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Stem-ED 210

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Final lesson Analysis paper

Teaching is definitely an art of giving away ideas that help in promoting growth and development among pupils and oneself. In making a better sense out of it I would also say it works more like a catalyst, that helps people to grow rather than being bounded by certain sets of principles. In order to put myself and my students to test, I was asked to come up with a lesson plan. This took me some time but eventually I was able to decide that trigonometric identities would be the best one to go with at least for this task, since I personally had a strong confidence on this topic. Next, I was assigned 3 students to teach, and I planned out the pretest for them. In this paper I am briefly going to discuss the things that went really well and the things which I kind of most struggled with the most. Further on I will also go over some statistical data to analyze if whether students at all gained anything from my teaching as this will help me getting a nice boost, next time I teach. Before diving down too deep into the story it is important to know what was part of the lesson plan. I tried my best to keep the lesson student centered but, when it comes to teaching mathematics, I have always noticed that it is kind of hard to come up with

reasoning-based questions. Mathematics itself is quite broad. There are topics which may seem very unrelated in the beginning but all kind of start getting entangled with each other as we progress through different levels of mathematics, and this could get really complex, but eventually all starts making sense through enough understanding practices and experience. At least this is how I view mathematics in general. A very good example could be how teachers tend to generally start algebra as a completely different topic and later it all kind of gets mixed into all sorts of crazy geometry, calculus and various types of ratios and entry level physics problems.

In order to test my student's prior knowledge on the subject it was important for me to come up with some sort of pre-test and see how they performed. Keeping in mind, that it shouldn't be too easy it seemed much like I had made it far harder, and time consuming. As I generated the statistics, I wasn't much surprised on how they performed on their pre-test mainly because the outcome of the statistics had satisfied my predictions, especially with such small sample size. Later in two weeks I had to come up with some sort of post-test problems, but because of lack of time I couldn't work on that. So, eventually it was decided that I would have the students go over the pre-test problems with me and side by side I could have four extra problems that I could use as post-test problems. Thus, in order to run this efficiently I sort of started working on the lesson plan and worksheet to keep the lesson as student centered as possible. Another important decision that I made was regarding worksheet which was deciding about how I would grade my students. Since, I had just four problems on the worksheet, I decided to set 25 points for each problem to grade them out of 100 points, to keep everything easy and concise. Some other things that I took into consideration was that I would also be giving away partial credits as long as their

process showed any progress towards the solution. This was important for me because I really didn't wanted to grade my peer-students roughly which would had caused my students to lose their interest in the material.

During my whole preparation for the lesson plan it was really important for me to consider going over some effective question building exercises, so that I could better grow in presenting my students with quality questions to help them spark curiosity. Hence, on April 10th of 2019 I was asked to teach my student-peers as part of the learning skill. I was really nervous in the beginning, and in order to run my assignment successfully I tried to prepare for all sorts of things that I could possibly think of, such as getting my post-tests printed ahead of time. I had thought of not using the whiteboard, but I guess that was quite a significant mistake that I made. Rather than using a whiteboard I instead used an A4 size paper to explain all the important concepts of the basics of trigonometric functions and how they could possibly be implemented to prove different identities.

While considering some of the important skills that I had learned from the previous STEM classes such as engagement and argument based learning I also decided that it would be really important to go over some things that I personally used to struggle with during my high school years of learning and implementing mathematical ideas, formulas and relationships. Just because

I wanted to make my lesson more reasonable, I further decided to go over where these trigonometric relations actually came from rather than just blindly implementing them to what problems asked. Another focus on the lesson plan was that I wanted my students to grasp the basics even if they struggled with some of the harder problems. Because again, it all melts down to practicing these harder problems, because this would be what symbolize growth rather than having fixed mindset and blindly applying formulas to wherever and whenever possible without having solid reasoning. This was also more related to the math common core standards of teaching and learning mathematics as abstract reasoning is the important skill for development of essential mathematical ideas. Based on research by Stanford Professor Carol Dweck and her colleagues, we know that students with a growth mindset - *the belief that intelligence is not just something that you are born with* - have higher levels of success than those with a fixed mindset. Teaching your students about this concept has the potential to make them grittier, more positive, and more successful in their career and everyday lives (Khan).

Aside from all this I chose this topic also so that I could also better prepare my students to form better decision-making skills especially when it comes to mathematics studying and understanding mathematics.

