

Problem Solving #1 & Critique

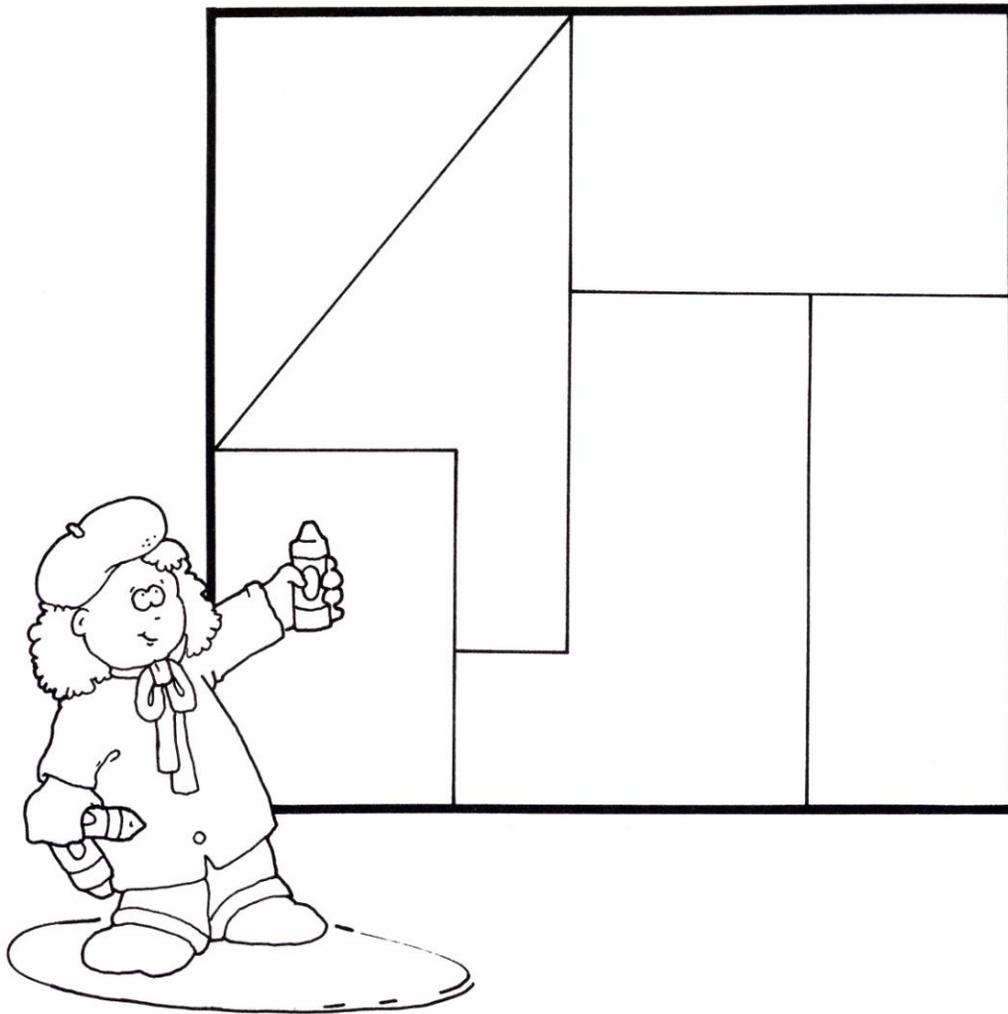
During the fall semester of 2008, I generated a series of eight problem solving math problems from various text and Internet sources as well as creating my own original problems. The following problem is one of the ones I found for use in my kindergarten placement. It does not require the understanding on numbers but does require the student to think and plan out his actions before acting. It asks students to color in shapes in such a way that they use three colors but at no time do the any shapes of the same color touch. 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 a demonstration sheet and several students' works selected to demonstrate variations in responses.

I have included this problem because it reflects my belief that not all problem solving need involve numbers. Doing something as commonplace as coloring but being required to think about it differently challenges and helps them to think more deeply in other situations. I also wished to include this problem because it showed how I worked with different student populations. Some students, such as a typically more struggling student who has IEP, I gave opportunities to try again and learn from their mistakes. In contrast, this problem also reflects working with gifted students.

