

The E in STEM
Online Problem Solving Assignment
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When I read this assignment, I immediately got nervous, because I do not believe that I think like an engineer. I was hesitant to get started and wasn't sure how I was going to be able to complete this assignment with any kind of thoughtful knowledge, much less the ability to do logic puzzles!

The first problem I tried was The Three Jugs Problem at <http://www.cut-the-knot.org/water.shtml>. True to my concern I was stumped fairly quickly and felt very inadequate in my own abilities. I continued working on this one for about twenty minutes and finally decided that I would move on to another one. I was not able to figure out how to move just one ounce of water, 3 ounces of water at one time and 5 ounces of water at one time and vice versa. I tried to walk away for a few minutes and let my subconscious work on it and that did not help. I attempted to do this problem the next day and was still frustrated and unable to make any progress. I think this puzzle is procedural, however I believe this only because it was so hard for me. I think there must be something missing.

The second problem that I attempted was Wolf, Sheep, & Cabbage <http://www.plastelina.net/game1.html>. As I looked at this problem I saw myself looking back into my memory and quickly reasoned that if the cabbage moved, the wolf would eat the sheep. Obviously, this was in the instructions. Therefore, I moved the sheep across the lake to side B, which left the cabbage and the wolf on side A. The wolf did not eat the cabbage, because it is a carnivore. The man then went back to side A and got the cabbage. Once the cabbage was unloaded at side B, he loaded the sheep again (from side B) and traveled back to side A. He then left the sheep on side A, and picked up the wolf at side A. The man then travels back to side B and leaves the hungry wolf with the yucky cabbage. He returns once again to side A to retrieve the sheep and move it to the other side. The cargo all arrives safely on side B without the sheep eating the cabbage or the wolf eating the sheep.

This problem used declarative knowledge and has only one solution. I was very surprised that I was able to do this problem so quickly. I was aware that my mind's eye was looking back into my memory, which made me wonder if I had seen this or something similar to it previously. I suspect that between my two children and husband that I have seen games similar to this that sparked a recognition and allowed me to reason through this problem so quickly. I found this problem very simple.

The third logic puzzle that I tried was Tower of Hanoi <https://www.mathsisfun.com/games/towerofhanoi.html>. As I started this one, I recognized that

my confidence was much higher and I felt better about this challenge. I immediately remembered that the puzzle before had three elements that had to be moved also. I do not think this knowledge helped me, however I do believe that the added confidence was beneficial. I started moving the rings from Tower 1. First, I moved the small ring to the middle tower, Tower 2, then the medium ring to Tower 3. It took me a moment to reason that I could not put a large ring onto a smaller ring. After about 75 seconds, the “ah ha” light bulb turned on and I realized that the small ring could move from Tower 2 to Tower 1, inside of the large ring, which would allow me to move the middle ring to Tower 2. Now I could move the small ring to Tower 2 on top of the middle ring. This allowed me to move the large ring to Tower 3. Then the small ring could go back to Tower 1, while the middle ring moved to Tower 3. Once this was complete the small ring could move to Tower 3, thus completing the challenge.

This puzzle also uses declarative knowledge, however it can have a couple of solutions. I was amazed at how much easier this challenge was for me. While the third logic puzzle took me longer to do than the second logic puzzle, I was able to visualize the third puzzle in a different way. It was not just a problem I needed to do, it was something I needed to figure out and by figuring it out, I was empowered to do more!

With two logic puzzles completed and a great sense of confidence, I went back to the first puzzle that I had tried. I knew that I could do it this time. Unfortunately, twenty minutes later and I was no further than I had been on the first attempt. I have decided that probably the solution is fairly simple and I will feel very dumb when I see it!

This assignment was very good for me. It allowed me to realize that I do not have to be an engineer to do problems like this. It also helped me to become aware of my own knowledge. I am always struck when I find myself looking back into my mind’s eye and pulling information from my memory. The two puzzles that I was able to complete were simple for me and I believe that I must have seen or done puzzles like this previously. Is it possible that the puzzle that I was not able to complete didn’t have all the information that was needed? Maybe I was suppose to assume something...I am still stumped by the first puzzle, however I am very proud that I had the ability to complete two others!