Academic Support Seeking Behaviors Differ by Gender in Coding Bootcamps

Author: Rachel Beaulieu

Academic Advisors: Visiting Scholar Sherry Seibel and Professor Nanette Veilleux

Abstract

Coding bootcamps are an increasingly popular alternative to an undergraduate computer science degree, where they are comparatively short and inexpensive, with an average duration of 14 weeks and an average cost of $14,000. The gender imbalance in traditional undergraduate programs is notorious, however coding bootcamps seem to be bridging the gender gap. This study found differences in the way men and women navigate their academic experiences.

- Grounded theory was used to analyze over 11 hours of recorded interviews of 7 women, with a smaller comparison group of 4 men
- Women intentionally selected study groups composed of other women, whereas men noted no preference
- Seeking all women peer groups was one strategy women took to mitigate negative experiences, where 50% of the women had some negative experiences versus 25% of men interviewed
- Seeking all or mostly women peer groups was one strategy women took to mitigate negative experiences
- With all participants, the majority of peers and teachers were men. Alternatively, these women formed study groups consisting of mostly or all women, whereas men formed study groups with mostly or all men
- Women expressed difficulty more frequently when learning to code.

Materials and Methods

The materials and methods taken to conduct this study of academic support seeking behavior included:

- Reviewing literature for formulating questions to be asked during participant interviews using grounded theory
- Recruitment was executed by posting on Facebook, personal references, and the snowball method
- Participants enrolled through Calendly and had Zoom meetings and consent forms by DocuSign automatically set up through Zapier
- Participants were all 40 or younger, attended K-16 or K-bootcamp in the United States, and had graduated from college as a computer science major or graduated from a coding bootcamp
- Interviews were conducted using a semi-structured instrument and consisted of 68 questions and 8 demographic questions
- All identifying data was stripped and subjects were given codenames
- Interviews were recorded over Zoom and transcribed through Otter.ai
- Interviews were done in two rounds six months apart, an approach informed by grounded theory
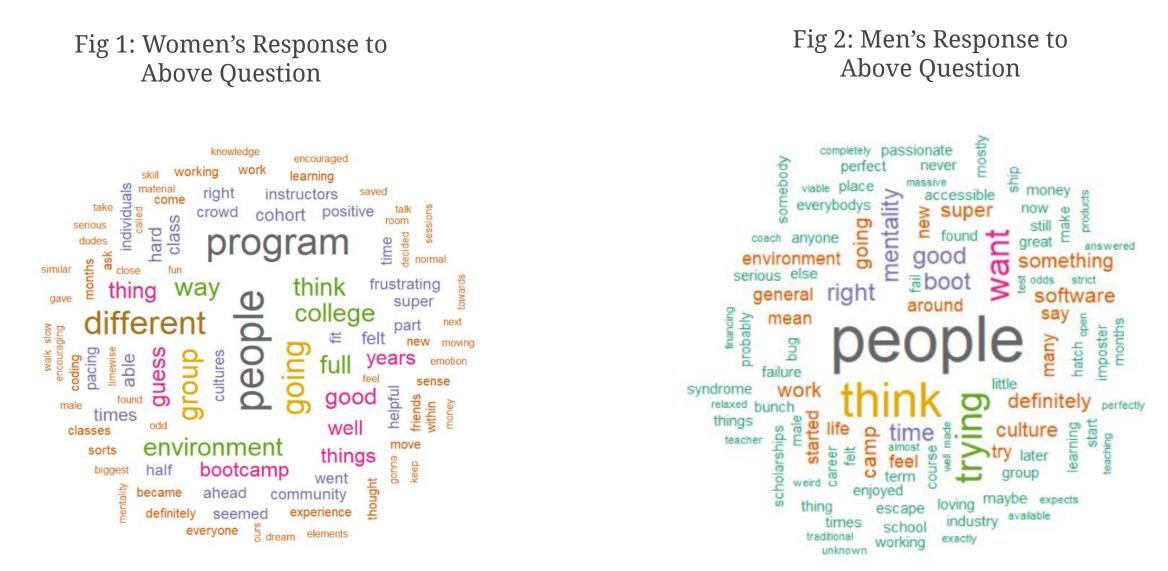- Data was coded in Google Sheets and analysis performed using R

Results

Women attending these coding bootcamps felt that their programs were "male dominated", as participant BC-012-2108F describes, the "majority of my class and the majority of my instructors were male."