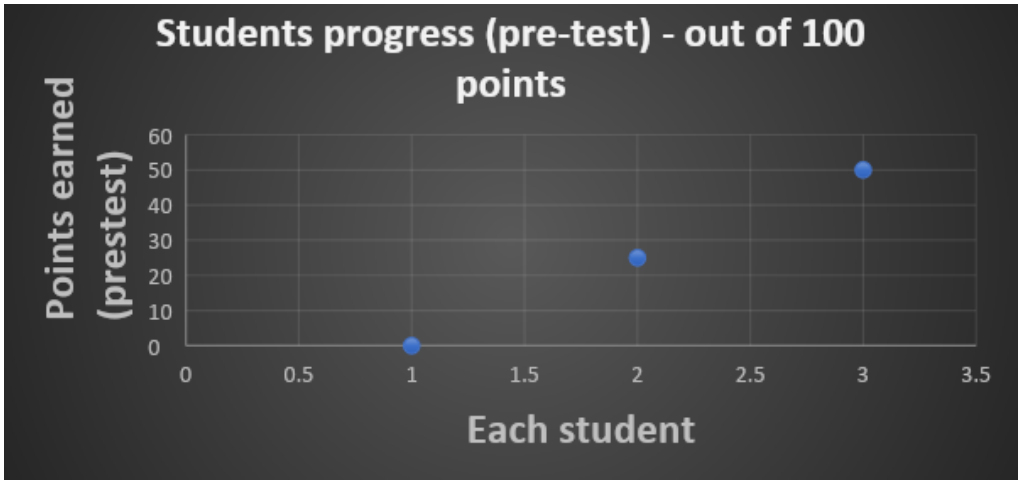
As for myself, I tried to be as respectful as possible to my fellow peer students and wanted them to engage with me as much as possible in the process of learning and sharing ideas. It was a way different setting than a regular teaching and learning experience I have had in the past. To be honest it felt much more like a tutoring session to me. All my peer students were actively engaged in asking some good questions, and one thing I really liked was how one of my students

had asked me that, “Why wouldn't it be reasonable to use this formula in that problems”. This definitely showed that my students actually wanted to know the content and that there was definitely growth taking place among all four of us. I was learning a lot from them but also at the same time I was regretting, that if I would had used a white board it would had been much nicer to see much brighter side of trigonometry. Another thing that I was also kind of struggling a bit was giving a solid direction to my students, but I guess it was because I was feeling a bit nervous every time, I gave them some instructions to follow.

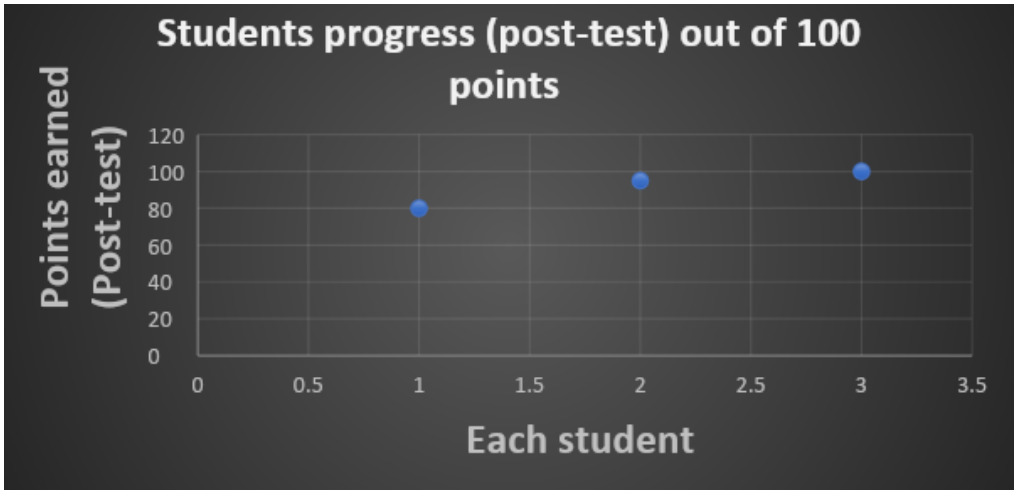
However, for the content part I really wanted my students to understand the importance of the content, and this was only possible for me to better monitor them to know where every student stood on the learning curve. Because of this by the end of explanations I decided to engage everyone on the questions that I began asking. This was something extra that I decided to do than what the lesson plan I had prepared for. Sometimes things don't go as planned; they go better than planned. And thus, it was proven to me as students actively answered some of these challenging questions. As Maria Miller mentions in one of her articles saying, “Let us strive to teach for understanding of mathematical concepts and procedures, the "why" something works, and not only the "how"”. (Maria) Like the way Maria says, I didn’t really wanted to fish for the right answer by asking them “how” and “what” type of question. Instead my focus on questioning was more directed towards reasoning such as “why?”

