Problem Solving #3 & Critique

The following problem is the last from the series of eight problem solving math problems I generated during the fall semester of 2008. I chose to do this problem last because it involved the most mathematical thinking using numbers. This was again used in my kindergarten placement. This problem required students to think about numbers that have two qualities, existing between a smaller and a larger number at the same time. Included with the problem is a summary of what happened while I taught the problem, my reflection on the problem, suggested modifications I would make in the future, and what I learned from the experience. Also included are several students' works selected to demonstrate variations in responses.

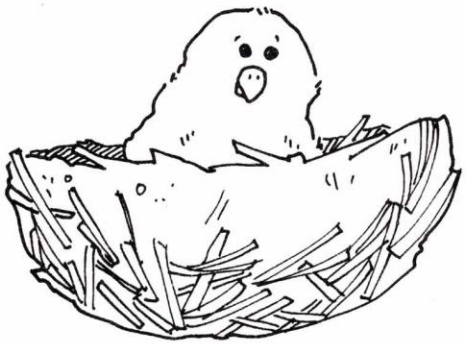
I feel that manipulatives are an important part of the math classroom, so I have chosen to include this problem because it was my first opportunity to use manipulatives in my problem solving exercises. The students with whom I worked did not have much experience using manipulatives to solve problems. I feel that this was a useful learning experience for me because I found that I needed to model using the manipulatives with the students in order to help them see the usefulness of them. Having the manipulatives allowed me to ask students to check their thinking and see if what they felt was the response was actually correct.

I do not feel that my students were completely ready for a problem such as this. I feel that this might have been better done later in the school year once they have more experience with counting and numbers. Once I am student teaching I will also have a better understanding of what background information my students have as well as their capabilities for meeting such challenges in meaningful ways.

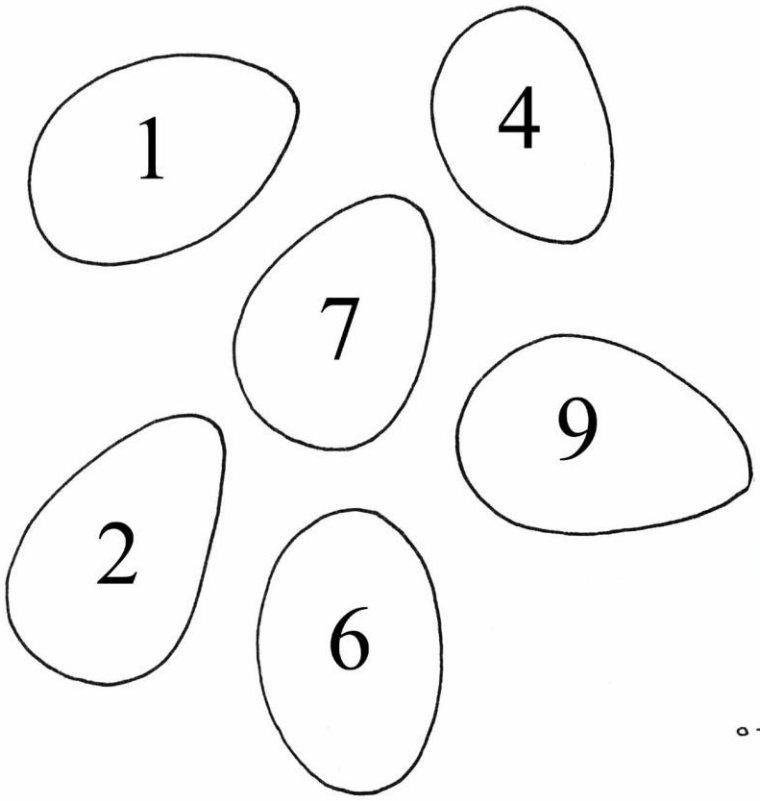
Name: _____

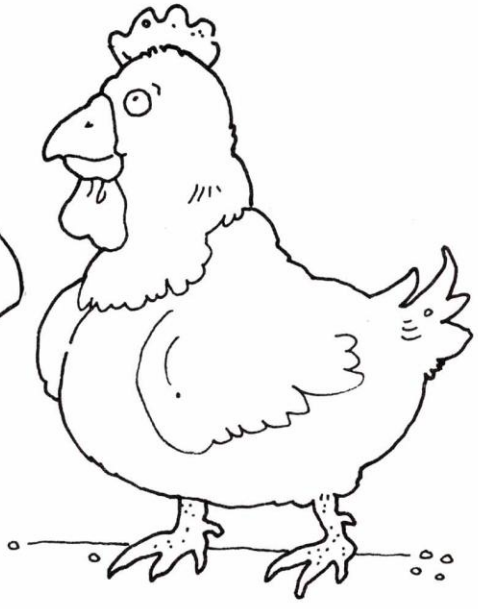
Sassy Hen lost her eggs. Her eggs are marked with numbers that are:

more than 3
less than 8



Circle the eggs that belong to Sassy.





