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Developing Habits of Mind through Family Engineering at Home

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Developing Habits of Mind through Family Engineering at Home

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Background

Engineering in early education provides the foundation for the future of innovation (Cropley, 2015). With the increased contact between family members during the COVID-19 pandemic, children may have experienced changes in their learning and engineering experience. Our research explores young students' reflections on their process of engaging in low-stakes engineering projects at home.

Methods

Participants were 22 families with children in grades 2-6. After the students attempted to solve an engineering challenge with their family members in their homes, they reconvened in recorded Zoom meetings to answer various questions about the process and product of their engineering project.

- Researchers individually watched and collectively discussed 13 video recordings
- Only coded for explicit, orally communicated responses
- Omitted unclear responses
- Framework: Learning Habits of Mind (LHoM) & Engineering Habits of Mind (EHoM) (Lucas et al., 2014)

Results

Figure 1
Total frequencies of Habits of Mind

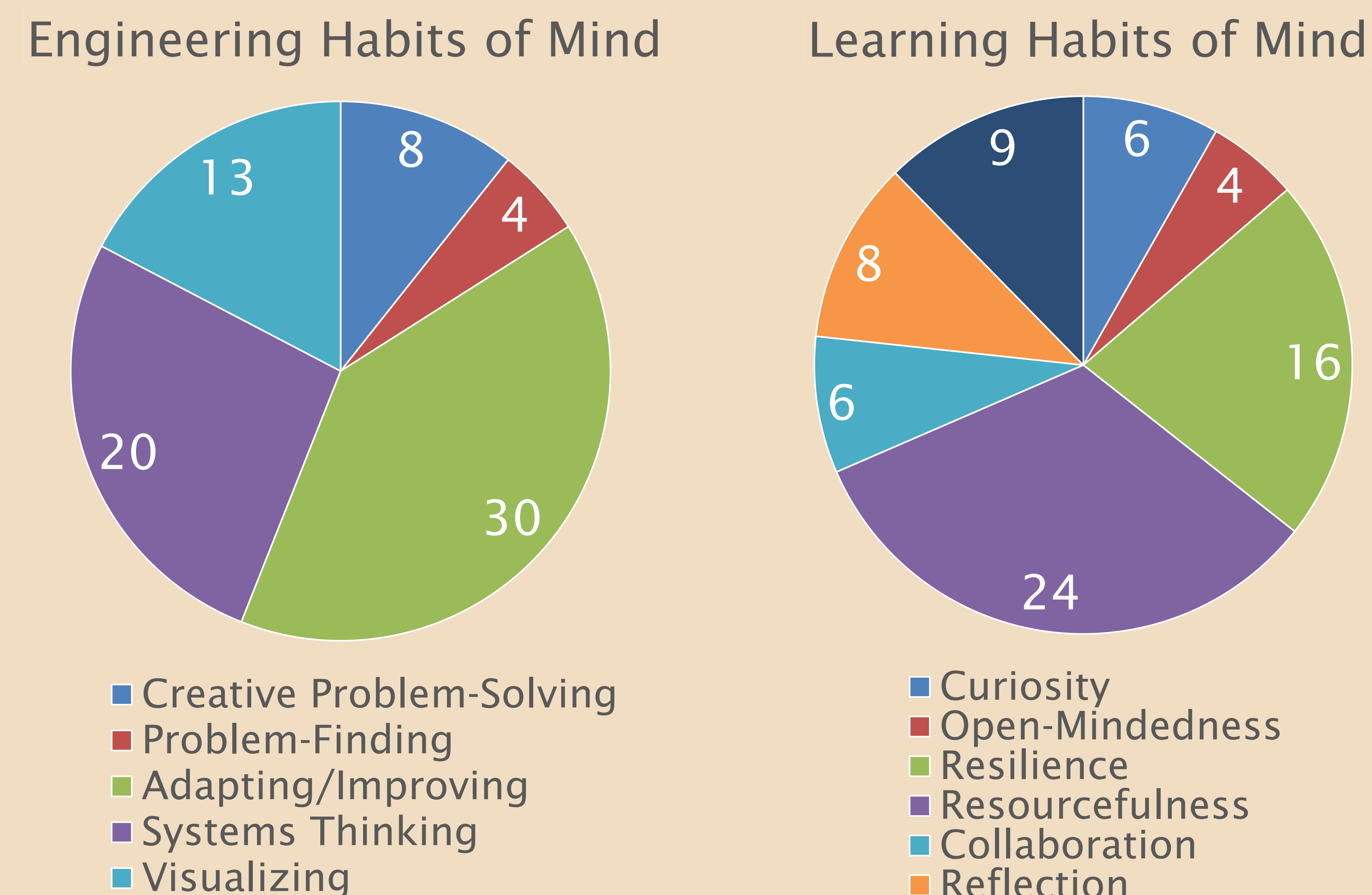
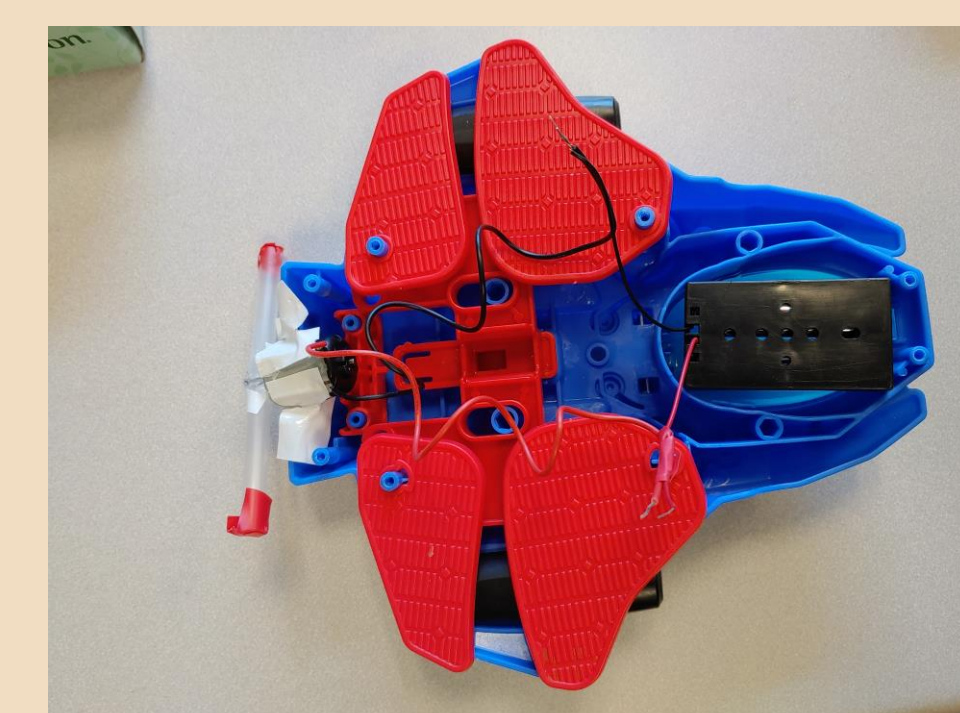


Figure 2
Examples of children's explanations of their engineering project



"We had to take the height off our column a lot. The marble would get stuck, we realized that we needed more great change and had to keep messing with them"



"We started out trying to, among other things, force the wings on this toy to stay outward, stay open like this, but it turned out that it was very compact and we couldn't fit the mechanisms... so we switched gears by adding a motor onto it"



"We used straws as gutters... And so I have another one that leads to the ground, and there is like a cup, so whenever it rains, the water can go down to the cup and the animal can drink water"

Discussion

- EHoM: Adapting/Improving (40%), Systems Thinking (27%)
- LHoM: Resourcefulness (33%), Resilience (22%)
- Engaging in engineering projects in the home can develop children's dispositions and inclination to think like an engineer (Figure 1)
- Thinking like an engineer at an early age has the potential to increase the number of individuals who enter the field

Limitations

- Some children were not as expressive as others, which limited our measurement of their EHoM and LHoM (Figure 2)
- Responses might have depended on the type of questions asked
- Did not code for nonverbal communication

Selected References

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