Next, as student had completed their first four questions and had shown some signs of growth and learning I decided to pass them the formula sheet, which contained all the important trigonometric relations of which I had given them some prior knowledge about. I decided to let them discuss on their own as they worked through their post-test because I strongly believe in team-based learning and incorporating ideas. The first two of the four questions resembled the pre-test questions to give my students some confidence to be able to generate reasonable answer to the trigonometric proofs. Under limited time they finished their post-test and now was finally the time to prepare the data on the spread sheet to compare both the results from the pre-test and the post-test. I am glad I was able to give them some feedback on their performance for them to be able to reflect on how they did. Upon reviewing the statistics, I was proud to see that my peer-students showed far greater progress, and this actually proved that I had succeeded in teaching some of the content that I had prepared.

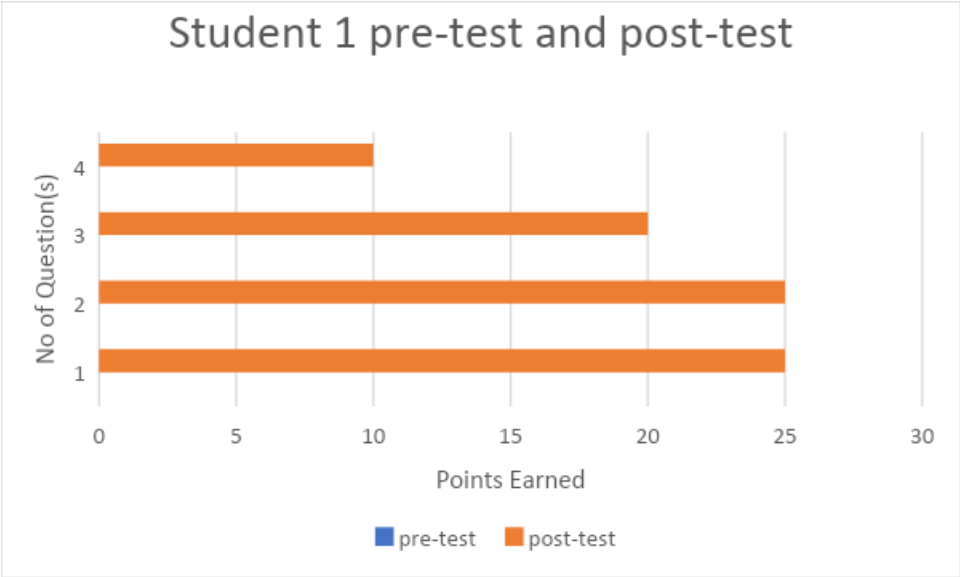
Graph of student's performance on pre-test:



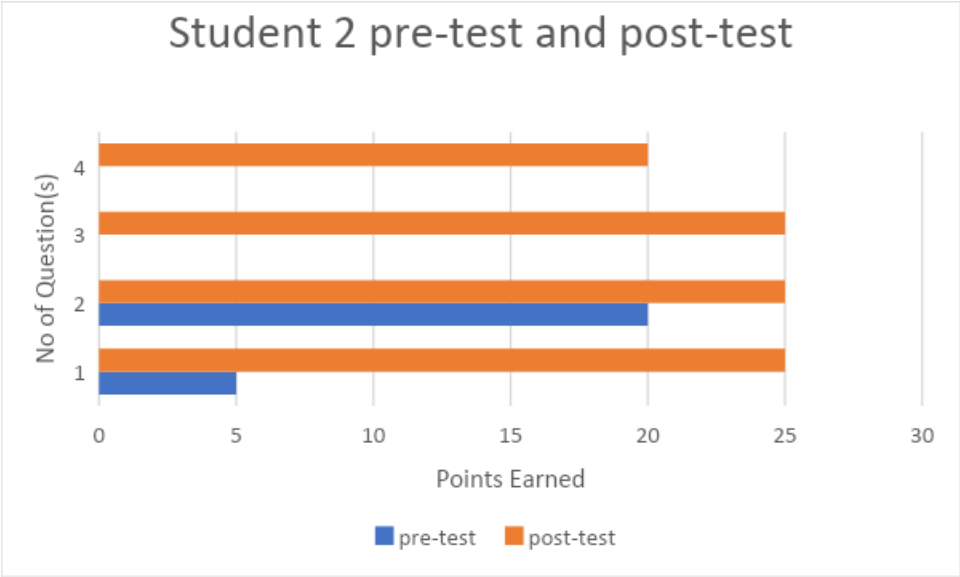
Graph of student's performance on post-test:



