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English 134

07 May 2023

Changing Students, One Machine at Time

Oil, wood dust and the smell of metal fill my nose as I patiently wait outside the machine shop for Eric to finish his meeting. I can hear the whirling motors from the drills, mallets hitting metal and the sharp sound of saws cutting through wood as Eric converses with the shop techs about fixing one of the machines. One of the students also adds that they need to buy a replacement part for another machine, and I see Eric nod along as he writes it down. The meeting was short and sweet but showcased Eric's direct application of "Learn by Doing" with his shop techs, giving them the lead with maintenance on the machines and the day-to-day tasks to keep the shop a well-oiled operation.

"Learn by Doing" is the core of Cal Poly. Students are encouraged to get their hands dirty, learning through their mistakes and not being afraid to try new things. Cal Poly believes with this education model, students gain valuable skills and experience to prepare them for their future after graduation. Nothing embodies this education philosophy better than the Mustang 60 Machine Shop run by Eric Pulse, a machining teacher who strives to provide a welcoming and inclusive shop space for all students at Cal Poly.

Eric was a student at Cal Poly, with a major in Mechanical Engineering and a minor in English. He spent his days in the shop working with the Baja team or out on the water with the

sailing club. After graduating, he worked in the industry as a machinist and programmer for 3 years before getting recruited by an old mentor to come back to Cal Poly to help set up the new machine shop, Mustang 60. His experience as a shop tech at Cal Poly, plus the knowledge he gained in the industry, made him the perfect candidate to run the new shop. He was determined and persistent throughout the whole process, putting holes in the walls for venting, revising the machine layout and getting new machines added to make Mustang 60 the perfect partner for the Hanger (the other machine shop on campus).

After discussing the shop's operations, I asked him what he was most proud of with his work at Cal Poly. He highlighted, "Definitely our advancements towards inclusivity and low barrier entry… I try and I want it to be for everybody, anyone who wants to use it, anyone who wants to come in, all you got to do is dedicate that three hours, [and] you know, you get 85% of what we have is yours to play with" (Pulse). All students, no matter their major at Cal Poly, their identity, or their shop experience, are welcome to build in the shop, as long as they complete the shops "red tag", the three hours Eric mentioned. The "red tag" is a straightforward safety training put on by the shop techs to teach students how to safely work on all the machinery. The training is finished with a simple and fun project for the students to try out what they learned. Once students have completed their "red tag", they are able to do other training to gain more access to the shop like welding, milling, 3D printing and many more. Students from outside the College of Engineering that earn the "red tag" are able to learn skills they would have never been introduced to in the classroom.

In addition to senior projects and class projects, clubs at Cal Poly also use the shop to complete their own projects for their competitions. Eric knows the importance of extracurriculars to build students' experience and community outside of their classroom and college. He says,

"The extracurriculars here, the club teams, I think are beneficial, if not more than just like, the classical educational portion of it. Now we have a hands on education, but it's all extra stuff that you can do. Like even just being in [the shop], it changes the whole attitude of how you're learning" (Pulse). Teachers incorporate "Learn by Doing" in their classrooms, but clubs bring "Learn by Doing" to life. They enable students to change their mindset when it comes to learning and gain new knowledge and skill sets. In an article called "Learning By Doing: The Long-Term Impact of Experiential Learning Programs on Student Success" by authors Bradberry and Jennifer they state, "In addition to improving students' analytical abilities, experiential learning programs provide a unique opportunity for students to work on skills that are hard to replicate in a traditional classroom, yet will be required for success in their careers after graduation" (Bradberry 96). Mustang 60, and the time and energy Eric has put into the shop, provides an inclusive and welcome space for all clubs and students to have successful "Learn by Doing" moments to further their education to better prepare them for their futures. Students are able to use the machinery, collaborate as a team, problem solve and learn communication and leadership skills outside of the classroom.

