Collaboration 3-Ed+gineering Lesson Reflection
Spring 2024

Directions: Write a few (at least two) sentences to answer each question below. Responses should be well written with correct grammar and punctuation, but should be written using first person, using "I" and/or "we". (Please type your responses directly below the questions. Do NOT reformat into a traditional essay.) Submit your reflection to Canvas. THIS is an INDIVIDUAL (not team!) assignment.

SECTION 1: PLANNING PROCESS & TEAMWORK

Team Rules

1. What rules did your team establish to guide your work on the project (e.g., time to respond to team emails, quality of submitted work, deadlines, etc.)? Were the rules followed? Were these rules useful to your team?

We established clear rules for communication, via Discord, or text with a maximum response time of 12 hours. Additionally, we had team meetings every Thursday after class to collaborate. For the most part team members followed these rules, and it allowed us to work effectively as a team.

Team Roles/Your Role

2. What roles did you and others on the team play in planning and delivering the lesson? Please, be specific in describing what each person did towards the project.
    a. How was this decided?

    As I had a 3D printer, I did all of the prototyping and design work for the device. Everybody else worked on the power point slides and the various other parts of the project.

    b. Were you satisfied with the roles you and your team members played? Why/why not?

    I was satisfied with the roles we played in the team, mainly because I really enjoyed the prototyping and designing portions.

Instructional Resources

3. Was the team collaboration website useful to your team for the project? Please explain your answer.

No, It was just another task on the mountain of tasks that needed to be completed. Anything that it could have helped with was done better by the google drive. I really hope you remove it as a requirement in the future.

Workload Balance

4. Did people in your team contribute their fair share of the work on the project? Please, explain your answer.

With the exception of Syncere Bullin everybody pulled their fair share of the load. My teammates were almost always at the in-person meetings and were punctual in their responses to communications. Homework was distributed evenly and completed punctually. Syncere really just dropped of the face of the planet about half of the way through the semester and did not respond to texts, calls or emails.

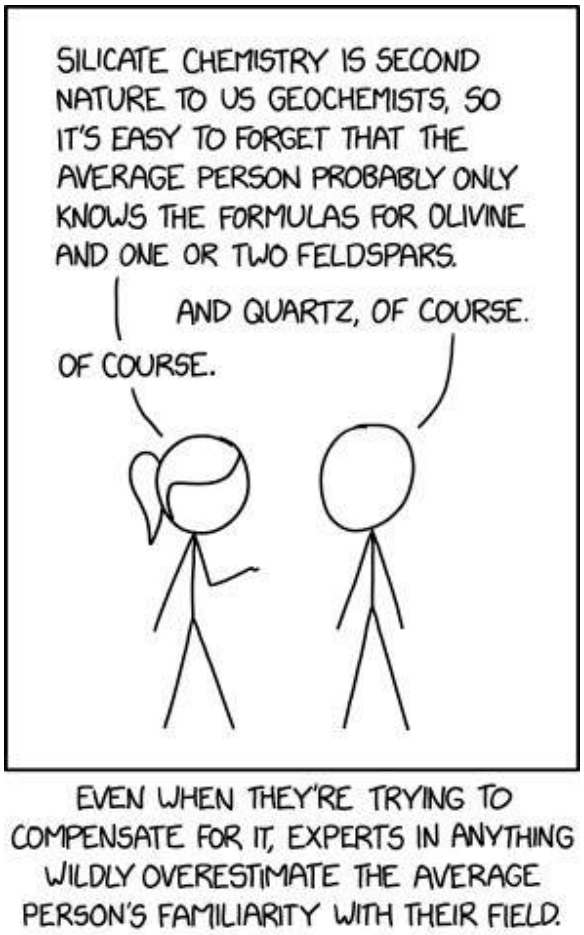
5. What did this project teach you about collaborating as part of a team? How would you apply new insights to a future group project?

