Professional Development for All Classrooms

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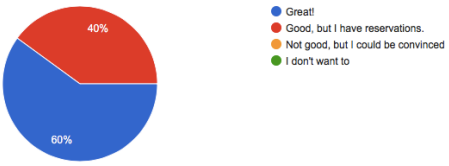
ED 545, STEM Leadership Seminar, Kristen Crawford & Stephanie Stern

Boothbay Region High School, located in Boothbay Harbor, Maine, is a small school with about 180 students and 24 teachers plus support staff. The professional development (PD) offered was split into 2 x 1 hour sessions offered over 3 weeks (one week off in the middle). With our hybrid schedule, all PD is offered on Wednesday morning's and our principal saved time for me when I asked her to last spring in anticipation of this class. Our school was recently gifted with new technology including: (3) industrial level 3-D printers with Upgrade Kits and Filtration Systems, (1) Laser Engraver , (30) Vivobook CAD devices (Mouse and Case), (12) Vex Robots, (1) Thermal Cycler, (2) Electrophoresis System w/camera, and (6) Digital Micropipettes. We already have a smaller 3D printer and laser cutter. While our engineering and technology teachers have been running PD for those that want to learn how to use this new technology, our principal has challenged us all to think of cross-curricular ideas to bring this new technology into the lives of more students. I jumped at the chance to focus my PD on cross-curricular ideas using the 5E model as a template for writing these new units. The specific goal of my PD was to piggy back on to the PD already happening around the new technology and use the excitement over this technology to start brainstorming cross-curricular ideas. The ultimate long term goal is to create new units that cross multiple disciplines, written using the 5E method, similar to the exemplars offered by NASA education resources.

The first day of PD included 12 other staff members, plus our principal, ranging from grades 9-12 and covering all departments, including our library and guidance department (Appendix A).The PD focused primarily on pedagogy in the form of brainstorming ideas and in using the 5E template for writing new curriculum. The 5E method was highlighted in a previous NASA Endeavor class focused on NGSS standards. Given the audience, standards from Common Core and Maine Learning Results were also taken into consideration, but not used specifically. As stated in my proposal, while 5E lesson were taught to us with a lens on STEM, I hoped to use this same model to help other subject areas engage with our new technology while offering ideas from the abundant NASA resources for engagement.

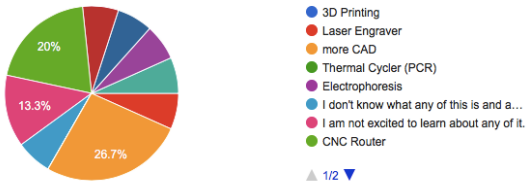
A pre-PD survey was sent out to all staff in Google Forms prior to the PD sessions. 15 teachers responded to the Pre-PD Survey Questions:

1) How do you feel about creating cross-curricular opportunities for our students? (short answer)

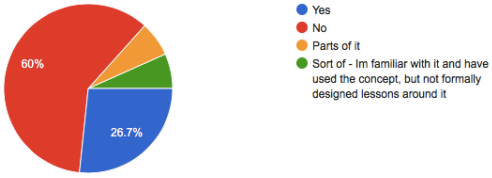


2) What support do you think you will need as we look at creating cross-curricular opportunities? (short answer) “Time” was the most popular answer.

3) In thinking about the new technology we have, what are you most excited to learn about? (short answer)



4) Have you ever used the 5E method while creating a new lesson? (multiple choice)



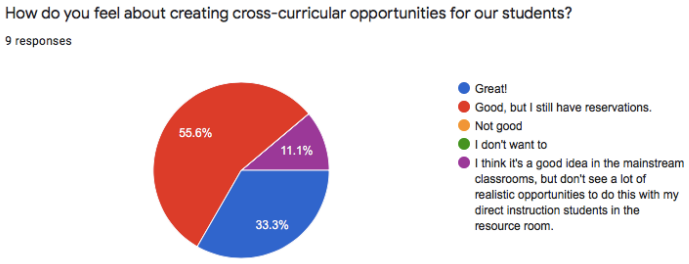
Day 1 of PD (1 hour, held via Google Meet) included a description of the CNC router capabilities (by Ben Powell) followed by an introduction, by me, of my role as we look at creating cross-curricular opportunities for the whole staff. After presenting how often this happens naturally (me teaching about pH while pre-calc is learning Log, for example), I gave examples of how this can be done purposefully, without all of us needing to know how to use each type of new technology. We spent the last 20 minutes brainstorming ideas with the expectation that in two weeks we will bring these ideas to the table and look at how to organize them within the 5E framework.

On the second day of PD, I presented the 5E process as outlined for NGSS by Rodger W. Bybee (Bybee, 2013, p. 58), along with slides to introduce my vision for cross-curricular learning. For this session I had 9 attendees with about half of the group meeting in my classroom with the other attendees on Google Meet. The group I had the week before worked on CAD, with Ben Powell, while the teachers that did not participate the first week were assigned to meet with me. Tanya Hammond and Abby Manahan were the only exceptions as they wanted to talk about cross-curricular ideas and came to my second PD session instead of continuing to learn about CAD.

