

Problem Solving #1 & Critique

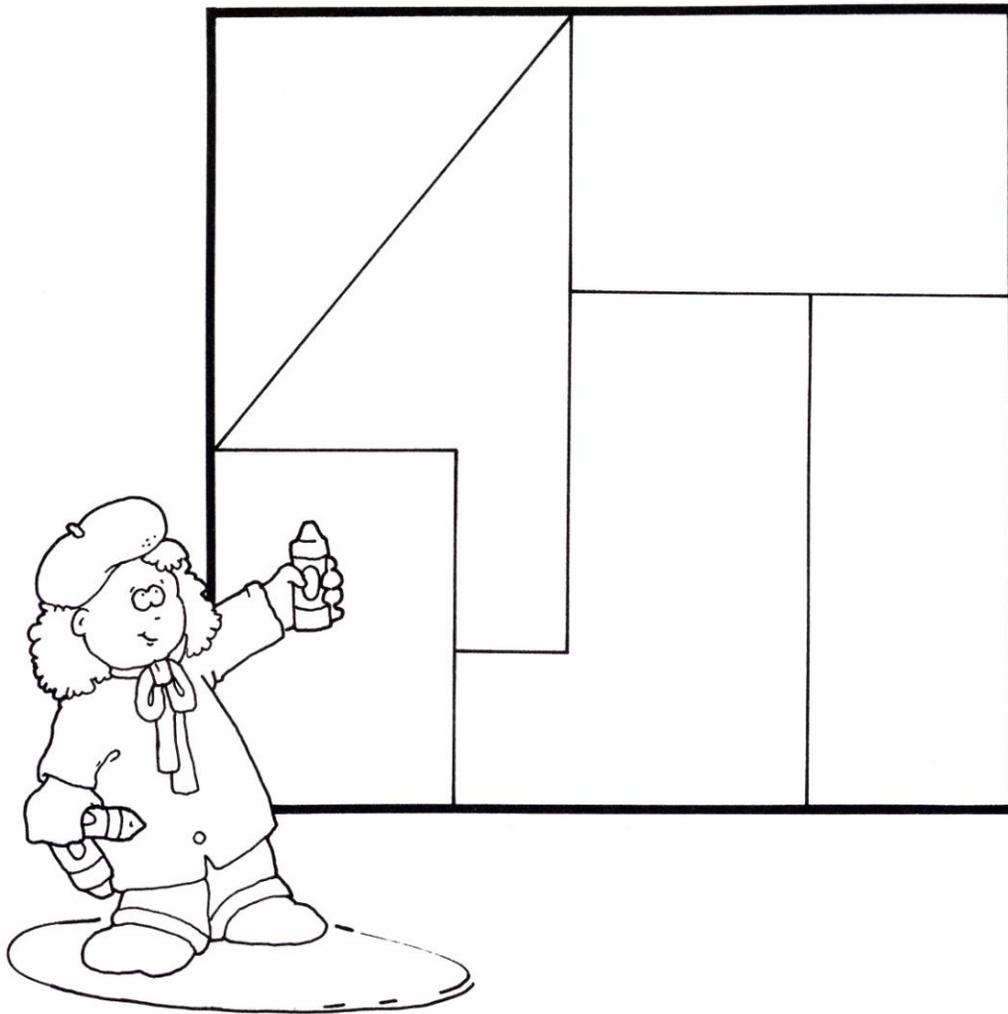
During the fall semester of 2008, I generated a series of eight problem solving math problems from various text and Internet sources as well as creating my own original problems. The following problem is one of the ones I found for use in my kindergarten placement. It does not require the understanding 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.

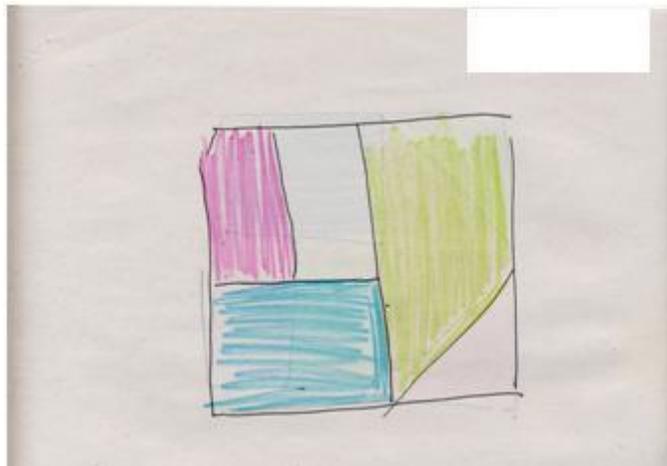
What I learned:

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."

