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Practicum in STEM Leadership
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STEM Collaboration

When coworkers at Monroe County High School hear the acronym STEM they know that it means science technology engineering and math, but that was as far as their knowledge went. Over the past two years a coworker and I have been involved in the STEM grant from GRECC and with that taking classes with endeavor. During that time we have learned about STEM and how easy it is to work together and collaborate across curriculum to engage students in concepts and give memorable experiences to students that help them understand the why behind the content. When we were given this assignment it clicked with us that we should do a PD together showing our coworkers what we have learned and what our students experienced from us going through this process.

Our school is a smaller high school, 9th-12th grades in south central Kentucky with approximately 550 students. There are approximately 30 teachers and 27 staff members. There is minimal diversification within the school. In the mathematics department we use illustrated mathematics for our curriculum which is based on the common core standards which kentucky standards are adapted from.

For our professional development we invited the entire high school staff and middle school staff along with people from Green River Education Collaborative Cooperative which oversees the STEM grant. We made flyers and sent email reminders, but after school is very hard to get people to stay. Out of that only 12 people attend the PD, 9 high school teachers and three teachers from GRECC. There were two math teachers, two science teachers, two special education teachers, two history teachers and an Art teacher. This was a great turn out all the teachers were very excited to learn and to collaborate with each other using STEM properties. Based on the pre-survey data our hypothesis was correct that most teachers were vaguely familiar with STEM, they were in the middle of collaboration with other teachers and they thought that STEM will increase student engagement and decrease learning gaps.

Professional development was held after school. I had candy and hypothesis cubes laid out on tables to intrigue them to try to figure out what they were and

why they were there. I had multiple tables set up but the teachers sat all together and made one big table, to me that showed that this group would be able to collaborate and talk with people from different curriculums. We started by having teachers fill out a survey using their phones and a QR code. Then Mr. Sheffield and I introduced ourselves and what STEM stands for. Mr. Sheffield started explaining how he uses STEM in his classroom, he explained the catapult unit that he did with his and how we collaborated to solve the distance and what angle the catapult needed to be to make a further distance. He explained about the standards that were associated with that unit and showed examples of student work and videos. After that I explained the solar system dilation lesson that I had completed with my students and how it was easy to incorporate STEM properties in math to teach math concepts. I also showed them the other lessons that I have created throughout the endeavor program and gave them access to my lessons as a resource. We also discussed a task ranking activity that Mr. Sheffield made it for both mine and his class to use during the solar system unit for him and the volume unit for me. This was a way of collaboration that teachers were amazed by not only is it including activities but you could also use the same activity as a way to check for understanding.

I discussed with teachers multiple resources that we had learned throughout the endeavor. I showed them the infiniscope site and walked through a lesson together. They loved how everything was pre-made and that it kept students engaged by assessing them after every step. I showed them the Nasa site and the JPL sites and how that they have specific search areas for lesson plans on specific topics. I also discussed my nasa data site and data nuggets site that my students used to find the size of the planets and distance from the sun. On these sites they also found different satellites and their information for the “What’s circling the globe unit?”. Feedback after the PD participants wanted more time to explore the resources themselves and to have their computers with them so they could save the sites that we were talking about even though I was sending them the slideshow after the meeting. They thought it would have been better to be able to explore on their own with us there to answer specific questions that might arise.

Our activity that we did after our presentation was about Hypothesis cubes. We learned about these in a training session we had this summer with the grant. These are cubes that have related images or phrases on each side and they are in a logical explanation question format as follows: “ Wile E Coyote is to Road Runner just like Joker is to Batman just like Darth Vader is to _____” Then students are given a blank side and they have to figure out the last picture that is

covered up. Instead of words students are given pictures of the characters named. This is an easy comparison of the hero and villain. I explained this example to teachers and then on each of the tables I had placed 2 mini cubes that had different content hypothesis cubes on them. One was about prime numbers and which was not prime, one was a dice instead of dots it had numbers, one was a picture of animals and one animal did not belong in that group, there was a foreign foods example, a plurals example. We had in total 10 different mini cubes that participants tried to solve. They worked together and made different hypotheses about what they thought would be under the paper. Then they had a chance to look after telling me their hypothesis and were shocked to see what it was. After the groups had figured out one or two cubes I gave them a template paper for the cubes they made their own. These groups were a mix of different curricula. For instance, at one table there was a math teacher, science teacher, history teacher and a special education teacher. They worked together to make cubes that would span all three curriculums. Participants discussed how it works on social skills, higher level thinking questions, team work, collaboration and it can be used in all classes. This was amazing to see that the collaboration was really that easy and they felt that they could incorporate not only the hypothesis cubes but also the STEM principles and NASA resources easily into their classrooms.

A week after our PD I went around to teachers that had attended and asked if they had any questions or needed help doing any of the activities that we had discussed. Most teachers did not need anything one teacher talked about how the history and science department were going to collaborate together when they talked about artifacts so the science teacher could discuss how things are dated and examined and the history will discuss the time period.

The post survey data showed that participants were likely to incorporate STEM resources into their classrooms, they are extremely likely to collaborate with teachers outside of their content area, and that they are extremely likely to encourage others to attend this PD in the future. I feel that overall our professional development was a success. All participants seemed excited and eager to include STEM principles into their teaching and to collaborate with each other cross curricular. Those were my two goals to show everyone what STEM was about and how easy it was to work together to achieve common goals. I feel that all the teachers will at least attempt to bring one aspect that we showed them into their classrooms. Below I have included links to the survey results, presentation slideshow and video of the PD. Contact information for participating teachers is included in the survey results.