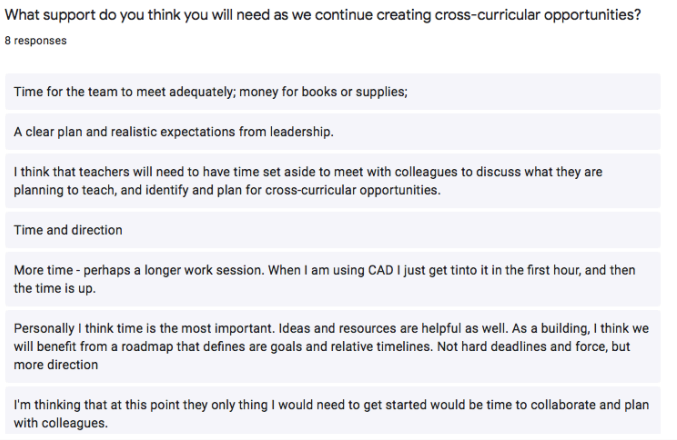
I did not spend as much time on the 5E format as originally planned because many of the attendees were not at the first session and had questions about the expectations of the

administration. The group on the second day was composed of more teachers from the 9-12 English and History departments than during the first week. I shared data from the survey and NASA education resources for materials to support our ideas such as “Planetary Poetry” (NASA, JPL, 2020) and “Space School Musical” (NASA, JPL, 2019). This second day was intimidating as the principal mandated attendance of all teaching staff the day before. Thankfully that didn’t give me too much time to overthink it, but it did make me nervous. As we learned in class teachers are “enthusiastic about professional development when they are able to volunteer rather than be required to participate” (Jenkins, 2010, p. 42). I did wake up at 4:30 am to re-do a few slides which included a slide to target the teachers I knew did not want to be there. Day 2 included first an overview of 5E and an exploration of cross-curricular NASA resources. As a large group we then put our brainstorming ideas on the white board followed by small group work as we identified which teachers wanted to work on which units. We than came back as a large group and discussed what we need to move forward. My presentation on day 2, with follow-up discussion and questions, took 65 minutes. A with a debrief between me and the principal followed the PD session.

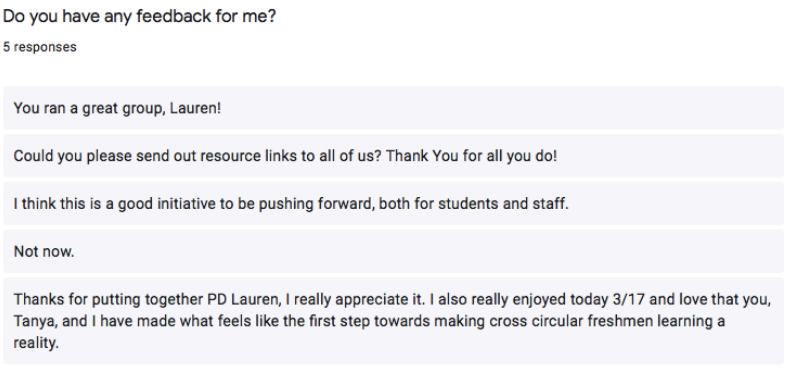
Only 9 staff members took the post PD survey, which was surprising to me. I sent it out the afternoon of the PD, after school hours, which may be why there was low



participation. In hindsight, I could have offered time at the end of the PD session for this survey. The data was similar to the pre-PD survey, but more staff now have reservations about cross-curricular units and the gift of time that would be needed to pull it off. When asked about what they need as we dive deeper into the ideas, there resounding majority wants time.



Of the NASA resources I shared, only a few participants really seemed to latch on to using them. I would love to follow up and offer more time to explore these ideas. Feedback from my peers was encouraging. I even received a thank-you note from our principal.



Yes, the PD I offered was successful for three reasons. One, it gave me my first opportunity to stand out as a teacher leader. While I joined the teaching staff 12 years ago, I had no training in education and held myself back from sharing ideas with colleagues that have been teaching far longer than I have. Secondly, I am passionate about cross-curricular teaching and had a platform and audience with whom to share my ideas and brainstorm how to make it happen. I learned that this is a shared passion among many of the staff. The most important

success, however, is that due to the interest and participation during the PD, our principal has not only given us time each week to work on our new units, but is even granting common prep-time for next year so that teachers can overlap and plan units together. She understands the importance of cross-curricular learning for our students and has adopted the goal as her own. I am a part of one group combining science, history and ELA to build a brand new class. After looking at the overlap of so many of our units we decided to go big. We have approval and will pilot the class with next year's 9th graders.

Contributing to the success of this PD is that it is not over. This was not a one and done opportunity. I met with the principal who was thrilled with how well my ideas were received and newfound growth mindset in many of our formerly rigid staff. Once the expectation that all attend was mandated, I needed to quickly foster trust. Daugherty taught us about "the need for adults to be actively engaged, as well as for teachers to develop a sense of collegiality and collaboration" (Daugherty, 2009, p. 20). My quick early morning edit of my slides was done to foster that sense of trust, and add examples of cross-curricular ideas that did not involve science. Our other departments were made to feel less than important by our former principal and I wanted to make sure they knew that I value their content. I was pleased to hear them offer their own ideas during the brainstorming session and then willingly break into groups to develop these ideas. There was still one hold out that was stuck on the idea that the administration is asking us

to do something new during a pandemic, but most staff expressed excitement over something new to look forward to once we have a more normal looking school day.

Going forward, we are being given Wednesday time in April and May to continue our work on our cross-curricular units. After the PD session I created a working document where each teacher has identified 2-3 big ideas that they teach that could become a cross-curricular opportunity. While my official PD presentation is over, my group of 3 will be digging deeper into the 5E lesson procedure as we develop our unit.

Both the use of NASA resources as exemplars and the 5E method for strong pedagogy where instrumental as the basis of my PD. Using the JPL website to highlight cross-curricular lessons that are already written was a starting point to show that I want to be inclusive of all disciplines and that our lessons do not need to be overly complicated. We can start small and work up to bigger ideas. The goal is for a few of us to pilot these lessons next year and then come back as a full group to discuss what went well, what could be done better, and hopefully sell the idea as workable and enjoyable for all.

References

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Appendix A

Abby Manahan, 9-12 Technology Integrator, amanahan@aos98schools.org

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