



Parent Professional Development: Connecting Formal Education to Informal Education (Curriculum Exchange)

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Abstract

For decades, informal education research has provided evidence of the importance of parents' involvement in pre-college students' STEM learning. Previous research has put efforts into understanding the roles parents play to better engage children in engineering in out-of-school settings [1][2][3][4]. On the other hand, the shift to online learning during the pandemic and lack of access to external educational resources have highlighted the importance out-of-school learning, including the very important role parents play in providing elite education for children [5](also look for the special issue at Journal of Pre-college Engineering Education Research [6]) However, when it comes to engineering education, parents, with no engineering background, do not have enough resources/trainings to provide engineering learning opportunities for their children at home.

This resource shares a detailed description of a short professional development (PD) that was held at a high school for parents to learn about engineering. The parent PD had two aims: (1) to introduce what engineering design is, and (2) ways to engage children in engineering design at home. The PD was developed based on the ASEE P-12 Framework for Engineering Learning (p12framework.asee.org). During the PD, parents engaged in an engineering design activity in groups of three-four, without being introduced to any engineering design processes/frameworks. They were then asked to reflect on and discuss their design practices and processes. Finally, they were introduced to the Engineering Design practices suggested by the ASEE framework. This resource will include the engineering design activities, the guiding questions for parents, as well as a few slides that was used in the PD. This resource can be used by educators and researchers who aim to hold Parent PDs.

References

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- [6] Alemdar, M., Moore, R., & Ehsan, H. (2021). Call for Papers: A Special Issue of the Journal of Pre-College Engineering Education Research on "The Impact of Covid-19 on Pre-College Engineering Education". *Journal of Pre-College Engineering Education Research (J-PEER)*, 11(2), 1.

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About this Resource:

In order for children to get the most exposure to engineering learning, in-school and out-school learning should be aligned and connected. Fortunately, more and more are getting access to engineering professional development these days. However, parent professional development does not happen very often. Although many parents know the importance of engineering learning for their children, they do not have the confidence and knowledge to provide those opportunities for their children.

This resource is a summary of a parent professional development (PD) that took place with high school students' parent at the school. The PD was advertised as a mini-class for engineering, with the goal of learning what engineering education looks like for pre-college children. The PD was in-person, happened on a Saturday morning, and took 30 minutes of their time. To give more options to parents, the school provided three time slots for parents to choose and attend the class. However, the PD can easily be adjusted to happen virtually in a longer time frame, if parents are available.

Parent Professional Development Set-Up

- Time: 30 minutes
- Learning Objectives: learn briefly about the engineering practices and ways they are already used in our everyday lives.
- Setting: a room with a screen, a board and working tables that groups of three-four parents can work together.
- Material: random craft material, LEGOs, markers, small woods and blocks, and sticky notes
- Resource: ASEE Pre-College Framework large posters, engineering design challenge slides, a copy



Parent Professional Development Summary

- The PD began by asking parents to share “what they think engineering is”.
- They were then engaged in designing a dog park in their teams, and talking about their process.
- They documented their processes on sticky notes, placed it on a large poster and shared aloud.
- They learned about the engineering practices based on pre-college engineering framework aspects.
- They discussed ways they could engage their children in engineering practices at home.

Professional Development Slides (selected)

DESIGN A DOG PARK

Imagine you have been hired by an organization to design a dog park for them.

Turn to your neighbors and talk about the process you would take to help this organization!

- How would you design the park?
- What steps would you take to design the park?
- What should you consider when designing?
- Feel free to actually building the dog park, using the material on the table!



Facilitation Note:

As parents shared their processes, the facilitator connected what they said to engineering practices by using the technical terminology.

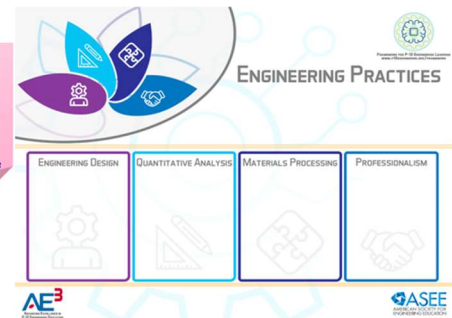
EXAMPLE:

Parent: We talked about the dog breeds we would be designing for. We also asked about the budget we have and the number of users.

Facilitator: Yes. You had to identify the scope of the problem. You conducted research. Isn't this what we always have to do to solve any problems we face?

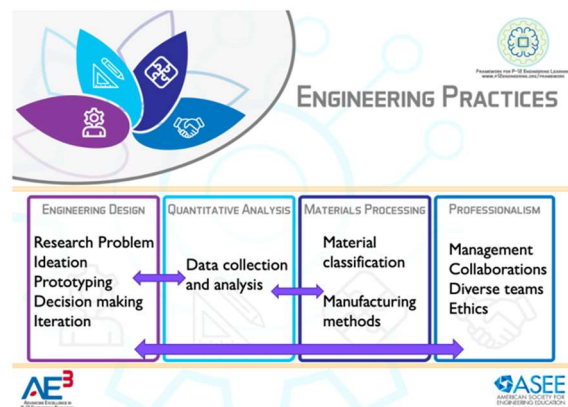
Document your process!

On sticky notes write down what aspects of engineering practices you considered in your process! Stick them to the appropriate box on the poster.



Let's share!!

What engineering practices did you consider in this design process?



DESIGN A DOG PARK

Engineers spend a long time exploring the problem, brainstorming and ideation, planning, sketching prototyping, before they make their final design!

AND THIS IS WHAT WE WANT THE STUDENTS

ENGINEERING AT HOME

Share ways you think your children can engage in engineering practices at home?

Lesson Learned

- Parents asked for more activities to have as samples for different age groups. Having those printed to send with parents would be helpful.
- 30-minute session was enough for most of parents. Some parents stayed longer to ask questions. Designating of 15 more minutes for possible questions would be helpful.
- Given parents' diverse background, providing low-tech and unplugged activity to introduce engineering to parents were necessary.
- Parents' self confidence in doing the activity and having conversation about engineering varied a lot. Thus, it is important that the facilitator does not expect all parents to engage in conversation at any time during the session.
- While we did not aim to evaluate parents' learning, a short survey/questionnaire could have been sent to parents for the purpose of evaluation.

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