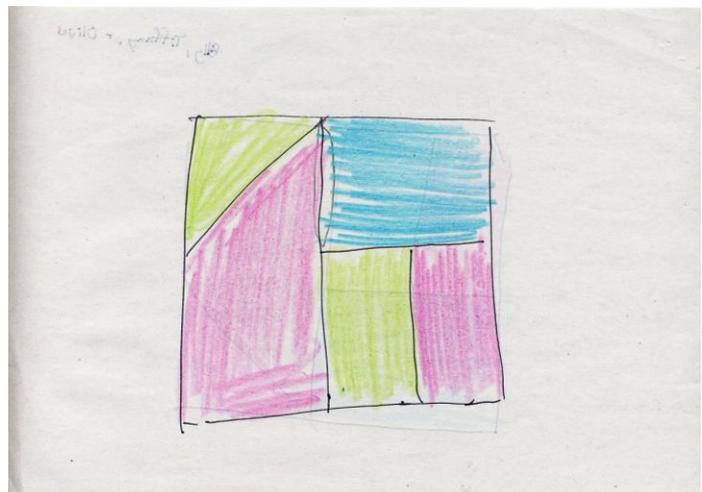
I also learned that demonstrating a mistake can be a useful approach. I had not thought about showing students a wrong way before beginning but making my unintentional mistake made me realize just how easy it would be for the students to do. By drawing their attention to the possibility of doing this,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