I feel that this problem was appropriate for my students because they had very little experience with mathematics when I did it with them. The lack of numbers made it an activity accessible to all students. The problem was appropriately challenging to this group of students.

Name: _____

Color this design, but use only three colors- and make sure that no shapes of the same color touch each other. Be sure to think before you color!



Description of What Happened:

On October 13, 2008, I did a problem solving activity with several of the students in Mrs. Wade's kindergarten classroom. I brought the students out into the core shared area in small groups of 3, 3, and 2. My cooperating teacher had given me time during the students' choice time, so working with me was not required. I began each group the same way. I did not give them the activity sheet immediately. Instead, I drew a rough sketch similar to the activity sheet but not the same. Once I drew it, I explained that the rules for coloring the shapes were a.) I needed to use three different colors and b.) that no shape could be touching another shape of the same color. I intentionally did it the wrong way the first time. I colored three shapes so that the fourth could not be colored without touching one of the matching colors. We discussed this, and then I flipped the paper over. The students helped me do it correctly by letting me know, "Will this shape touch the same color if I fill it in?"

Once the demonstration was done, I let each student choose three different crayons and gave them their activity sheet. At this point, I watched but tried to stay uninvolved. A few students got the idea immediately. Others worked more slowly but did get stuck because they did not anticipate where they were coloring. When this happened, they were allowed to start a new sheet. A few students asked me, "Should I color here?" and I told them, "I want you to look at the shapes around it and think, 'Will this touch the same color?'" I had to ask a couple students to not call out what another student should color because I wanted to see how everyone worked on their own. If students finished more quickly than others, they were allowed to return to class or to color the little artist on the activity sheet.

Reflection:

At this point in the school year, my students had very minimal mathematics experience. There was a lot of testing going on and the language arts program was taking up most of the free time. Therefore, I feel that this problem solving activity was very appropriate for my students because it did not require them to be able to write numbers or even to count. However, it still challenged them to critically think about what they were going to do before they did it. They seemed to really enjoy it and understood the concept well enough that most of them were successful in their attempt at the activity sheet. When I asked them, all of the students were able to tell me why they colored the shapes the colors that they had. (“Because it isn’t touching the same color.”)

I had not initially planned on doing a mistake demonstration drawing. I drew the demonstration shapes and started coloring them without thinking ahead! But this turned out to be a very useful teaching moment because I used the opportunity to show the students that it really does matter where they color; they can make a mistake if they are not careful! None of the students knew that I did not mean to make the mistake. I chose to intentionally make this mistake with the other two small groups that followed and I believe it was a useful approach to get them engaged and to make them think.

I was also interested to note that the students chose to start coloring the shapes in all different areas. Some the top right, others the bottom left, and so on. It did not matter to most of them that I had started in the top left during the demonstration. I was happy to note that because I think it is better that they think on their own than get fixated on how I did it.

Suggested Modifications:

When using this activity again in the future, I would choose to change a few things about the process of the activity. To begin, I would give specific instructions at the beginning of the activity to not call out solutions. I wanted to get authentic assessments of student understanding without outside influences, but kindergarteners do not have the natural restraint to not call out answers, especially if they are not directed to do so.

As another modification, I would do this activity with a larger group of students. Perhaps I might ever begin with the whole group for the demonstration. Then I would break them into small groups of two or three, based on ability level, and let them work together to solve a more complex shape pattern following the same directions listed above. This would give me the chance to hear them talk out their ideas with each other and allow them to share and grow from one another's thoughts.

After allowing my students to work in small groups, I would present them with individual activity sheets like the one used for this problem log, but this time they would be working on it entirely alone. Afterwards, I would make time to have a short conference with each student about their response. This would allow me to see who has grasped the concept, who had a lucky guess, and who is still struggling with solving the problem.

