

## **PDIG Project – 2018: 24U Program Development**

### **Project Description**

This project involved creating math teaching material for teaching high level high school math (trigonometry, algebra and analytical geometry) by demonstrating how this math is applied by professionals in a trade. We wanted to bring trade work expertise into the math classroom to help teach it, in a form that could easily be shared with all other math teachers.

There were two main reasons we set out to build this project. One was that we kept hearing students say that they had difficulty understanding math, or finding motivation for learning certain concepts because they were unable to see how the math would be useful to them in their work. We knew that we had teachers at the vocational center who could help provide the examples students were asking for; to demonstrate the utility of math and to give it a realistic context. Our second motivation was that we felt students could gain insight and possibly interest in a field of work if they were to see some examples of the work from professionals. This again, would hopefully give the students some context, an engaging challenge and an opportunity to try their hand at a trade!

Here were the objectives for the project:

### **Objectives**

In our initial meetings to plan the project it was clear that we needed to concentrate on specific objectives and to prioritize them, in order to build an effective project. Our objectives were:

1. Build math teaching materials that pertain to certain essential competencies for the CST 4 math program; especially those subjects that most students find difficulty with, or which can be difficult to teach without examples for real-world applications.
2. Build demonstration material to allow other math teachers to provide a trade application example in any classroom.
3. Build math exercises that offer realistic trade-related situational problems.
4. Provide information about the machining trade and manufacturing industry; to educate students about opportunities that exist in this field

### **Challenges:**

Although we originally planned to work together for several days, to concentrate on the project, our schedules this year did not allow for this. All three teachers had different schedules and certain conflicts in their schedules such that it was only possible for us all to meet for a few short periods of time.

You will see from our journal that most of the work was done by each teacher independently. We made sure to focus each meeting that we did have together on outlining specific goals for each teacher to be completed before the next group meeting. This strategy was key to our success. We were able to be very specific about our project goals and steps in the early stages, so that each teacher was clear on what they had to do.

You will also note from our, "Project Minutes" document, that a significant amount of the work was done during the planning time or personal time of a teacher, so that there are a lot of hours that are not accounted for in our journal. This was because it was not possible to be replaced during some important periods of the project. Our schedules did not allow it.

\*Chris for example, our project manager, was not able to take any supply leave throughout the course of the project and therefore his work time was not included in the official journal.

In the future we would make sure to define a project scope for only the days we knew it would be possible for the whole team work together.

### **Outcomes:**

We were able to produce the following:

- **2 instructional videos which demonstrate how math is used by machinists and which serve to teach students how to apply two of the key concepts from the CST 4 math program (Analytical geometry and trigonometry).**
- **2 situational problems, which follow each instructional video and which allow students to learn each progressive step to master the concept.**
- **2 material parts that students are familiar seeing (large dice and clock) that can serve as demonstration pieces for further math lessons.**
- **3 math exam problems that relate CST 4 math concepts to machining**

**All of our work can be seen here:**

<https://drive.google.com/drive/folders/1zcLIGM2qsg2hQmiaHO-galrnbLw-1nZb?usp=sharing>

### **Feedback:**

We have already used some of the math material to do short demonstrations with students at Alexander Galt and at LVTC and the feedback has been very positive. The videos and instructional materials have proven effective at engaging students and at teaching the subjects they were intended for. We were even surprised to see at how quickly the students were able to grasp some complex concepts. We were also pleasantly surprised to see how generally interested students were to learn about how the CNC machines worked, even if this was not an interest area for them.

### **Reinvestment**

We intend to share the math materials we have with other math teachers and also hope to offer small workshops for math teachers to demonstrate the lessons we have built.

In the future we will build more instructional videos and lessons that link the concepts of the math and science curricula to their application in the variety of trades.

**Conclusion:**

From our student feedback we can see that project has been worthwhile and that it would be beneficial to produce more of the same type of work in the future. We have done short lessons with over one hundred students already and the effectiveness of this approach is immediately apparent. As opposed to a traditional math lesson, students seemed to feel that they were learning something useful from the beginning and remained engaged throughout the lesson. This engagement made teaching the subject extremely effective and more enjoyable!

The majority also seemed confident in the fact that they understood the concepts we covered, although the lessons were short. Students had multiple visual aids to relate the math concept to, including a physical object to help design and an instructional video. This clearly helped students that were more visual or "hands-on" to grasp the problem they had to solve. Students left saying that felt they had learned something useful and that they felt that they understood the math concept we had covered in class.

In a vocational school we often see students learn a greater aptitude and interest for the traditional subjects, such as math and science, once they have a chance to apply these skills to real-world problems and a trade that interests them.

As a vocational school we have a lot to offer to help engage those students earlier on. Mainly we have teachers in a variety of fields who know how math gets applied in their particular line of work. Who work with math and science every day and who can demonstrate its utility and how important it can be. We feel that we have a lot more to share to students in high school and that this is just the beginning. If we can share more real examples for how school concepts are applied by professionals, it should give students a better appreciation for the things they are learning and a better idea of what things interest them going forward.