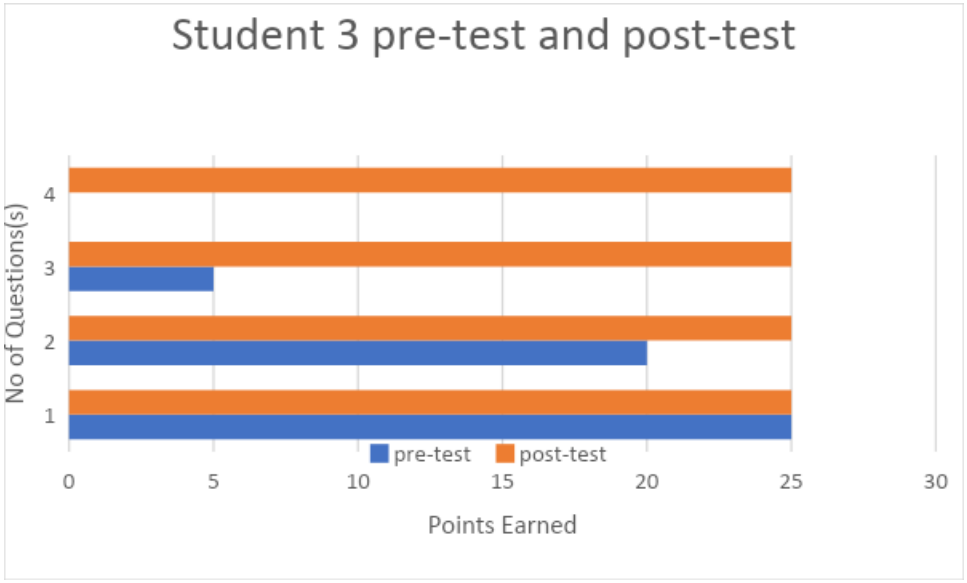
Graph of Student 1 pre-test and post-test:



Graph of student 2 pre-test:



Graph of student 3 pre-test and post-test:



Looking at the data student seem to have progressed quite a lot. Of course, it would had been much nicer to have students practice much more problems to see a better result, but due to very limited time I was only able to test my students on very few problems (four to be exact).

For the most part they seem to make quite a lot of progress. The main motive of the lesson was not to grade but rather test and see if they showed any kind of growth and were able to take anything from me in these forty-five minutes of teaching. I felt really nice for the progress of my student 1. When the pre-test was handed out Student 1 did not even attempt to do any question. However, by the time I had taught my lesson and took a post-test about what they had learned Student 1 had scored 80. Even though his score was lower than other two students, student 1 showed most growth and interest in the material when it came to learning trigonometric

identities. And this is what I was trying to demonstrate through my data analysis of my statistics which is that growth is the most essential part for student teaching. Teaching itself is a lifelong process, but it also requires us to grasp different and better approaches to teaching that promotes positive growth among the students. Upon reflecting if there was anything, I could had changed in conducting my lesson would ha been most definitely the use of white board rather than simply using an A4 sized paper. Other things such as some kind of modelling the problems according to common core math standards would had been much nicer in understanding and doing mathematics. As Elham mentions in her article that, “Children also need opportunities to identify mathematical problems in their world, determine what information will help them solve a problem, develop mathematical models of situations, and revise their models to more closely predict real world phenomena. This is the work of modeling with mathematics, a mathematical practice identified by the Common Core State Standards as central to the work of K-12 mathematics (Elham). At the end all I can say is that this over all activity taught me quite a lot of things in regard to teaching, learning mathematics, materials management and planning ahead.

Citations:

"Four Principles of Deeply Effective Math Teaching." *Teaching Math - Four Principles of Deeply Effective Math Teaching*, www.homeschoolmath.net/teaching/teaching.php.

Khan, "Growth Mindset Lesson Plan." *Khan Academy*, Khan Academy, www.khanacademy.org/resources/parents-mentors-1/helping-your-child/a/growth-mindset-lesson-plan.

Elham, "Modeling With Mathematics." *Teaching Channel*, 12 Apr. 2019, www.teachingchannel.org/blog/2016/05/13/modeling-with-math-nsf.