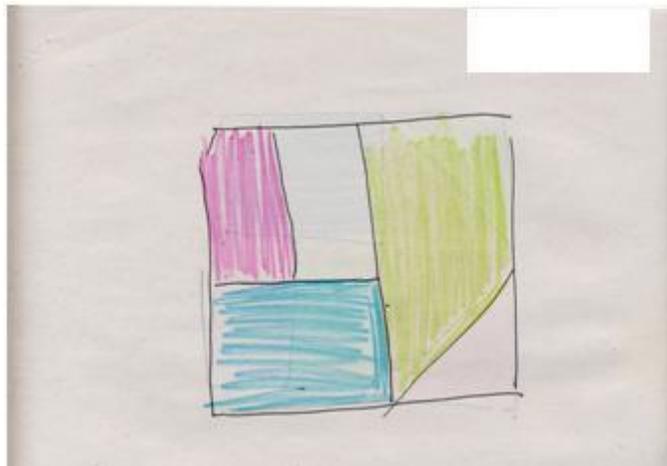
What I learned:

During this activity, I learned that it is important that I be very specific about the behavior I expect from students. I had not been thinking that I needed to tell the students to not call out how to solve the problem when a classmate got stuck. I had told them that they were each going to try to solve it on their own, but this experience helped me realize I need to clearly state, "Do your own work and not your classmate's."

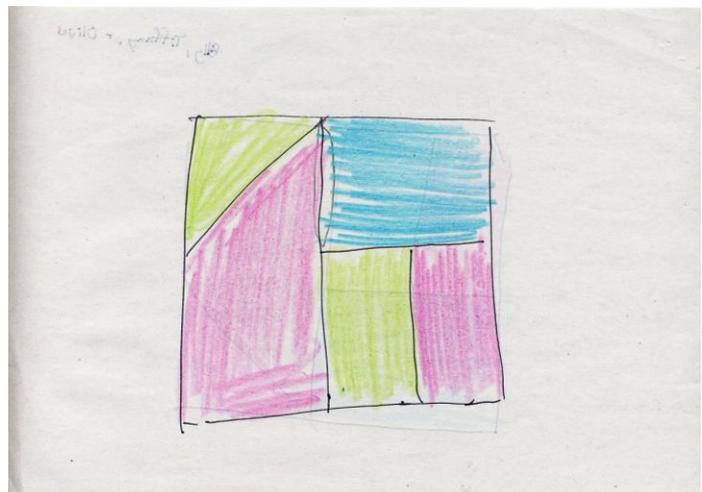
I also learned that demonstrating a mistake can be a useful approach. I had not thought about showing students a wrong way before beginning but making my unintentional mistake made me realize just how easy it would be for the students to do. By drawing their attention to the possibility of doing this, I think I helped them think more critically once they began working on their own.

Additionally, I discovered that sometimes students might put the wrong answer intentionally. One of the students had wanted to make a specific design. When he realized his design would not work for the directions, he said he wanted to do it his way. I asked him how he would complete the picture the right way and he could clearly tell me the remaining steps. He then told me the different way he wanted to do it. I explained that we really wanted to follow the rules for this activity but that he had come up with a very nice pattern idea. If I had not heard his dissatisfaction while working in a small group with him, he might have gotten the answer “wrong” simply because he wanted to do something else.

