How Robotics Programs Influence Young Women’s Career Choices: A Grounded Theory Model

Cecilia D. Craig, Ph.D.

Abstract
Women in college, alumnus of a well-known high school robotics program, shared how it influenced their career choices and who they have become in this qualitative study. A general system theory model was developed using grounded theory practices, after conducting online focus groups and interviews.

Relevant Literature
Conceptual Framework
Career theory factors influencing career choice:
1. Experiential activities (Roe, 1952; Super & Bachrach, 1957; Super et al., 1957).

Data Analysis
Grounded theory practices were foundational to the qualitative process.

Findings
General system theory type model grew from the analysis. Model resonated with mentors, researchers, and high school students currently in FRC teams.

Conclusions
Stories from the young women validated conceptual framework elements. The nascent model offers a foundation for further research.

Limitations

Social Change Implications
Programs that encourage young women to move outside their comfort zone and consider STEM careers or that help solidify their beginning love for solving engineering problems are something society needs.

Moreover, engineering cultures need to change to become more welcoming and interesting to young women. If improving these kinds of intervention programs inspire young women to pursue careers in engineering, physics, and computer science, then society will benefit.

Research Questions
How did FRC influence young women’s career choices?

a. How and when did young women make their career decisions and college program selections?

b. How did the experiential part of the FRC program influence career choice?

c. What FRC heroes affected the young women and how?

d. How does a team’s gender composition, that is, a single-gender versus mixed-gender team, make a difference, if any?

Procedures
Online asynchronous focus groups offered young women a safe space to share their stories and memories. One-on-one interviews (online and face-to-face) explored ideas and categories further. Young women in both Science, Engineering, Technology, and Mathematics (STEM) and non-STEM careers were included from northern California FRC teams. Observations of a current robotics competition, photograph sharing, and stakeholder reviews provided additional triangulation steps.

Committee Members
Dr. Sharon Johnson (Chair), Dr. Sigrin Newell, and Dr. Asoka Jayasena

Problem
Women remain less than 20% of engineering, physics, and computer science graduates in the U.S. after 20+ years of intervention programs. Talent, aptitude, and skills are not the obstacle; the issue is choice (Ceci & Williams, 2010; Fouad, N., Fitzpatrick, M., & Liu, J. P., 2011).

Women in college, alumnae of a well-known high school robotics program, shared how it influenced their career choices and who they have become in this qualitative study.

Grounded Theory Practices

Focus Groups and Interviewing

How did FRC influence young women’s career choices?
a. How and when did young women make their career decisions and college program selections?
b. How did the experiential part of the FRC program influence career choice?
c. What FRC heroes affected the young women and how?
d. How does a team’s gender composition, that is, a single-gender versus mixed-gender team, make a difference, if any?

Procedures
Online asynchronous focus groups offered young women a safe space to share their stories and memories. One-on-one interviews (online and face-to-face) explored ideas and categories further. Young women in both Science, Engineering, Technology, and Mathematics (STEM) and non-STEM careers were included from northern California FRC teams. Observations of a current robotics competition, photograph sharing, and stakeholder reviews provided additional triangulation steps.

Committee Members
Dr. Sharon Johnson (Chair), Dr. Sigrin Newell, and Dr. Asoka Jayasena