PROBLEM SOLVING AT THE CENTER OF OUR LIVES

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Abstract

In this paper I told a piece of my experiences about problem solving as I was a student and a teacher candidate. Also I mentioned what problem solving at the center of mathematics classes means for me. Additionally I studied "stay seated problem" by using Polya's four steps about problem solving.

Key Words: problem solving, Polya's four steps, center of mathematics curriculum.

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Introduction

The purpose of this article was to respond a question: “What does it mean if someone suggests that you place "problem solving at the center" of your mathematics classroom?” I explained what this question means for me and my future teaching profession in this paper.

A Famous Question: “When Will We Use This?”

As I was at the last class of high school I wanted to be a genetic engineer. However, both my mother and my mathematics teachers said: “You should be a mathematics teacher.” I always ignored this and said: “Can you think that I would be telling the “Sets” during the next 30 years?!” Because in my opinion mathematics classes were such a thing that a teacher usually tells something and give instructions/some formulas/techniques etc. just to solve a question more quickly in an exam, so in time you usually get used to be dependent on these instructions and do not think much more on it. But when I was attending the first class of Mathematics Department at university –incidentally-, I suddenly realized that it did not have to be such a class. Then I decided to be a mathematics teacher.

When I was working in a *dershane* I always encountered this question: “When will we use this?” I mentioned about mathematics in science, technology, engineering, art, music and nature. Children agreed but it was not satisfying for them. Then I said: “Think about a problem. It can be anything in your lives. What will you do then to solve this problem? Run away? OK. But again you must think about it. What are the ways to run away, which one is suitable for your situation etc. Then you select the best way and get the solution! So, problem solving is everywhere, you see? And mathematics helps you whenever you encounter a problem. Come on, mathematics can be your best friend!” They always laughed but also believed and saw that it works. Because in course of time they got used to think about data, required things and

connections in a problem and interpret the problem as a whole. Even students could not solve the problem, it was a process. They took the lead in problem solving.

At this point let's look at this "stay seated problem" by using Polya's four steps in problem solving:

Problem: "Everyone sits in a circle. People are numbered clockwise around the circle, starting with #1. Start with #1 and skip him or her. Person #2 is asked to stand up. Person #3 is skipped, and #4 is asked to stand up. This process continues around the circle. Skipping every other person, until only one remains seated. (For example, with ten people the fifth person would remain seated.) If there are 25 people, where should you sit to make sure you are the one remaining seated?"

First Step: Understand The Problem

When I was reading the problem at the same time I imagined each part of it. I thought it was a kind of game and we do not know how many children were sitting in this circle. Everybody had a number and they lined up clockwise around the circle, starting with #1. Skipping #1; #2 was up. Then skipping #3; #4 was up. This continued until only one remained seated.

Second Step: Make A Plan

I drew a circle and placed ten people according to this rule. Then skipping #1, 3, 5, 7, 9; I raised #2, 4, 6, 8, 10. Now number 2, 4, 6, 8, 10 were already up. We do not need to think about them anymore. We could assume they eliminated in the game. #1 was the number after 10 (who stood up last) so skipping #1; I raised #3 and #7 this time, they eliminated also. After this section, #9 was the number after 7 (who stood up last) so skipping #9; I raised #1 and it eliminated, just #5 and 9 were sitting now. #5 was the number after 1 (who stood up last) so

skipping #5; I raised #9 and it eliminated. And #5 is the winner who remained seated at the end of the game. Now we will play this game with 25 people and who will be the winner this time?

Third Step: Work The Plan

Now let's divide this game into sections. In first section: 2, 4, 6, …, 24 are up. Now skipping 25; 1, 5, 9, 13, 17, 21, 25 are up in the second section. In third section, skipping 3; 7, 15, 23 are up. In fourth section, skipping 3; 11 is up and in the fifth section skipping 19; 3 is up. So the winner is #19. But for example if there are 250 people in circle then this method is not effective. So we should look for a rule/formula/algorithm etc. We can make tables to observe the connection between data and unknown step by step. For example beginning with 1 person, the winner is #1; with 2 people, winner is #1; with 3 people, winner is #3 … etc. If we make such a table we will have some findings and then we can form an algorithm like this:

S1: Let a is a natural number and n, p, i and m are positive natural numbers.

S2: Insert p, for the number of people in the circle.

S3: Let $i \leftarrow 1$.

S4: Let $a \leftarrow 0$.

S5: Let $n \leftarrow 2\text{^}a + (i\text{-}1)$.

S6: If $n < p$ then $a \leftarrow a + 1$ and go to S5.

S7: If $n > p$ then $i \leftarrow i + 1$ and go to S4.

S8: If $n = p$ then m $\leftarrow 2*i - 1$ and go to S9.

S9: Print "the winner is:" m.

S10: End.

Fourth Step: Look Back and Check

In this part we work the algorithm to see whether it works correctly. If it does not work we must look for what is wrong and what could be done to fix it at a time. Then we have a product to use in different problems, whenever we want.

Conclusion

The purpose of this article was to express my ideas about problem solving, its advantages and disadvantages and Polya's four steps. I learned problem solving should be at the center of mathematics curriculum since it makes students more eager and independent at the same time. Students could consider about questions on their own. They could form their own understanding by using their own rules/formulas/algorithms. Of course, a teacher should give some clues/ideas and explain misconceptions such as a guide. Here, it could involve some problems to adjust curriculum according to this idea. It could take much more time in lessons and also the teacher could effort much more to prevent a chaos in his/her classes.