Team collaboration takes effort on the part of every member of the group and requires at least 1 weekly meeting. I think that having more would have been even better if the project was any larger. In the future I will suggest that any group project teams have a weekly meeting.

Overall Team Experience

6. This semester you received support through an education student consultant team. How did this design aspect of the prototype project affect your preparation and overall project experience? Did the interdisciplinary nature of the consultants bring new challenges or benefits? How so?

The addition of the education students to the project allowed us to better understand and prepare for teaching the children. We had several meetings with them to help them understand fluid mechanics principles, and for them to help us tailor our presentation for the children. They were a little challenging to work with as they had very little understanding of even the most basic scientific principles.



7. This semester the engineering students introduced themselves as engineers to elementary students and they created a prototype/model of an engineering design to share with the elementary students. Education students led the design of the lesson plan and the implementation of the final engineering lesson. In what ways did the structure of this collaboration affect your experience working on the project?

The division of the project parts lead to some confusion as to how connected our separate parts needed to be. After we had finished making our prototype, we were told that we had to have a similar design, at least conceptually, to what the Education students were having the kids do.

8. Was your team effective? Were you satisfied with your team experience overall? Please explain your responses.

Our team did a great job with the prototype and the lesson plan, with some minor public speaking issues. Over all I think that despite engineers propensity for poor communication skills, I was very satisfied with our performance.

Introduction to Engineering & Fluid Mechanics Concepts Lesson

9. How did the initial "Introduction to Engineering & Fluid Mechanics Concepts Lesson" with the elementary students at the beginning of the semester influence your perception of the prototype/model of an engineering design?

We realized that the kids were basically a blank slate in the area of fluid mechanics, so we decided to keep it as simple as possible. Additionally, we thought that things would be best explained with visual models rather than just pictures or talking. This led to us bringing both our working and failed prototype to show the kids, demonstrating the engineering design process.

10. In what ways did this introductory lesson influence the design of your final prototype/model of an engineering design?

We realized that we needed to show them something that they would both understand and be interested in so we could leave them with a good impression of engineering.

11. Did you feel as if you were able to make your prototype/model of an engineering design more relevant to students' lives and cultures through your experiences in the initial introductory lesson (or any subsequent lessons) with the elementary students? Explain your response.

We made the prototype something easily recognizable to the kids, and something they would be interested in. We wanted to be able to keep their attention and be memorable, as we had issues keeping their attention in the introductory lesson.

12. How did your team connect the prototype/model of an engineering design to students' prior knowledge and/or interests? How did you connect your prototype/model of an engineering design to students' cultures? How do you know?

We tried to connect our tipping bucket prototype/model to the students' prior knowledge and interests by choosing something fun and interactive that many kids are already familiar with from experiences at water parks or splash pads. Using a familiar concept like the tipping bucket made our engineering design more relatable and engaging for the young elementary students.

Evaluation of Student Learning

13. If your team took photos or videos of the students' engineering designs during/after the lesson, please copy and paste those images here. What can you learn about your work or lesson overall from the photos/videos provided?



The pictures show how involved we all were with the groups of kids. We acted as consultants for the teams, helping guide them to reasonable designs and solving problems.

14. Based on your interactions with the elementary school students, what do you think they learned from the lesson? Try to recall specific student comments, actions, or field test results to justify your response. Including pictures/screenshots here is encouraged.

They learned that rough surfaces slow down water flow: "The foil is bunched up here so it will slide down slower" – devon
They learned that the slope of the slide influences the speed of the water flow: "If we make it taller it will go faster" – student

15. Are there concepts/ideas that you think the elementary students did not understand? How could you tell?

They got confused about Potential and Kinetic energy. I helped gather the quizzes they had to fill out.

16. Was there a connection of the lesson to students' prior knowledge and/or interests? How do you know?

The students were interested in water slides and talked about it a bit.

17. If you were to teach this lesson to a different group of elementary school students, what would you change?

I would have extended the lesson time a bit, and done it with a smaller group. We had 30 kids in our class and only 5 people helping them. It got really noisy and chaotic in such a small class room. (There was a teacher that walked in half way through the lesson, dropped off 10 extra kids and left. So that was not ideal.)

