

Permission and Commission to Step into STEM Teacher Leadership

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I still remember the feeling I had when I turned sixteen. I was so excited to get my license to drive. When I got it, I felt this incredible sense of freedom, excitement, and desire to navigate the open road! I've been teaching for sixteen years and I'm experiencing those same feelings about teaching right now as I did about driving. Something new is stirring up inside me professionally as I've gotten this permission and commission to launch.

This new, or renewed feeling, I have about teaching has everything to do with the experience I've had participating in a professional learning community (PLC) of sorts. As described by ISTE.org, **"A professional learning community (PLC) is a team of educators who share ideas to enhance their teaching practice and create a learning environment where all students can reach their fullest potential. Most PLCs operate within a school building or across a district. They can be organized by grade level, content area or an entire teaching staff."** My experience was a little different than this defined PLC. I connected with teachers outside my district from schools across New York State to answer a big question, "What happens when there are systemic barriers in place that are preventing teachers from creating those deeper, more active, STEM learning opportunities?" It all started when I signed up for this STEM Teacher Fellowship through the National Network of State Teachers of the Year (NNSTOY) through a grant from 100Kin10. Three systemic barriers were focused on; lack of teacher autonomy, lack of time to collaborate, and lack of time to experiment. As I participated in this fellowship, I found ways to break through those barriers and others that I identified along the way.

I think it is important to paint a quick picture of my district and the environment in which I've been teaching for the last sixteen years. I teach in a small rural district in Central New York. Students are exposed to STEM from an early age and are given many opportunities to engage in STEM learning throughout elementary, middle, and high school. Most of this content comes from programming by Library Media Specialists in the elementary and middle school. We have makerspaces and STEM rooms in each of those buildings. There are clubs and afterschool enrichment program opportunities for students. Students attend computer, library, and technology "specials" throughout K-7 grade. Our high school, which includes students in grades 8-12, teaches technology in 8th grade and has a number of STEM courses available for students to take as electives in grades 9-12. We have also begun to offer summer STEM camps and they have been very popular and successful. I am a technology teacher and I've taught 7th

and 8th grade technology and high school elective courses throughout my career. If I could sum up what I've taught those students over the years it would be this: how to creatively and systemically, design and make things to solve problems.

Teaching in my school, I have had abundant access to quality resources. Sure, I've upcycled my fair share of paper towel cores for projects! But I've also been able to use plenty of 3D printer filament for our 3D printers and premium baltic birch plywood for our laser cutters, not to mention CNC milling machines, vinyl cutters, and robotics equipment. Our district and community has decided to place a significant investment in our STEM programming over the years to build our programs and therefore funding and resources have not been scarce. Our department leader and teachers have worked hard to create quality STEM programming available to our students. I say this because I know this is not the case in a lot of districts. And although I could offer some suggestions for how to build up a program and increase funding, that is not what this story is about. This story is about having all I need and yet still facing barriers that limit my student's access to that STEM programming. Perhaps, it is also about feeling this burden or passion around not letting these resources go to waste. I want to be a good steward of the investment that taxpayers have made and the effort that other teachers have put in, with the support of administration, to build our program. It is also about this desire to increase student access and interest in STEM because we have all these wonderful resources available to them and I know we can help create meaningful and authentic learning through STEM programming.

Throughout my teaching career, I have felt empowered to create a specific environment in my classroom. A place where students feel safe, encouraged, and capable to learn. I love the quote from Haim G. Ginott:

"I have come to the frightening conclusion that I am the decisive element in the classroom. It's my personal approach that creates the climate. It's my daily mood that makes the weather. As a teacher, I possess a tremendous power to make a child's life miserable or joyous. I can be a tool of torture or an instrument of inspiration. I can humiliate or heal. In all situations, It is my response that decides whether a crisis will be escalated or de-escalated and a child humanized or dehumanized."

I remember hearing this quote early in my teaching career and I have found it is so true. I also found that I have locked onto the phrase "in the classroom". I have done this almost to a fault. Through my experience involved in this fellowship of STEM teachers who have been connecting for the last 18 months, my focus has broadened. I'm no longer locked-on to that phrase and my tunnel vision approach to teaching solely in my

classroom has expanded to include my school and dare I say, my entire district. It wasn't simply videoconferencing with these teachers and hearing their stories that got me to this place. It was explicitly taking the time to consider what I was hearing and how I might do something different or take a risk like my colleagues had done. It was taking the time to consider how I might implement or create change that I had always wanted to make. It was learning about being a teacher leader or better, teacher leadership.

