

Parents Becoming Informal Engineering Educators: Workshop for Parents (Resource Exchange)

Dr. Hoda Ehsan, The Hill School

Hoda is Chair for Engineering and Computer Science Department and the Director of Quadrivium Design and Engineering at The Hill School. She holds a Ph.D in Engineering Education from Purdue University, M.S. in Childhood Education from City University of New York, and B.S. in Mechanical Engineering from Bahonar University in Iran.

Dr. Abeera P. Rehmat, Georgia Institute of Technology

Abeera P. Rehmat is a Research Scientist II, at Georgia Institute of Technology's Center for Education Integrating Science, Mathematics and Computing (CEISMC). She has experience conducting research in engineering education that spans pre-college up to the collegiate level. Her research interest involves investigating how engineering and computer science education can foster students critical thinking and problem-solving skills to prepare them for the challenges of this evolving world.

Samieh Askarian Khanamani

I am Samieh Askarian Khanamani, a second year of Ph.D. student in Engineering Education from the University of Cincinnati. I have 10 years of experience as a vice principal and STEM teacher in STEM-based elementary schools and host of several workshops for kids and parents about engineering and hands-on activities in STEM. My research area is in PreK-12 and diversity. Have an engineering background in my Master's and Undergraduate.

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Abstract

Parents play very important roles in their children's education, including engineering learning experience [1][2]. From at-home activities to making decisions about where they send their kids to school, and how they spend their time together, they have impact on their children's learning. A more important role of parents was highlighted since the beginning of the Covid-19 pandemic [2-5]. Parents suddenly had to become teachers; teachers who never received training to teach. That was especially true for parents with early elementary-aged and younger children. Parents used available resources to help their children learn different subjects. Resources on some subjects were more accessible and available than others. And teaching subjects like engineering that had very limited resources became the least of parents' priority, if not eliminated completely. Thus, in an effort to help parents with young children, by using resources previously published [6-9] and to expand engineering education resources for parents, we planned a series of workshops for parents to help teach their kids engineering using everyday items. Previous studies have

In this resource exchange, we share the guideline we developed for parents so they can easily develop wide range of play-based engineering activities integrated in science, math and story-telling. We provide examples of the activities we and participating parents developed, as samples to be used by other parents and educators.

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PARENTS BECOMING INFORMAL ENGINEERING EDUCATORS: WORKSHOP FOR PARENTS (RESOURCE EXCHANGE)

Team: Dr. Hoda Ehsan, Dr. Abeera Rehmat, Ms. Samieh Askarian, Ms. Sogol Namnabat

WE CONDUCTED A SERIES OF IDENTICAL WORKSHOPS FOR PARENTS. OUR GOAL WAS TO INTRODUCE ENGINEERING DESIGN TO PARENTS SO THEY CAN ENGAGE THEIR 5-8 YEAR-OLD CHILDREN IN ENGINEERING THINKING DURING THEIR EVERYDAY PLAY AND CONVERSATIONS.

This resource aims to present the workshop format for others who would like to try it at home and other informal settings. We limited the workshop to is 1 hour for parents, and stayed 15 minutes longer for questions. we accepted only 10 parents at each workshop.

WORKSHOP SEQUENCE

1. The workshop began by proposing a challenge to parents without any conversations on engineering learning.
"Organize a picnic for your friends"
 - Questions we asked:
 - what would you do?
 - what are the things you need to consider when planning?
 - what are the first things to consider? what are the important things you need to consider?
2. We encouraged parents to "write the questions you may have individually, and then share them in your team of 3-4, and try to answer the questions. When you feel ready, start planing for the picnic." (15 minutes)

QUESTIONS SHARED BY PARENTS

- where do you want to hold the picnic? at home, a park, a rented place?
- how many friends to invite? Via Facebook, text, or email?
- what day/time? how much advance notice so you can make sure everyone might have that day open?
- what foods and beverages to provide?
- what games or activities to plan?
- what is your budget? Totally all estimated costs on a financial sheet. if costs too much, iterate and revise your plan.
- how can we go there?

3. We then asked them to share their plans with each other over Zoom. When they shared, we asked them to “now that you have heard each other’s plans, how can you improve your plan? What are the things that you didn’t consider? What are the things that you are the most proud of?” (10 minutes)



Question: How would you improve?
 Answer: I would improve this by adding more details between each step. Examples would be considering how much food I would pack based on the number of people are going and confirming who's going before I pack my picnic basket.

Question: How are these steps similar to engineering design process?
 Answer: They had to define a problem and be able to plan different steps in order to find a solution.

4. After parents discussed their plans, we introduced engineering design to them. We asked them, "how do they think Engineering Design process is relevant to what they have done? What are the steps that they have taken are similar to the engineering design processes?" (15 minutes)

Tip: since not all the parents are familiar with these terms, we had to spend some time talking about these phases [9]. While they shared their thoughts, we facilitated the conversation by role playing how we would do each phase with our kids, and strategies they can use to effectively engage their children in engineering thinking [6][8].

5. We discussed how do they think their children could engage in engineering design process? We asked them to identify some of their children’s everyday plays that are similar to what we have done? (15 minutes)

6. Finally, we asked them to come up with ideas for role play that they can plan with their children, that could engage them in engineering design thinking. (5 minutes)

IDEAS PARENTS SHARED

- designing a new house.
- designing spacecraft to take us to the moon.
- designing a playground for their dolls.



Engineering design cycle
 Adapted from Purdue's
 rollercoaster challenge