



# Closing The Gap Between Classrooms and Industry With Open-Source Internships

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## ABSTRACT

Many colleges lack the resources to teach computer science students the skills to succeed in interviews and work on real-world products. Internships solve both problems, but are often not accessible to under-served students and colleges, adding to the underrepresentation of minorities in technology. This poster reports the results of a program providing unpaid open-source internships with volunteer industry mentors.

## CCS CONCEPTS

• **Applied computing** → **Interactive learning environments**; *Collaborative learning*; E-learning.

## KEYWORDS

internships; open source; project based learning; underrepresentation; software engineering

## 1 INTRODUCTION

Internships are a traditionally important part of computer science education for many smaller CS programs. Career-connected education, interview skills, and professional networking are just a few of the opportunities which are difficult to replicate on campus [1]. In response to the COVID-19 outbreak in early 2020, companies canceled an estimated 76% of tech internships, and students in these smaller CS programs were disproportionately affected [2].

This paper details an effort to create an unpaid virtual internship working on open-source software, and mentored by volunteer software engineers.

The program served 300 students, ranging from high school through graduate students, but a majority of students were undergraduate juniors and seniors.

## 2 OVERVIEW

The program comprised two tracks. The "beginner track" featured easier projects, and was designed for students without experience working without the detailed guidance of an instructor. The "advanced track" featured more complex projects similar to those completed in a traditional internship.

Volunteer mentors proposed ideas for open source projects related to their work, industry, experience, or interests. All mentors completed an on-boarding call with staff members who helped revise projects to meet learning goals and the expected experience-levels of students in the desired track. Mentors were full-time software engineers at software companies.

Admitted students were shown projects/mentors and asked to rank their preferences, and were then paired with a volunteer mentor and other students through a modified stable marriage algorithm. Most teams comprised three students and one mentor.

For the duration of the program, students and mentors met as a group twice per week to discuss project management, software architecture, and technical problems. Mentors also conducted 2-3 one-on-one meetings with each team member. Upon the completion of their program, students presented the final project in both a short and long form video, as record of their work.

## 3 RESULTS

1,500 students applied and 300 were selected. 84 students participated in the beginner track (of 100 invited), and 196 students in the advanced track (of 200 invited). Although it was not directly considered in admissions, diversity far exceeded industry norms: 65% identified as women and 34% were Black, Latinx, or Native American.

Though many students said they were not prepared for real-world projects at the start, most left feeling more prepared, according to exit surveys. Mentors performed well, with an average rating of 4.7 out of 5, and 137 of the 157 respondents said they had a positive experience working with their student group, for an average rating of 4.3 out of 5. Several students were offered internships or job interviews following their participation in the program.

A complete analysis of results is included in the poster.

## 4 CONTRIBUTIONS AND FUTURE WORK

Follow up surveys will be conducted with participants to assess the program's impact on job prospects, job preparedness, and overall career opportunities.

One challenge identified in this year's program was the difficulty of on-boarding students into a new technical stack quickly. This is not a unique problem to open source internships, but an industry-wide area of study. In the future we hope to test different formats to improve this on-boarding time.

Another challenge was encountered when managing team dynamics. We hope to investigate improvements to the matching algorithm, mentor training, and student training.

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