Description of What Happened:

On November 24, 2008, I did my third problem solving activity with the students in Mrs. Wade's kindergarten classroom. This time I was given the opportunity to have students come work with me in the classroom during their morning choice time, therefore there were no set levels of ability among the students who agreed to work with me. The first group I had consisted of four students. I had hoped to see what the students could do on their own, so I read the directions to them and asked them to think which eggs would be Sassy's according to the rules in the problem.

Unfortunately, all the students in this group began circling all of the eggs, not just the ones that satisfied the conditions. I had counting bears out and told them that they could use those for comparing the numbers, but it was pretty obvious that they had no idea how to represent the numerals with the counting bears to compare them, so I had them all stop what they were doing and just watch. I took out a group of three blue bears and another group of eight blue bears. I told them that this represents the rules in our problem. I then represented the rest of the eggs by making groups of same-colored bears. I tried to place the groups as they appeared on the problem sheet. I them walked through the egg numbers one by one representing them with the bears. For example, to look at number 4, I brought the group of four bears over to the blue group of three and asked a student to count and say which group had more since we wanted a number that was more than three. If the number was more than three, the students almost always jumped ahead to circling it and needed to be reminded that we also needed to check if the egg number was also less than eight. Returning to the example, I then moved the group of four counting bears next to the group of eight blue bears and had another student count. I then asked, "So, is four

more than three but less than eight?" Generally, the students understood and responded that it is, so they circled it. If it was not both conditions, the students were told to put an "X" on the egg.

When working with the next group consisting of three students, I decided to prepare somewhat differently. This time, I took pieces of paper and drew evenly spaced dots to represent each of the condition and egg numbers and then placed monochromatic groups of counting bears on each card. Immediately, one child was able to tell me which of the eggs belonged to Sassy, but he remained and helped out while I worked through the problem with the other two students. I brought the group representing the egg number next to the group representing the condition number, and had the students compare in a way similar to the first group with whom I worked. One student had more difficulty understanding what we were doing than the other two. After counting the bears for four and three, the struggling student still said that three is more than three. I had her count the bears a couple times and compare them to see that the group of four had more bears.

There is one sheet shown below that was not done in a group. This student had wanted to do the problem with me because I give stickers as a reward for doing a good job when working with me. She asked if she could do the problem quickly as the class was leaving for lunch, and I said she could try it out. She read the directions herself and circled the correct eggs immediately without the help of manipulatives or counting. She is a very bright young girl.

Reflection:

This problem did not go as well as the others I have done. When I found the problem initially, I felt it was too challenging for kindergarteners, so I changed all the egg numbers to numerals below 10. I also included the use of manipulatives to give the students something concrete from which to work. Unfortunately, these attempts were not as successful as I had

hoped. The students did not seem to understand how to use the manipulatives to solve the problem, so I did more of the work through modeling than I had wanted. I think it would be good if the students used the math manipulatives like bears for more than just one-to-one counting. More experience representing numbers with groups of objects would have been useful to students solving this problem on their own.

I think that some students had problems doing this problem because they had trouble understanding that both conditions applied at the same time. Instead, they seemed to be considering the conditions separately; numbers 4 and above satisfied the condition "more than 3" and numbers 7 and below satisfied the condition "less than 8." This resulted in many children thinking that all of the eggs belonged to the chicken. However, this was not true for all the children. Two students were able to apply both conditions together at the same time to accurately solve the problem without the use of manipulatives.

Suggested Modifications:

I now feel uncertain if this problem is appropriate for kindergarteners, so I am not sure if I would attempt it again. A few of the students were able to understand the concept of two conditions at once, but more of them did not. This could be due to a lack of experience thinking in this way but it could also be due to a lack of maturity to consider two things at once. I think that it might be very useful to start student thinking in this way by using attribute blocks. Students could begin by making trains of one difference blocks, and later progress into finding blocks which fulfill two conditions, such as "red" and "triangular." This introduction might help them to build a frame of mind in which they think about two conditions at once.