If I'm completely honest, my view of a teacher leader or teacher leadership meant adding responsibilities, a title, and more pay. It was really more about the role rather than the work itself. In his book "Leading Together", Jonathan Eckert notes that "one of the primary attributes of great school leaders - both administrators and teachers - is the fact that they don't define, they do. They get things done." We read this book and spoke with the author during our fellowship and understanding this concept was transformative. I can't tell you how frustrated I have felt when I've seen something that needs to get done or decided and people just walk around waiting for "the leader" to make the move. In education, we see this all the time. That barrier of teacher autonomy can so often prevent teachers from stepping up and stepping out. They don't feel like they have the permission *to do*. Or they limit that autonomy to their classroom and this leads to classroom silos. My classroom and my perception of *doing* was no exception. Yes, I was the decisive element in my classroom, but it stopped there. I've since realized that I can be a decisive element in my school or in my district.

Is this my age and becoming a veteran teacher? One does hope that with experience comes wisdom. But, it also might just be recognizing that leadership is in the doing. When you realize this, there are no added responsibilities or titles and unfortunately, often no added pay! It actually becomes a little freeing in a sense. You are free to do things and try things. You are free to step out and take risks without fear of failing or not fulfilling your new responsibilities or living up to some new title. You don't have to earn some new wage or salary or stipend. But herein lies another barrier; time. As teachers, our plates are full, and there is little time to collaborate or experiment. Thankfully, I found (or made) some and I was able to be compensated for that time as well. Your time is worth something. You give time or make time for things that matter to you. You should be valued for your time. Participating in a fellowship provided me with a stipend for that time and perhaps more importantly, the way that I was treated, as a person and professional, made me feel valued. It helped me overcome that barrier. If there is one suggestion I have for policy makers or decision makers to help develop leadership, it would be to provide time for and value people for the time they spend *doing* leadership. This can be done in many ways. One way is certainly through pay or stipends. It can also mean creative scheduling for teachers, changing up responsibilities, sharing of workloads or providing release time. But demonstrating that

people are valued for their time will always win over simply piling on additional responsibilities or expectations to people who are already burdened and overwhelmed.

Through this fellowship, I began to dream a little about how to increase student interest and access to STEM programming in my school. I was provided with an opportunity to think creatively about my time and my schedule. After I recognized that a major barrier is my time, I looked ahead to the next semester and reviewed my teaching schedule. It wasn't completely full just yet. This is where I got creative. I came up with a plan to discuss with my building principal how I might use my time differently. I asked my administrator if she would be willing to let me do something new and use some of the time that I would normally be assigned duties or supervisory work to develop a STEM certification program of sorts and host or create a makerspace. There was some hesitancy in allowing me to do this and my principal noted that there were some things that she had to consider. There was the legitimate shortage of teachers that were "free" to do necessary supervisory duties. This meant it would take more work for my principal to find ways to shift study halls or coverage that was already established. There were also our contractual obligations that needed to be followed and ensuring that I was carrying a full teaching load. There was also concern that other teachers might request their time to be used creatively and allow them to host open lab times for students in lieu of duties. I believed these were all legitimate concerns and yet, I pressed on and presented my case. I shared how empowered I felt to address my concerns about having so many resources but wanted to reach more kids. I demonstrated that I had given this significant thought and planning and I had a design. I even connected and aligned what I was proposing to our district initiatives. With some stick-to-it-iveness, gaining support from my department leader, and even surveying student interest, it was finally decided I could try it. I wasn't approved for doing it exactly how I imagined. I was given about half the time I requested but it was a chance to give it a shot!