Furthermore, Mustang 60 is also student led. After some thoughtful consideration, Eric added to his pervious answer about what he is most proud of with the shop. He said, "I'm actually most proud of my staff. I would say and the way that we have created not only training for users, but training for the staff themselves…I don't run this place, I run some of the students and that's about it. The students run the shop, the students do the training, the students do maintenance. It's all them. It's their baby". While Eric helps with questions and takes care of the finance related tasks, the shop techs oversee the maintenance, training, and supervision of the shop. If Eric is the heart and soul of the shop, then the shop techs are the brain, making sure the

machines are ready for the students to work and everything is organized. In the same article highlighting the importance of "Learn by Doing" on student success, stated, "Experiential learning opportunities in the form of internships and role-playing simulations advance civic engagement, career development, cultural and community awareness, appreciation of diversity, and leadership" (Bradberry 98). The role for shop techs isn't an internship but the work they do gives them numerous other life skills besides the obvious mechanical knowledge. As they practice "Learn By Doing" in teaching their fellow peers, organizing training, maintaining the machines and working with others, they are gaining valuable experience of the industry in the real world.

During our conversation, Eric described why he believed "Learn by Doing" to be so significant for students planning on going into the industry. He started by saying that Cal Poly is like a company and our product is the students. The client we serve is the industry or the companies that want to hire our students. He goes on to explain that Cal Poly needs to train or teach our product to be what the industry needs or wants. Cal Poly must provide the correct and necessary skill sets and the knowledge base that companies want so they hire students that graduate from Cal Poly (Pulse). Through Eric's simple but accurate metaphor, we can see how "Learn By Doing" is an excellent education philosophy to ensure students are prepared for what the industry wants from them. Eric can be seen with a "Learn by Doing" mindset as he teaches a student shop tech in the photo. As both Eric and student intently stare at the HAAS, a computer operated milling machine, you can clearly see the concentration and focus written in their body language. Eric is pointing out important mechanisms on the machine, sharing his extensive knowledge with the student. Cutting fluid and metal shavings coat the walls showing the machine is being used in real time.

Eric Pulse working with Shop Tech

Not only does Eric provide change in Mustang 60, but he is also patient, realistic and thoughtful with his students in class. Eric is one of the machining teachers on campus, showing young engineering students how to run lathes and mills safely and correctly. I have personally gotten the opportunity to be a student of Eric's for two quarters. It is clear he truly has a passion for helping students become more confident in the shop. He is welcoming to all, making it easier for students to get out of their comfort zone and ask questions. In class he also strives to teach other important skills besides machining in the "Learn by Doing" model. For example, Eric always says that "Safety is everyone's responsibility in the shop". He enforces this idea by playing a game every week during class. As he does his demos at the machines for whatever project we are working on for the day, he "forgets to take his ring off". The first student to mention to him that he needs to take his ring off before running any machinery gets extra credit for that week. It seems like a silly game, but it is impactful in reminding students to not only

double-check themselves when going into the shop, but also making sure the people around them are being safe too.

Lastly, Eric teaches his students about the importance of cleaning up after yourself in the shop. He talks about how appearances are important, and something as simple as cleaning the machine up when you are done can improve machine life, save money, and gives a better impression of the shop. Not only is cleaning the machine shop important for the daily maintenance, but it also teaches his students how to be considerate, kind, and work as a team to compete a task. This mindset with teaching is further supported by Bradberry's text: "Most importantly, experiential learning gives students the possibility of learning from natural consequences, mistakes, and successes. When we remove the safety net of the classroom, students are encouraged to take risks and to take accountability for their actions" (Bradberry, 98). With safely glasses on, hair tied back, and sleeves rolled up, students can work confidently on the machines learning new techniques, asking questions, and making mistakes in a safe environment. Overall, Eric makes machining enjoyable which helps with getting up at 7am for a 3-hour lab.

Eric's work with Mustang 60, has been invaluable and provided significant change at Cal Poly. His mindset behind inclusively in the shop and his active participation in providing valuable "Learn By Doing" opportunities for his students, has been able to positively impact not only College of Engineering students, but all Cal Poly campus as a whole. Personally, he has influenced my view about engineering and has made me excited to get more involved in extracurriculars while in college.

Works Cited

Bradberry, Leigh A. and De Maio, Jennifer. “Learning by Doing: The Long-Term Impact of Experiential Learning Programs on Student Success” *Journal of Political Science Education*, vol. 15, no. 1, (2019), pp. 94-111. Accessed 8 May 2023.

Eric Pulse with Shop Tech. 2022. *College of Engineering Machine Shops*, https://machineshops.calpoly.edu/. Accessed 8 May 2023.