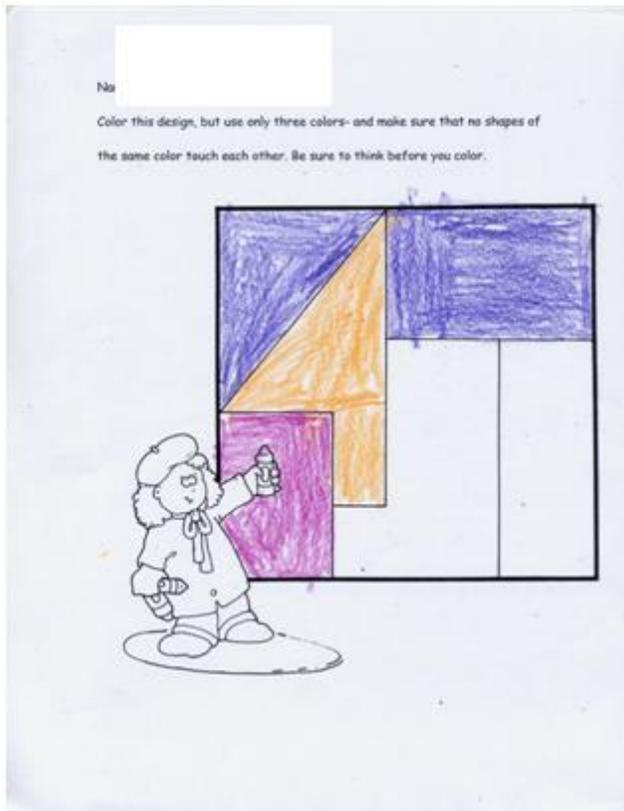
Demonstration Work



Incorrect Solution



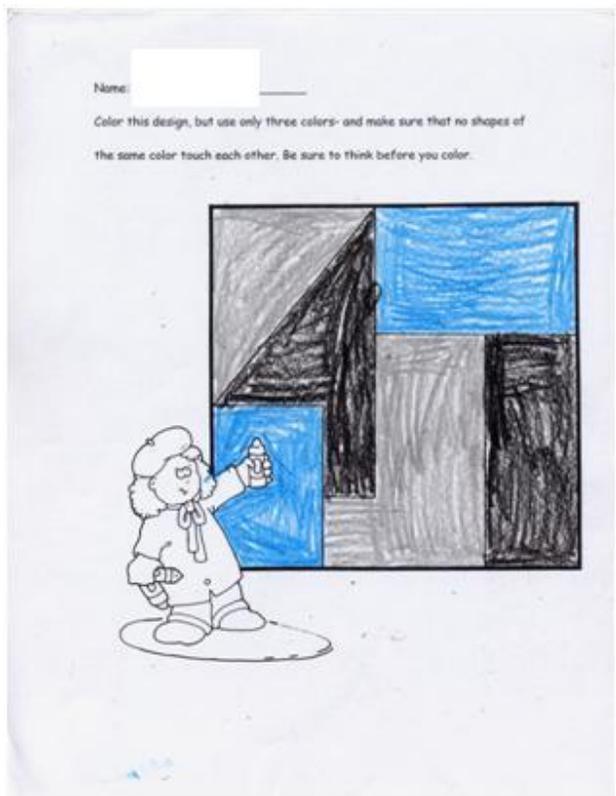
Correct Solution



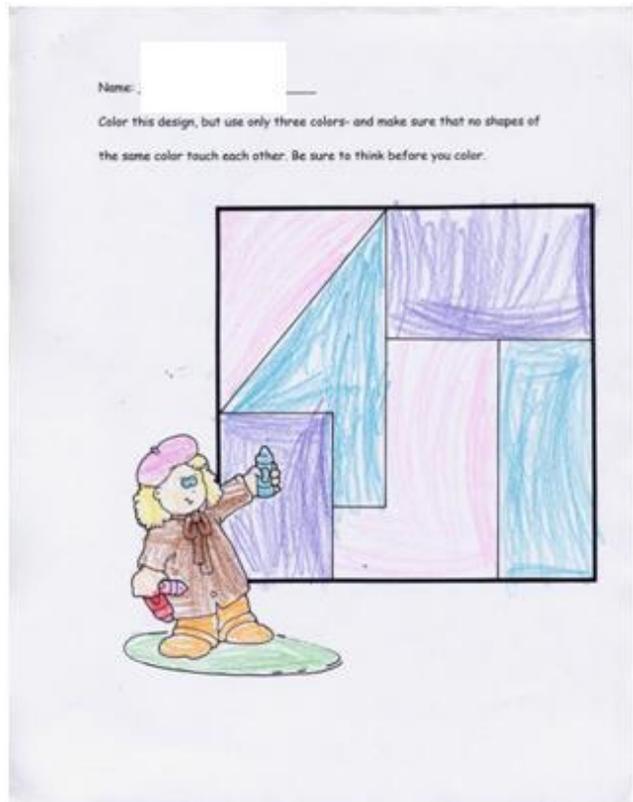
Incorrect First Attempt



Correct Second Attempt



Correct Attempt



Correct Attempt of "Gifted" Student

Problem Solving #2 & Critique

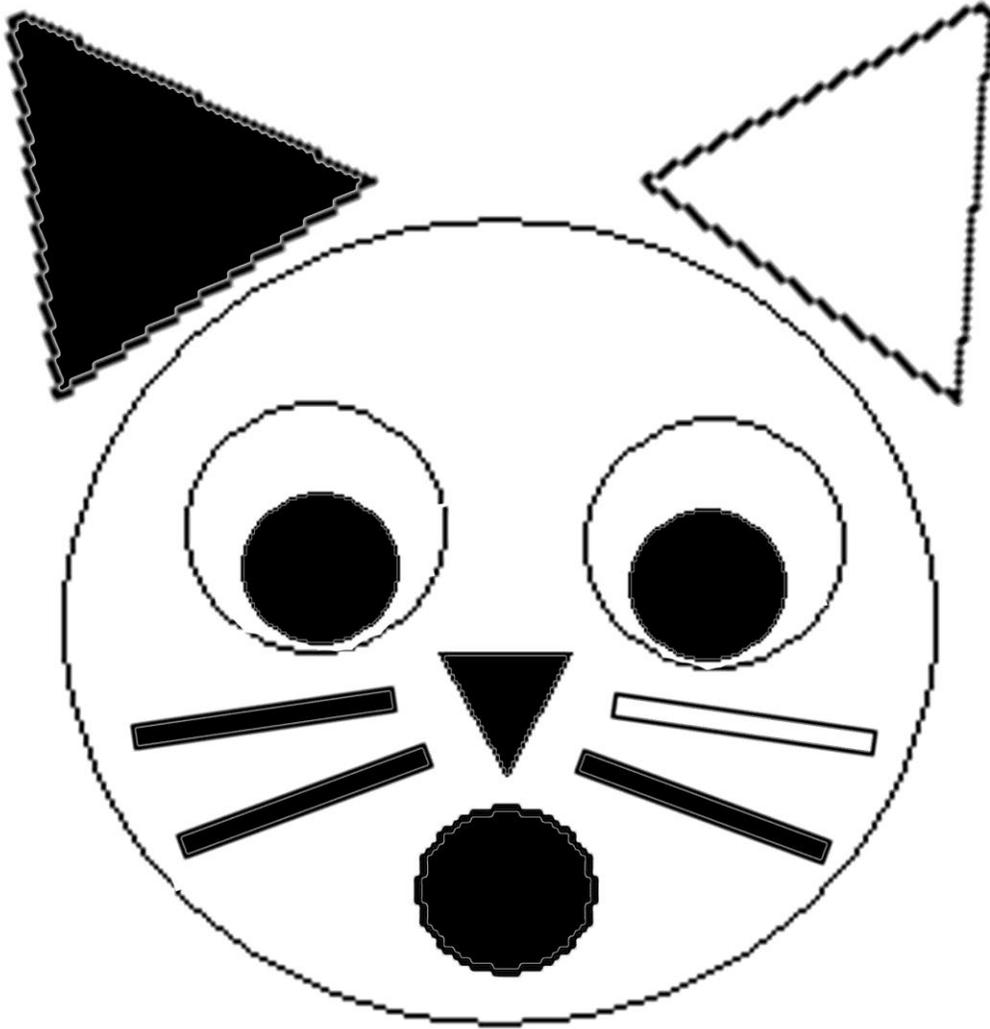
The following problem is another of the series of eight problem solving math problems I generated during the fall semester of 2008. This was again used in my kindergarten placement. This is an original problem I created which involves minimal use of numbers because my students are still learning how to write numerals. In this problem, students need to challenge their thinking by looking for specific things with two different qualities; a certain shape and color. 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.

What I liked most about doing this problem was getting to work one-on-one with Elijah, a special needs and English language learner in my classroom. I feel that it is important to challenge all students and give them the proper support they need to experience success. I have also included this problem because it was an important learning experience for me. I found that abilities in other subjects, such as language arts, do not necessarily reflect a student's abilities in problem solving. Several of the students in the highest reading group did not examine the picture carefully and gave incorrect responses while two students from the lowest reading group were able to generate correct responses.

I have some things I would change about this problem for the future, but over-all I feel it was a useful activity for my students. However, I believe that I would approach the way in which I would have students do this problem differently, which I explain in the "modifications" section of the critique.

Name: _____

Kisha has drawn a cat's face made of shapes. Some of the shapes are white while some of the shapes are black. Count how many white circles , black triangles , and white rectangles  are in her drawing!



		
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Description of What Happened:

On November 20, 2008, I did my second problem solving activity with the students in Mrs. Wade's kindergarten classroom. This time, I decided to stay in the classroom with the students, who were moving among several work station in the room based on read group levels. The first group with whom I worked consisted of students from the highest reading group. For this group, I went through an example activity by asking them to find the triangles on the page. This made me quickly realize that the shapes I had put into the directions were distracting to the students, so I made sure to specify that they were only to look at the picture of the cat. We then looked at the difference in colors of the shapes; black and white.

I read the directions to the group and asked them to write down how many white circles, black triangles, and white rectangles they found. Before telling the students the correct answers, I collected all of their papers except one student, whom I had asked to try to write his "2" again because he had written an "S." I began asking the students why they had written the numbers they counted. Of the four students, only one noticed that the face contained three white circles (One student changed his answer because he still had his paper from attempting to fix his "2.>"). All of the students except one saw that there were only two black triangles. At first I had thought this student might have counted the triangle in the directions, but he had counted the three in the picture, including the white triangle. All of the students correctly counted only one white rectangle.

