



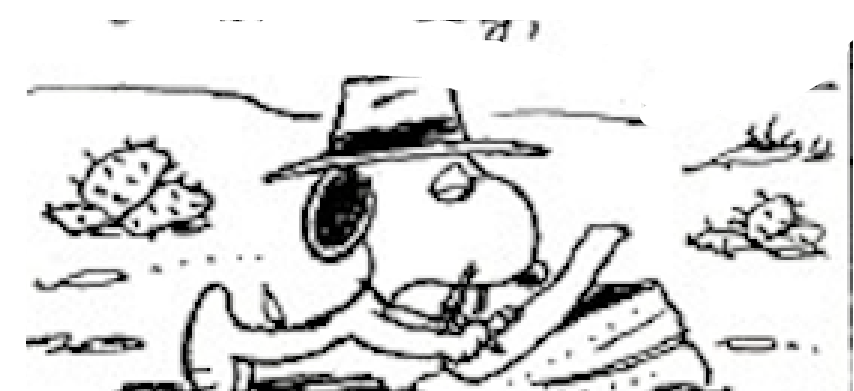
Parents' Knowledge, Attitude and Behavior on Pre-college Engineering Education Course (Work in Progress)



XINGCHEN WEI, JIALING WU, STACY S KLEIN-GARDNER

Background

Pre-college engineering courses are vital in sparking students' interest and confidence in STEM fields, serving as a gateway to engineering careers. While much of the existing research has concentrated on curriculum design and teacher influence, emerging studies highlight the significant impact of parental involvement on students' STEM engagement. Interventions that equip parents with strategies to communicate the relevance of STEM subjects have been shown to improve students' academic performance and increase their interest in STEM careers.



Research Question:

What are parents' Knowledge, Attitude, and Behavior (KAB) on pre-college Engineering education?



KAB model

Knowledge refers to the information and skills that an individual acquires and understands, which can be enhanced through educational activities

Attitudes encompass feelings and psychological states that can significantly impact one's learning abilities and experiences

Behaviors represent actual actions that can be observed or measured

Method

We conducted three semi-structured interviews with the four parents. Ultimately, we conducted two one-on-one interviews and one two-person group interview. All interviews were conducted by the third author via Zoom and were recorded with the parents' consent.

The following are the specific interview questions:

- 1) How did you hear about the new introductory engineering course at your child's high school?
- 2) What was your motivation to enroll your child in the course?
- 3) What does the word "engineering" mean to you?
- 4) What is your perception regarding the course as it is being taught so far?
- 5) Would you recommend this course to other parents?



Codebook



The researchers applied hypothesis coding during the coding process, and we directly employed "Knowledge," "Attitude," and "Behavior" as the coding categories.

During the coding process, ideas about "community" appeared frequently as a context that intersects with KAB. We believe it would be valuable to investigate this theme further. Therefore, we introduced "Scenario" as an independent code during the second round of coding to capture the aspects expressed by parents, and "community" appears as the common theme in this study.

Result

The data reveal that in terms of knowledge, parents demonstrate a strong understanding of the importance of engineering education. While acknowledging the limitations in their access to engineering-related courses during their school years, they have developed an understanding of engineering studies, shaped by their personal experiences.

Moreover, they show a positive attitude towards their children's involvement with engineering, attributing this to various factors such as their children's interests, effective teaching, and local network resources.

However, though they recognize the broader benefits of pre-college engineering education for their children's academic and personal growth, they are concerned about the challenges posed by existing high school policies and the cost of higher education.

Code	Definition	Example
Knowledge	Parent's background knowledge about engineering/ learning engineering. This could include vague impressions and stereotypes about engineering learning.	"when I was in school, I didn't really know what engineering was... I wasn't exposed... I think a lot of the students view engineering as ... making something..."
Attitude	Parent's attitude towards children's early exposure to engineering/ learning engineering.	Positive: "Because [the child] had so much fun, because he learned so much." Concern: "The high school has so many requirements, and I'm not sure how this affects her choices.... And there are a lot of options, but it's hard to fit the extra step in."
Behavior	Current or potential actions taken by parents in terms of their children's learning engineering.	"But I encouraged him to push the physics to senior year and do like biology, chemistry,So I encourage him to do that because like I said, he...likes the engineering electives and I know he wanted more."
Scenario (community)	The anticipated scenario for applying and implementing engineering knowledge and skills. This could refer to a specific context or a more abstract situation. Note: "Community" appears as the main theme in this study.	"And it's like, it's almost like you're doing engineering, but you're working with the community and you're giving back your, ...which is what my children are doing with their lives."

Parents' believe that pre-college engineering education resources were insufficient in their own learning experience in the past, and today's children also lack an understanding of engineering.

"when I was in school, I didn't really know what engineering was... I wasn't exposed... I think a lot of the students view engineering as ... making something..."

Knowledge

Parents expanded the definition of engineering with their children, moving from viewing that engineering knowledge is confined to the field to the idea that it can be applied to other areas. They may perceive engineering as an isolated field, separate from other disciplines originally.

"She was not ever really looking at engineering. She's very much like a science person and she's very science-oriented."

Parents exhibit a positive attitude towards their children's exposure to engineering education. However, they also worry about a lack of additional engineering education for their children.

"Because [the child] had so much fun, because he learned so much." Great teachers and sufficient local network resources also contributed: "[The teacher is] fantastic... and uses community resources... experts in the community."

Attitude

Parents also expressed concerns regarding school-provided resources and the potential to transfer high school-level engineering courses to college.

Parents take various actions to support engineering education, ranging from encouraging their children to explore engineering, promoting engineering education, and seeking additional resources.

Behavior

"So I encouraged him to do that because, like I said, he maxed out the engineering electives, and I knew he wanted more."

Parents hoped for more engineering resources and took action to secure them: "When my son went into look at some of those schools, they really were lacking in what his interests were as far as electives. And being a school counselor, a high school counselor, I'm a big fan of trying out the electives to see if that is really what you think your path is."

Parents expected children to apply what they had learned in the community and make contributions in certain scenarios. In this study, researchers found that "community" was a common context, and parents defined what community meant to them in different ways.

"There were some great people in our community working to connect kids with internships and all kinds of opportunities."

Scenario (community)

Parents also considered broad ideas about the scenario and hoped that their children could apply what they had learned in practical contexts or within their community.