Pulse, Eric. Personal Interview. 25 April 2023.

Final Reflection

1. Honestly, my initial thoughts about the project weren't super positive. I was really suck on who I wanted to interview and what change I wanted to talk about. At first I thought I was going to interview my dad but I felt like that was too "safe" of an option and I wanted to get more out of my comfort zone with this project. I am really interested in the shops on campus, and I really enjoy having Eric as a teacher, so I thought that this project was a great way to get to know him more and learn more about the shop as well. In result of completing this project I learned that I don't feel as strongly in my academic writing as I originally thought. I really enjoyed the first essay because I got to be more poetic and lyrical but with this essay, I needed to be a lot more educational and informative. It was a lot of fun to interview Eric and learn more about the shop and his work at Cal Poly and it was interesting to get a behind the scenes peek at the shop operation and Eric's mindset when teaching. In all, this wasn't my most favorite writing piece but I really hope I was able to showcase all of the really cool things Eric does to impact his students.
2. For audiences I have a wide range of different people that I wanted to reach. Firstly, I wanted to reach other Cal Poly students to inform them about Mustang 60 and the impact Eric has had on the College of Engineering. I also wanted to possibly inform Cal Poly students of a part of campus they might not know about to helpfully get them interested in learning more or checking it out. Additionally, I wanted to reach other colleges to showcase all the pros of having a "Learn by Doing" education model. This writing shows just one example of how teachers can implement little things into their daily teaching that can have big impacts on students.

3. This assignment sequence helped me to explain how audience can influence content in composing effective written communication because I noticed that when my essay was peer reviewed, my group didn't understand some of the things I was talking about when it came to the shop and the "red tag". I realized I needed to better explain these things because even though I knew what they were, my audience didn't. I think going more in depth on the different ways to outline this essay would have been beneficial because I know we talked about it in class but one of the things I struggled with was taking all of the information I had collected and turning it into a good outline to start my draft. That leads me into the next education outcome of recognizing that the writing process is necessary to the discovery, development and clarification of ideas because I made like 5 different outlines, moving ideas and information around until I finally picked one that I thought worked the best for my essay. The writing sessions in class were very helpful for this but I definitely still struggled to make an effective outline to start my draft. For the next educational outcome of demonstrating information literacy through the successful search, discovery, critical evaluation, and ethical reporting of information, during this sequence I was able to utilize the Cal Poly One Search in order to find the best source possible for this essay. Once I found the source I used, I was devastated to find that I didn't have access to it but through the Cal Poly library system, IT was able to email me a PDF of the article that I was then able to use with this essay. I am very proud of the source I found because I think it adds a ton of ethos and logos to my essay and really shows the audience the significance of Eric's impact on students. Going through One Search in class was extremely helpful since that was my first time being introduced to the resource. I don't think anything could be changed for this educational outcome this

sequence because we clearly went over finding good sources and how to correctly cite information and quotes in MLA format. The last educational outcome is employing sound reasoning, effective organization and accuracy in expression based on audience awareness and an understanding of cultural differences in communication norms and practices. I also think this education outcome is showcase in my above example of having to explain some of the terms I used in my essay for my audience that might have never heard of them before. I had to understand that some of my audience might have never been to Mustang 60, or the College of Engineering part of campus and I had to change how I was writing so they could understand what I was talking about. For this one I also don't think anything in the sequence assignment needs to change but I do want to point out that the peer reviews for this assignment was also extremely helpful for this education outcome and realizing where I was missing valuable organization in my essay for my audience.

4. I think the strongest part of my final draft is my use of an outside source to support the change and impact Eric has on his students. I couldn't find any statistics but with the article I found I was still able to effectively use reason to showcase that Eric has a direct impact on students with his role in Mustang 60 and his use of "Learn by Doing" in the shop. I think the weakest part of my essay is my photo analysis and conclusion. I struggled on adding my photo analysis to my essay and in the end was only able to add a paragraph. I hope it was enough, but I think regardless I was still able to use the image positively in the essay. If I could continue to revise this essay, I would look at changing the end to make it finish stronger. My conclusion paragraph isn't terrible, but I definitely think it could use some improvements to make it a better ending for the essay.