Once again I got to work with a special needs and ESL student in my classroom. I took a different approach to doing this problem with this student. He is not normally with us during that part of the day but he was that particular day due to a half day schedule. I first asked him if he could name the shapes as I pointed to them and then asked him if he knew the names of the

colors to assess his basic understanding of what would be needed to solve the problem. When we looked for the white circles, I first had him find them by running his finger along them and then circling the ones he had found with a pencil. I made sure to remind him that we were only looking for white circles and I asked him to confirm if what he found were actually white circles. We then practiced one-to-one counting to see how many white circles we had found, which he successfully found was three. He cannot write most numbers without a guide yet, so I drew a dotted “3” which he could follow. We then repeated this process for finding black triangles. This student did well but did get a little confused because he also wanted to count the white triangle. However, he did a great job finding the one white rectangle and was able to write that number on his own.

The last group with whom I worked consisted of four students, all of whom belong to the lowest level reading group. I began similarly to what I had done with the first group by having them find the black rectangles. One student was very stubborn about there being four black rectangles because she was going to color in the white rectangle. It was hard to convince her otherwise. I read the directions and asked the students to write the number of white circles they found. This student was very insistent in saying that there was only one white circle, even though I repeatedly said to write their answers without talking. I noticed that two of the other students, who both had correctly counted the three white circles, started changing their answers to match the more stubborn student’s answer, so I told them all to not change their original answers because we would talk about them at the end. One student in the group did not seem to know how to count on her own so she just copied the stubborn student.

Again, during the search for black triangles, two of the students successfully found them while the more stubborn student insisted on counting all three triangles because she wanted to

color the white triangle. The fourth student seemed very confused and just began to write numbers. I asked her how many black triangles she had found and she said, "Three," like the other student. During the last part of the problem, the stubborn student wrote that she counted three white rectangles, which the fourth student again copied, but the other two students both correctly counted one white rectangle. When going through the answers with this group, the stubborn student had a hard time accepting answers that were not her own and the fourth student seemed to have little understanding of what we were doing. However, the other two students were both able to demonstrate their understanding of what the problem asked by pointing to the different shapes they counted.

Reflection:

Over-all, I feel that this problem was more challenging for the students in my class than my last problem and more challenging than some of the things I have seen them do in class for mathematics. It required that they think about two ideas at once; both color and shape. The other challenge in finding the shapes was having them expand their understanding of the problem to also include shapes within other shapes or shapes which contained shapes, such as the large white circle which contained the majority of the cat's facial features. Some of the students were thrown-off by this because they seemed to be looking more closely for isolated shapes rather than any shape which fulfilled the requirements.

I also feel that I should have approached this problem a little differently for the students. I have described in the modifications section the use of crayons to mark the different shapes, but I feel that I did not take advantage of the idea I had with the special needs student to have students put a ring around the shapes they found. I felt at the time that it might be hard to make sure all four students in the last group did not circle random things, but after I finished doing the

problem, I felt that having ringed the shapes might have been really good for two of the students in the last group to do. Both did not seem to have a solid understanding of what they were doing, and ringing the shapes might have given them a more solid understanding.

Suggested Modifications:

I liked this problem for the kindergarteners, but I feel that there are some modifications which would make it more successful in the future. One of those modifications would be within the directions. When I was asking the students to find all the white circles or other shapes described in the problem, they were sometimes including the images I had put in the directions in their counts. Luckily, the groups were small enough that I noticed this, but if it had been a larger group activity this problem might have gone unnoticed.

Another modification I think might be helpful is having students use crayons to put a ring around the different colored shapes that they find. I felt that ringing the shapes was helpful to my special needs student, and I think using different color crayons would make counting the shapes easier as a student progresses through the problem. This would also make it easier to see what students were counting. I had the luxury of being able to ask the students what they had counted for each shape so that I could understand their thinking, but in a normal classroom setting, I would not usually get this opportunity.

