Examples include

 - student participation in whole-group shared writing
 - quality of content in student books, especially relationship of pictures to text in equations
 - student participation in discussion about their stories
Mathematics

(2.12) Underlying processes and mathematical tools. The student applies Grade 2 Mathematics to solve problems connected to everyday experiences and activities in and outside of school. The student is expected to:

(A) identify the mathematics in everyday situations

(B) use a problem-solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness;

(C) select or develop an appropriate problem-solving strategy including drawing a picture, looking for a pattern, systematic guessing and checking, or acting it out in order to solve a problem; and

(D) use tools such as real objects, manipulatives, and technology to solve problems.

(2.13) Underlying processes and mathematical tools. The student communicates about Grade 2 mathematics using informal language. The student is expected to:

(A) explain and record observations using objects, words, pictures, numbers, and technology; and

(B) relate informal language to mathematical language and symbols.

English/Language Arts

(8) Reading/vocabulary development. The student develops an extensive vocabulary. The student is expected to:

(A) discuss meanings of words and develop vocabulary through meaningful/concrete experiences (K-2);

(B) develop vocabulary by listening to and discussing both familiar and conceptually challenging selections read aloud (K-3);

(C) develop vocabulary through reading (2-3); and
(14) Writing/purposes. The student writes for a variety of audiences and purposes, and in various forms. The student is expected to:

(A) write to record ideas and reflections (K-3);

(B) write to discover, develop, and refine ideas (1-3);

(C) write to communicate with a variety of audiences (1-3); and

(D) write in different forms for different purposes such as lists to record, letters to invite or thank, and stories or poems to entertain (1-3).

(18) Writing/writing processes. The student selects and uses writing processes for self-initiated and assigned writing. The student is expected to:

(A) generate ideas for writing by using prewriting techniques such as drawing and listing key thoughts (2-3);

(B) develop drafts (1-3);

(C) revise selected drafts for varied purposes, including to achieve a sense of audience, precise word choices, and vivid images (1-3);

(D) edit for appropriate grammar, spelling, punctuation, and features of polished writings (2-3);

(E) use available technology for aspects of writing, including word processing, spell checking, and printing (2-3)

Technology Applications

(7) Solving problems. The student uses appropriate computer-based productivity tools to create and modify solutions to problems. The student is expected to:

(A) use software programs with audio, video, and graphics to enhance learning experiences; and

(B) use appropriate software, including the use of word processing and multimedia, to express ideas and solve problems.

(8) Solving problems. The student uses research skills and electronic communication, with appropriate supervision, to create new knowledge. The student is expected to:
(A) use communication tools to participate in group projects; and

(B) use electronic tools and research skills to build a knowledge base regarding a topic, task, or assignment.

(10) Communication. The student formats digital information for appropriate and effective communication. The student is expected to:

(A) use font attributes, color, white space, and graphics to ensure that products are appropriate for the defined audience; and

(B) use font attributes, color, white space, and graphics to ensure that products are appropriate for the communication media including multimedia screen displays and printed materials.

(11) Communication. The student delivers the product electronically in a variety of media, with appropriate supervision. The student is expected to:

(A) publish information in a variety of media including, but not limited to, printed copy or monitor display; and

(B) publish information in a variety of media including, but not limited to, stored files or video.

References