I don't think what I came up with is the main point of this writing. But I will share it because I'm pretty excited about it and perhaps it could also help others in a similar boat. I'm calling it the Maker Apprenticeship Program and the Creative Collaborative which I'll explain in detail in the paragraphs that follow. I do not have proof of concept yet for implementing it, but my ideas are grounded in my core beliefs, what I've already observed to be true in my classroom, and what I've learned as a veteran teacher. I have come up with six "pillars", listed below, that provide the framework for my plan to increase interest and motivation for students to engage more in STEM:

1. Challenge students
2. Give students responsibility
3. Provide students with real-world problems to solve

4. Encourage students to come up with solutions that positively impact others (peers, teachers, community, and the world)
5. Recognize and value students for their achievements and work
6. Create a culture of collaboration

Most educators would agree that these are all important factors in learning and could get on board with them in some way or another. They are sound principles and rooted in good educational practice. I'm not looking to convince anyone to agree with me on these points. But I felt it necessary to lay these ideas out for myself. This helped to ensure my plan was mirroring the things we have done in our program already and what has helped us to be successful in the past. In addition, I wanted it to be aligned with our district initiatives. Thankfully, all those things we have done and all the things we are hoping to do in the future, get along quite well already and there isn't much difference between them.

With that framework set, I was ready to start imagining how I could knock down those barriers that limited students from accessing our resources and participating more in our STEM programming. Our biggest barrier, that is easily identifiable, is that our students are stretched thin. In our small rural district, students can make almost any team they try out for, join any club they want, and fill up their schedule with as many classes as they choose. In fact, many of our students choose to give up their daily lunch period in order to participate in a performing art or additional course. I believe this to be a broken system personally, but our high school has operated in this way for decades now. It is ingrained in our school culture and simply accepted as normal and no longer an exception to the rule as it once was. Part of the reason for this is the design of our daily schedule which uses a block scheduling system and designates times for ensembles and performing arts to be during lunch periods. In addition, our students are encouraged to take a rigorous course load and push themselves to their fullest potential. I fundamentally disagree with forcing our students to choose between taking certain courses and having some scheduled "down time" like a lunch period. Thankfully, that is an ongoing discussion and problem that our district is looking at changing. One of the ways we are doing that is looking at implementing a daily "advisory" or "enrichment" period and changing the time that each class meets. Right now, blocked classes meet for 80 minutes every other day, but that may be shortened to "create" more time in the daily schedule. There has been significant work done at this point in making this a reality and I'm proud of the shared teacher and administrative leadership that has gone into making this a reality.

Having this hope for a future change to the school schedule, I considered that students may have a little more time in their daily schedules. However, it may not be

enough to fit an entire STEM course or elective into their schedule. I wondered aloud, “what if students could find 30 minutes once or twice a week to do something STEM related?” Could they still access our resources? Could they still learn how to use our fabrication or maker tools? This led me to think of introducing a makerspace to our school. We have all the equipment and resources. In fact, our school is even going through a large capital building project aimed at creating a flexible learning space or STEM lab for our technology courses to use. But many makerspaces are staffed by teachers, adults, or library media specialists. Another barrier emerged. Enter my proposal in using my time creatively instead of being given traditional supervisory duties! If I was assigned time to be in the makerspace, I could easily work with students who chose to come in and work on projects.

But what if students didn’t show up? How could I motivate them to take or make the time to come in and work and learn? It was back to the framework and the six pillars that I outlined above in order to motivate students. However I structured this new Maker Apprenticeship Program (MAP), it needed to follow, support, and build on that framework for motivating students. I wouldn’t just open the doors and invite students in to make stuff and tinker. Although I believe this should be a future component of my plan, I wanted to structure it a little more to increase motivation. My idea is to invite students to a makerspace and have them work on specific projects that move them toward mastering the use of a specific tool or machine. When they reach that mastery level, they earn a certificate, a badge, or a trophy of sorts to recognize their achievement. The Creative Collaborative works in conjunction with the MAP as it is a menu of projects that has been curated from students, teachers, or community members. They are projects that have the potential to provide a positive impact on others. Projects from the Creative Collaborative can be worked on by students who are looking to achieve a specific MAP certification or students with more experience can work on more involved projects. Built into the MAP will be an element of mentorship. Students who have achieved higher levels of certification will be required to earn a mentoring certificate where they teach younger or less experienced students how to use fabrication tools or processes. This creates a train-the-trainers system and allows students to take more ownership of their learning and participation in the program. Each of these aspects fully aligns with the 6 pillars, building on those core beliefs.

