On a recent trip to the Milwaukee Public Museum, I found myself captivated by one of the exhibits. This exhibit was one of many fascinating items that I would see on my trip, but this piece was different. It truly piqued my interest and I had a whole host of questions that immediately popped into my head. The item of my intrigue was a 19th century coin sword from China (Figure 1). I had never seen anything like it before, and it got me thinking.

Classroom teachers have a similar hope for their students. Teachers want our students to enter our classrooms and immediately be engaged and filled with wonder. We know that this kind of engagement and wonder does not happen by accident. We can help to foster the curious; we can create an itch that simply must be scratched. The coin sword was my itch, and I needed to scratch it.

My First Noticing and Wondering
I noticed that the sword was made of coins. This is a simple observation. However, this knowledge led me to think about a follow-up wondering. I wonder how many coins make up the sword. Based on the picture, I made a couple of follow-up wonderings that would influence my estimation. Is the sword the same on both sides? Are all the coins the same size? They appeared to be identical coins throughout the sword.

These initial wonderings led me to reach out to the museum to ask my initial question. How many coins are there in the sword? I got an immediate response through Twitter. The museum representative said, “We’ve checked with our experts, but can’t give you an exact number. The number of coins varies from sword to sword. It’s the thread on the swords, always red or yellow, that is used to impart the idea of wealth and fortune.” At first I was dissatisfied with this response. However, as I thought about this within a classroom environment, my dissatisfaction began to subside. Too often in mathematics, we make it so that our students expect one exact answer. This one-answer philosophy disallows for students to express ideas, theories, and different perspectives. The open-ended nature of this activity encourages students to enter “into the mathematics conversation, from their vantage point, … to increase their confidence in doing mathematics” (Varygiannes, 2013, p. 278). The attributes of this sword allows students to think about methods and strategies for estimation that are useful in daily life. How often do our students ask the question, “When are we ever going to use this stuff?” Teachers need to show their students that estimation and general number sense are an everyday skill for the functioning members of society.

Since one of our goals as math teachers is to facilitate meaningful mathematical discourse among students, an open-ended answer to the coin count is wonderful (NCTM, 2014). As students express their ideas of the count of the coins, a teacher is given the opportunity to have students pres-
ent a logical method for their estimation process. Kazemi and Hintz (2014) have as their fourth principle of classroom talk the idea of teachers making sure that all students are sense makers and that student ideas are valued. Therefore, if student A says the sword has 50 coins and student B says the sword has 1,000 coins, a conversation of method, justification, and reasonableness of answer should follow.

**The Continued Chain of Wonder**

I cannot help but think of some more questions in respect to this sword. I would ask students to come up with questions of their own for which the answers would satisfy their curiosity. Here are my questions of curiosity.

- How heavy is the sword?
- Was the sword designed to be art work?
- How big is the biggest coin sword ever made?
- Are all the coins the same kind of coin? Are there swords made up of multiple kinds of coins?
- How does the diameter of the coin relate to the height of the coin?
- What if I made coin swords out of pennies, dimes, nickels, quarters, and silver dollars, how would these swords relate to each other? How would the lengths of the swords relate? How would the weights of the swords relate? How would the value of the swords relate?
- How much yellow and red thread is woven through the sword? Is the length of the yellow and red thread the same? Is it different?
- How does one make a coin sword? Where and how does one start the process?

This is just the beginning of my list of curiosity questions. Do you have any questions?

**Another Sword and the Curiosity It Created**

I did a little additional research on coin swords and found a posting where an individual was looking to sell a Chinese coin sword. Here are the images. This sword was sold for $50. What a deal!
However, more wonderful questions came to mind.

• If the entire sword is worth $50, how much would each individual coin be worth?

• Is there any significance to the additional blue thread in this sword?

• In the close-up image, I can see that a square is cut out of the middle of the coins. How does this influence the weight of the coin?

What do I notice?

• I notice that the additional tassel piece in Figure 3 has some wonderful geometric attributes (symmetry, octagonal red pattern, eight central angles, the octagon is regular).

• It appears that the tassel piece forms a 1, 4, 4 pattern with the number of coins. Is there another single coin on the other side? Then the pattern is 1, 4, 4, 1.

• What if the tassel piece added another layer of coins? What would the pattern be then? How many coins in the tassel piece with another layer? Would the pattern become 1, 4, 6, 4, 1? Pascal’s triangle?

A sword like this is a wonderful confluence of history, art, and mathematics. A certain power and authenticity come into play when multiple disciplines of content are found within an activity. As a result, I look forward to my next trip to the museum with my family to find more curious artifacts. I am willing to bet that the mathematical applications will be intriguing and wonderful.

Benefits of a Noticing and Wondering Activity

The benefits of an activity focused on noticing and wondering is that every student can participate, regardless of their current mathematical understandings. This sword and all of the mathematical possibilities it contains, allows all students to access the math. As Boaler (2015) has noted in reference to a successful math class, “(Students) talked of many different activities such as asking good questions, rephrasing problems, explaining ideas, being logical, justifying methods, representing ideas, and bringing a different perspective to a problem” (p. 67). This activity is filled with all of these qualities of an engaging mathematics classroom. Moreover, a noticing and wondering activity puts the student as the leader in the educational venture.

References