If I were to present this problem to a whole class group, I think that it might also be helpful to include an example picture to go through with the students to give them guided practice. The students in my classroom have not had much experience with mathematics like this, so I feel that some of their difficulties may also be related to their inexperience. In a whole group, I might also create a more complicated shape image that students could examine in pairs.

What I learned:

I think one of the most important things that I learned during this problem activity is to not over-estimate or underestimate students based on their ability level in another subject. Some of the students in the first group are very skilled at reading, but they did not listen to directions or did not see the picture as fully as they could have. However, so one the students who have struggled the most in learning to read were able do this problem as well if not better than the students in the more advanced reading group.

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○	▲	□
3	2	1

Special Needs & ESL Student

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Incorrect Attempt (Lowest Reading Group)

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○	▲	□
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Correct Attempt (Lowest Reading Group)

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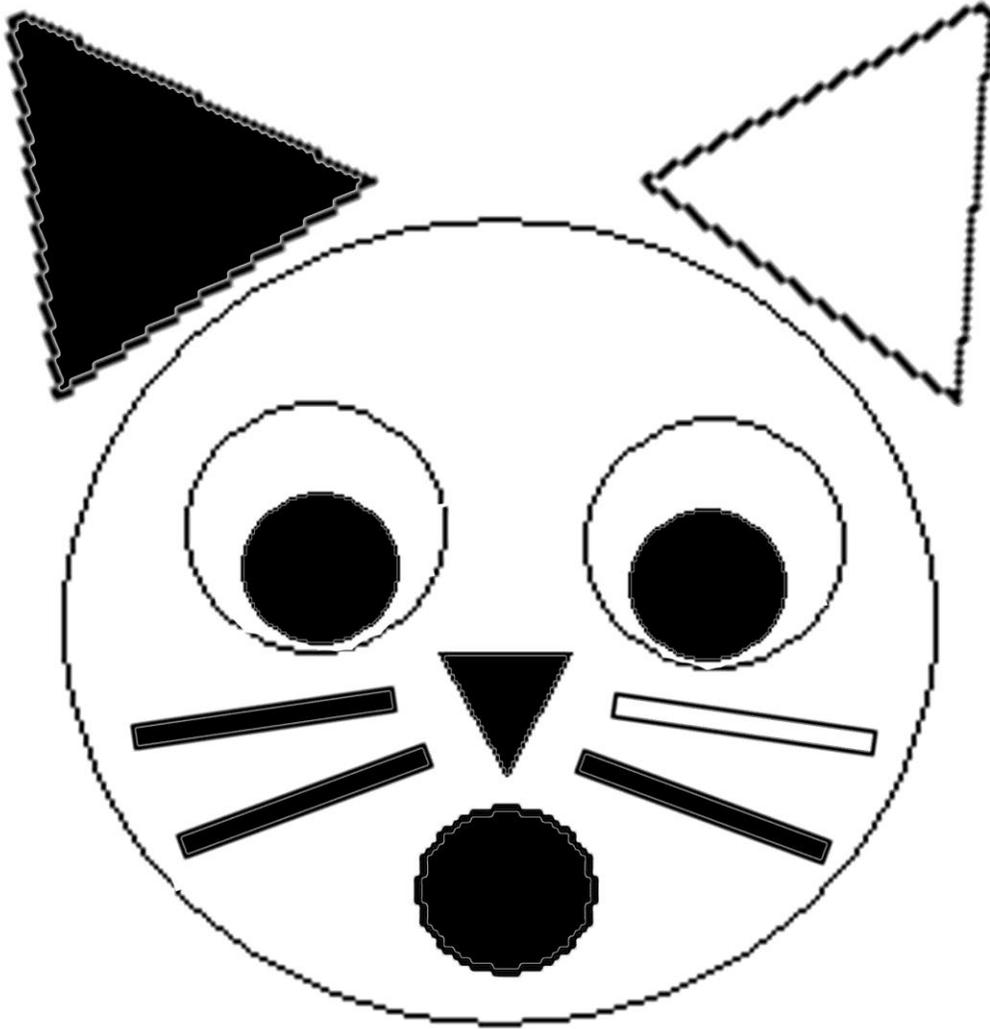
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Correct Attempt (Lowest Reading Group)