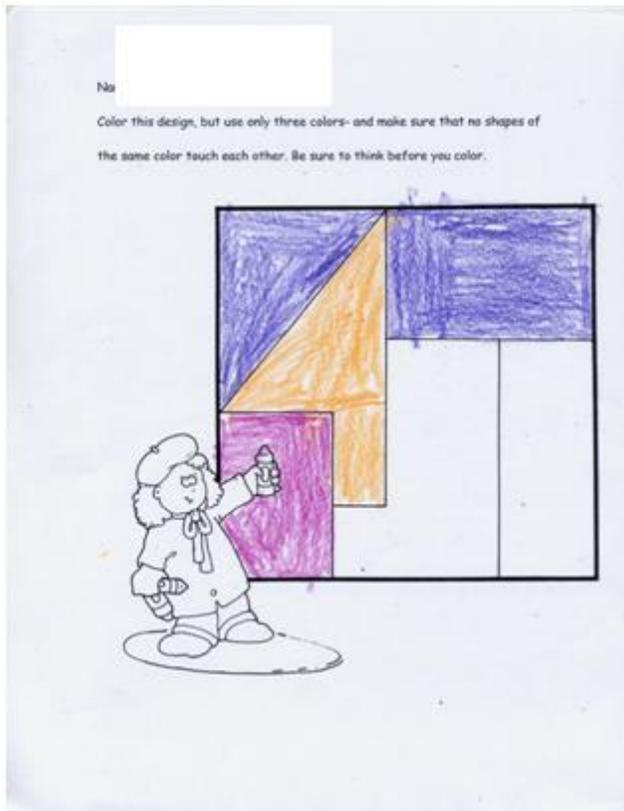
Demonstration Work



Incorrect Solution



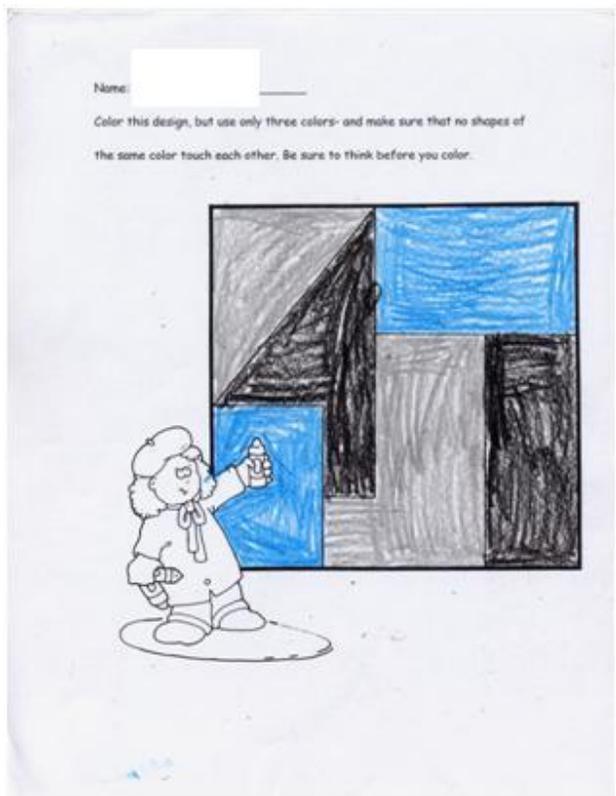
Correct Solution



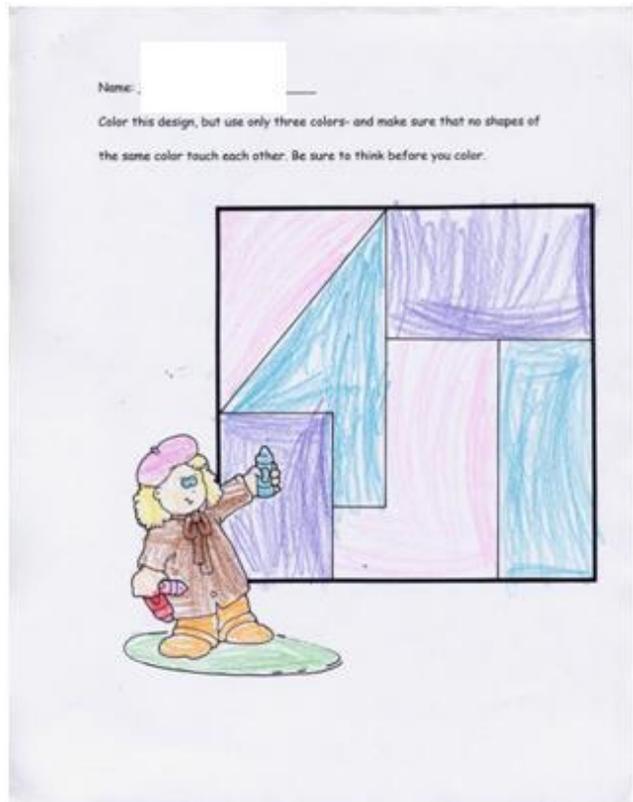
Incorrect First Attempt



Correct Second Attempt



Correct Attempt



Correct Attempt of "Gifted" Student