SECTION 2: OVERALL EVALUATION OF THE ENGINEERING PROJECT & ATTITUDE TOWARD ENGINEERING EDUCATION

18. a) What did you learn?
I learned that I don't mind kids too much so long as they are focused and motivated.

b) What did you learn about engineering?
How to design a tipping bucket.

c) What did you learn about teaching?
That I really don't want to be one.

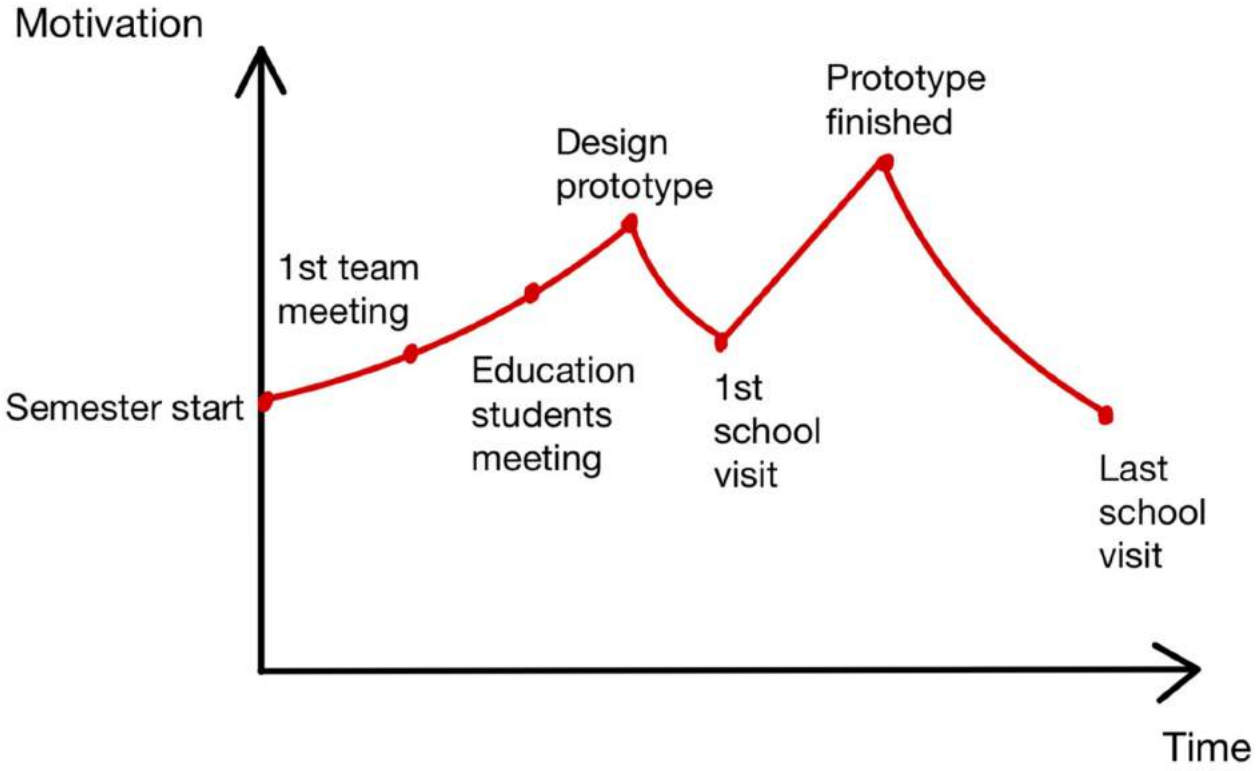
19. How did faculty support students to make adjustments? How helpful/necessary did students find this support?
We didn't really need much help, but the help we did get was helpful.

20. How valuable was this Engineering Project? What was valuable about this experience? What was challenging? Do you have any suggestions for improving the project in the future? If so, please share your thoughts.