From here, I took a page from Jonathan Ekert’s book again and applied it to my situation. If I wanted to lead students to participate in the MAP, the Creative Collaborative or the makerspace program I’m designing, I had to focus on followership. Ekert points out that, “leadership is contingent on followership - influence matters. No one leads without followers; therefore developing followers is part of developing leaders.” This is where I turned a barrier into an opportunity. Teaching in a small school

may create some unique problems or barriers to overcome but it also affords me things like the opportunity to teach the entire 8th grade. And for the last two years, that is exactly how my teaching load has worked out. The best part about this is that I know every 8th and 9th grade student. I know students who could not fit a STEM course into their schedule. There are also those students who didn't want to sign up for an elective but still might be interested in maker concepts or that type of approach to learning. I know my students and can invite them personally into participating in this makerspace or maker program that I have dreamed up.

It was time to put on my Pied Piper hat and hit the ground to stir up some interest. I have found that some of the *work* to get an idea off the ground is at the grassroots level. You build support for something by making connections with people and share your vision with them. Slowly but surely, if your idea has merit and you are excited about it, you can get most anyone to support it. Finding people who agree with you or support your idea is the easy part and a good place to start. I also believe that passion is contagious. So, it is also helpful to identify your greatest doubters or nay-sayers and go to them early on. Listening to their questions can help you to overcome other barriers you may not have identified yet. Using that feedback you get from those slow-adopters can help you create a more successful idea and winning their support can tip the scales for others to join in. I did this work in two ways; building followership among students and gaining support from staff and administration.

Building followership among students was pretty easy, to be honest. Perhaps this was why I was so passionate about this whole idea. I knew there were students out there that would be interested in a makerspace and would want to participate in the MAP. Since my idea did not have a proof of concept yet and I felt it was a necessary part of sustaining this idea into the new year, I focused my efforts on those students that I knew had the time to participate. I set myself up for success. I went through my class lists from the last two years and went to our counseling department to find out the schedules of possible student participants. I also requested a copy of student rosters from study halls and looked through those names to see if there were some students who I might have missed. It didn't take long to identify those students and they signed on almost immediately!

One of the ways, which I have mentioned already, that I helped build support around my idea was to take the time to align it with our district's recently identified "strategic intents". These strategic intents were developed as part of our district's long range plan for improvement that we recently created through a lot of hard work (leadership) and input from core groups of stakeholders and an outside consulting group. I have this document that directly connects what I plan to do with the MAP and

the Creative Collaborative with our strategic intents. It clearly explains how this idea moves us forward, specifically addressing our identified areas for improvement and provides a working solution for stakeholders to support. I also went to teachers in my district to survey them about ideas they might have about projects or partnerships possibilities for the Creative Collaborative. I also considered my local contacts in the community and what role they might play in helping. All this, helped me develop this document further to include school and community groups. I used this document to earn support from my department leader and building principal. In the future, I plan to share it with our district's Director of Curriculum and Instruction, our Superintendent of Schools, and our board of education.

It is true, I could not have implemented my plan without the support of the administration. But something more important to note is that none of this would have happened if I hadn't chosen to *do the work*. I have been sitting around for a few years now with these ideas and had a sort of, failure to launch about it all. I had put the ideas out there but waited for someone else to pull the trigger and tell me what to do. I was waiting for a leader, most likely an administrator, to tell me what their idea was for implementing their vision or version of what I wanted to do. I didn't know that leadership was in the doing and I already had the *permission* to do the work. The experience I've had in this fellowship with other STEM leaders across New York State has given me the *commision* to do this work. The empowerment I felt from hearing other stories of successful STEM leaders cannot be understated. They were personal stories, of which I find to be the most powerful. I connected with them and was inspired by them. I have overcome barriers that they too have overcome and I have learned that some barriers can be opportunities for growth if you look at them in a different light. I used creativity and allowed my passion to become contagious to others. I was strategic in my approach and did the work of leadership. My time was valued, I was shown respect and understanding, and I was invested in as a professional. I was seen as a learner instead of having all the answers. I was allowed to experiment, to dream, and to try. I'm now facing an open road. The freedom, excitement, and desire to navigate it, is pushing me forward. And this is only the beginning.