Regardless of their genders, bootcamp participants expressed similar learning preferences.
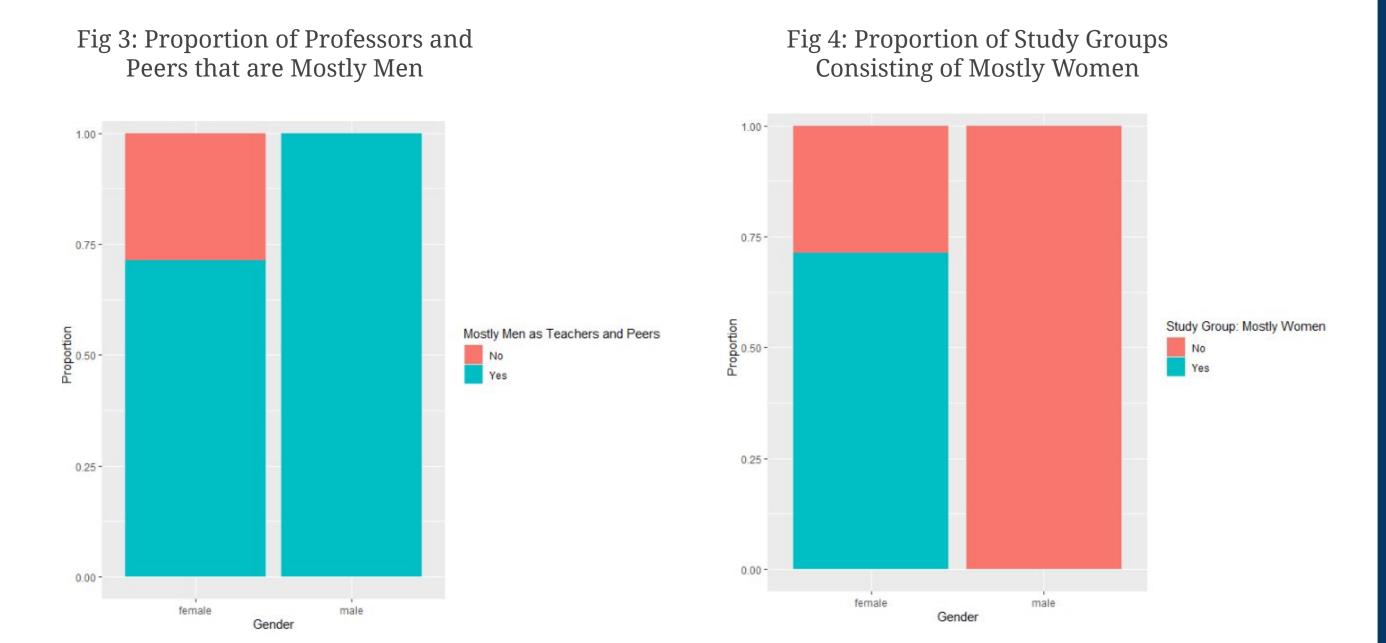
Participant BC-011-1708M describes his learning style as "having some type of demonstration, and then going off and doing a variation of that where I can apply" the topic.

Similarly, BC-020-0203F describes her learning style as "watch and see someone do it first before I attempted it on my own".

Responses to the question: *How would you describe the culture of your program's learning environment?*

Fig 1: Women's Response to Above Question

Fig 2: Men's Response to Above Question

Figures 1-2 show the common words used from both men and women participants to describe their bootcamp's learning environment. Men appear to have focused more on their internalized experiences, whereas women focused more on their externalized experiences. Women focusing on their external experiences could be attributed to the 50% of women experiencing negativity within their programs.

Fig 3: Proportion of Professors and Peers that are Mostly Men

Fig 4: Proportion of Study Groups Consisting of Mostly Women

Figures 3-4 show that, while women and men prefer similar learning styles, women were more likely to seek homogenous study groups, despite the ratio divide between men and women in their programs.

Conclusions

Coding bootcamps, while decreasing the gender gap in computing fields, does not provide a clear alternative to the unwelcoming environment that women students cite in traditional undergraduate programs.

- From Figures 3-4, women are spending more time studying with each other, despite there being significantly less women in total in their programs
- While women were studying in public settings, provided by their programs, men were less likely to join their study groups, creating groups of primarily women throughout their program

These findings suggest that bootcamps do not provide a clear alternative to the unwelcoming environment women students cite in traditional undergraduate programs and that further research is necessary to identify their greater popularity.

References

Cheryan S, Master A and Meltzoff AN (2015) Cultural Stereotypes as gatekeepers: increasing girls' interest in computer science and engineering by diversifying stereotypes. *Front. Psychol.* 6:49. doi: 10.3389/fpsyg.2015.00049

Coding bootcamps IN 2021: Your Complete Guide. (2021). Retrieved April 11, 2021, from https://www.coursereport.com/coding-bootcamp-ultimate-guide#online

Dasgupta, N., Scircle, M. M., & Hunsinger, M. (2015). Female peers in small work groups enhance women's motivation, verbal participation, and career aspirations in engineering. *Proceedings of the National Academy of Sciences, 112*(16), 4988-4993. doi:10.1073/pnas.1422822112

Dennehy, T. C., & Dasgupta, N. (2017). Female peer mentors early in college increase women's positive academic experiences and retention in engineering. *Proceedings of the National Academy of Sciences, 114*(23), 5964-5969. doi:10.1073/pnas.1613117114

Bachelor's, master's, and doctor's degrees conferred by postsecondary institutions, by sex of student and discipline division: 2017-18. *Digest of Education Statistics*. (2019), from https://nces.ed.gov/programs/digest/d19/tables/dt19_318.30.asp?current.asp

Louise Ann Lyon & Emily Green (2020) Women in coding boot camps: an alternative pathway to computing jobs, Computer Science Education, 30:1, 102-123, DOI: 10.1080/08993408.2019.1682379

Seibel, S., Veilleux, N. (2019). Factors influencing women entering the software development field through coding bootcamps vs. computer science bachelor's degrees. J. Comput. Sci. Coll. 34, 6 (April 2019), 84–96.

Veilleux, N., Bates, R., Allendoerfer, C., Jones, D., Crawford, J., & Floyd Smith, T. (2013). The relationship between belonging and ability in computer science. *Proceeding of the 44th ACM Technical Symposium on Computer Science Education - SIGCSE '13.* doi:10.1145/2445196.2445220

W. (2018). Women Wavemakers: Practical Strategies for Recruiting and Retaining Women in Coding Bootcamps. 20-43. doi:10.1596/30114

Werner, L. L., Hanks, B., & McDowell, C. (2004). Pair-programming helps female computer science students. *Journal of Educational Resources in Computing, 4*(1). doi:10.1145/1060071.1060075

Acknowledgements