I think another modification that might be helpful is adding dots to the eggs. I think that having solid counting dots that are equal to the numeral listed on the egg will allow students to

work faster and more efficiently than they are able to do with their limited experiences representing numerals with counting bears. The class does not have enough time or materials for every child to represent each of the numerals on the eggs the way I did, but domino-like dots of the eggs would provide a solution to these problems.

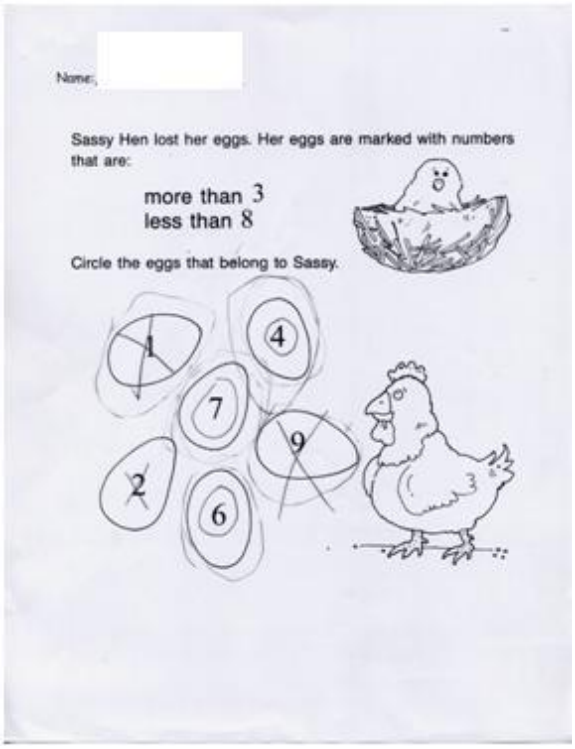
During implementation of the problem, students could be instructed to use their counting skills to compare the eggs and discover which ones belong to Sassy Hen.

What I learned:

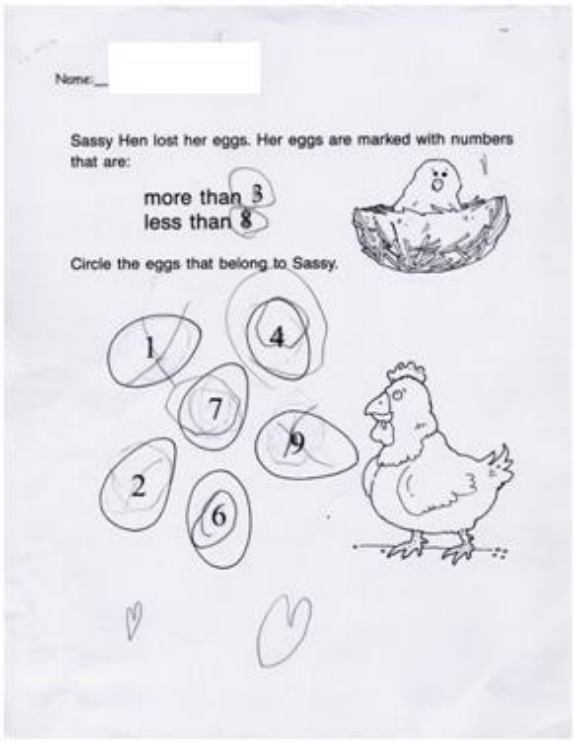
I learned a great deal from doing this problem activity. For instance, I learned that I need to think more realistically about my students' experiences previously in mathematics and using manipulatives. In my estimation, I feel that many students in my class were not ready to do a problem like this. If I had been the main teacher in the classroom, I would have spent time building up to a problem like this by supplying students with opportunities to experience techniques for thinking about and solving a problem like this rather than just throwing them into it.

I also think I need to learn more about my students' understanding of the manipulatives in the classroom. I think the students might need a more formal introduction to these materials which they have used without much direction for building roadways, random patters, or pictures during choice time. I would like them to see the mathematical uses for them. I also need to think about which manipulatives could realistically work in a classroom setting. Thinking that counting bears could be used by all the students who would need them is impossible; we simply do not have enough. I have also learned from working with the students that they sometimes get so fixated on making the bears all face the same way when they line up or putting them in some other particular pattern that they lose sight of what they are supposed to be doing with the bears.

I think that maybe using counter chips or the printed dots (mentioned above) could be more realistically possible than the bears I used.



Corrected Attempt



Corrected Attempt

Guided Correct Attempt

Unguided Correct Attempt of Gifted Student