I think that this project was helpful to me insofar as it let me design and prototype a functional model and then show it off. The work load, on top of an already challenging class was difficult. A proper write up that both the Education and Engineering departments agree on as the criteria for the project would be invaluable.

21. What factors affected your motivation for this project over the course of the semester? For example, did your instructor impact your motivation, the topic itself, your relationship with your teammates, your interactions with the kids, feedback you received etc. Please consider factors that positively affected your motivation as well as factors that negatively affected it and consider how your motivation may have changed over time.

My motivation for the project was dependent on what stage of the project we were working on:



When I was doing fun things like designing and building the prototype I had high motivation and when I was doing things that gave me stress, I was less motivated.

22. Should engineering be included in PreK-6 instruction? How so? Why?

Maybe for the advanced kids that it would actually benefit. Life is all about spending resources wisely, and this is no different. Some people are better suited to the sciences and we should help those that are likely to go that route.

23. What did you learn from working with the education students? Please explain.

How hard it is to deal with children. They gave us a 15-minute presentation on how to communicate effectively with children. It was complicated.

24. What did you learn from working with the engineering students? Please explain.

I learned effective team work and collaboration tactics. My group did a very good job of working together.

25. How did your interactions with the education students contribute to your experience on this project overall?

They helped us tailor our teaching material to cater to the children.

26. Would you have wanted to be more or less involved in the teaching of the final engineering lesson with the elementary students?

I don't really feel any which way about this, I think my level of involvement was optimal.

What were the benefits of not having you as involved in teaching the lesson?

We got to mentor the kids from the background.

How could you have benefited the lesson if they had been more involved?

I don't know?

(Think beyond workload division. Think about what you and they may have gained/lost from the lesson experience.)

27. Was designing the learning/demonstration engineering kit a valuable experience for you as a team? As a future professional engineer?

Yes, it helped us grow as a team and showed a little bit of how working in a real engineering development environment would be like.

28. Was interacting with education students (considering they are outside the engineering field) a valuable experience for you as a team? As a future professional engineer?

Yes, it showed how ignorant the general population is of basic engineering principles. This will help temper my expectations for managers, and non-engineering colleagues.

29. Did the final product your team created benefit from the feedback from the education students? In what ways? Be specific.

Not really. They did not provided much feed back about the device itself. Their feedback focused around our presentation and PowerPoint slides.

30. How did this project affect your vision of teaching careers?

How terrible (for me specifically) they would be. I respect them a lot more.

31. As shown in NASA's model of the EDP, the engineering design process consists of several components. How did you use the guidelines of the engineering design process (both purposefully and not-purposefully) during the course of this project?

Obviously, during the design and prototyping of our model we followed the EDP. Additionally, we displayed it to the students during our presentation.

32. Please explain your answer to the question above in the context of all components of the engineering design process in the development and implementation of this project. Then, choose one of the design aspects that was most challenging, and explain how you would approach this differently if you were to do the project again or how you would apply what you learned when you tackle this step in a new team engineering design challenge.

There are 5 Main Steps: Define the Problem, Plan Solutions, Make A Model, Test The model, Reflect and Redesign.
Step 1: Define The Problem: We want to design a Water Park Bucket dump system that will tip over every 30 seconds.
Step 2: Planning to solve the problem: We looked at water park dump bucket designs.
Step 3: Make A Model: We designed a bucket in CAD and 3D printed it. Then coated the inside with marine epoxy to make it water-tight.
Step 4: Test the Model: After testing the model we found out that it would not stay upright.
Step 5: Reflect/Redesign: Thus we had to redesign the bucket by moving it's axis of rotation to ¼ of the way from the top.

If I had to redo this project over again I would have done more research about the physics behind the tipping bucket, and perhaps gone with an unconventional shape that would help with the tipping motion.
Like this:

33. How has your understanding of fluid mechanics changed as a result of this project?

I now understand how tipping buckets work, and the physics behind them.