# BOARD # 452: S-STEM: Enhancing Career Readiness of S-STEM Scholars Through Co-ops and Internships

**Dr. Wei Zhang, University of Louisville**

Dr. Wei Zhang is the Professor and Chair of the Department of Computer Science and Engineering at the University of Louisville. He earned his Ph.D. in Computer Science and Engineering from the Pennsylvania State University in 2003. Dr. Zhang served as an assistant/associate professor in Electrical and Computer Engineering at Southern Illinois University Carbondale (SIUC) from 2003 to 2010 and as an associate and full professor at Virginia Commonwealth University (VCU) from 2010 to 2019. His research interests include computer architecture, compilers, real-time computing, and hardware security. Dr. Zhang has published over 170 papers in refereed journals and conference proceedings. His research work has received support from various government and industry grants, including 10 grants from the NSF for which he serves as the principal investigator. He was honored with the 2016 Engineer of the Year Award from the Richmond Joint Engineer Council, the 2009 SIUC Excellence through Commitment Outstanding Scholar Award for the College of Engineering, and the 2007 IBM Real-time Innovation Award.

# S-STEM: Enhancing Career Readiness of S-STEM Scholars Through Co-ops and Internships

*Wei Zhang*
*Department of Computer Science and Engineering*
*University of Louisville, Louisville, KY 40292*

## Abstract

This paper presents our initial study on how participation in co-ops and internships enhances the career readiness of S-STEM students in computer science and engineering. Many students collaborate with the Engineering Career and Co-op Office to secure these opportunities. Additionally, S-STEM cohort meetings provide a platform for new students to learn from junior and senior S-STEM students, who share their experiences in finding and participating in co-ops and internships.

Student survey results indicate that for 70% of S-STEM students in our program, the co-op or internship experience has significantly improved their technical knowledge and skills. All students responded agree that the co-op or internship experience has improved their professional skills and job readiness. In addition, 90% of the S-STEM students think working with the co-op and career office is effective or very effective. However, 20% of the S-STEM students believe it is very challenging to find their last co-op or internship, even with the help from the co-op and career office. This is not surprised, considering the recent national job market trend in computer science.

## 1. Introduction

The Department of Computer Science and Engineering (CSE) at University of Louisville (UofL) has received an NSF S-STEM grant to support low-income, academically talented students in the Bachelor of Science in Computer Science and Engineering (BS CSE) program. A key component of the program is developing students' practical and professional skills through on-the-job training in co-ops or internships.

The School of Engineering's Career Development and Co-op Office provides support for students in finding appropriate co-op or internship opportunities, including those enrolled in the new Bachelor of Arts in Computer Science program. S-STEM students have worked closely with their co-op or internship advisors to better prepare for these opportunities.

Despite the recent challenges in the CS job market, many S-STEM students have successfully secured co-ops and internships. Through these experiences, they have strengthened their professional skills and enhanced their job readiness.

## 2. S-STEM Project Background

The S-STEM project funded by NSF aims to improve the retention, graduation, and employability of low-income academically talented students. The project has already graduated three students who successfully completed their BS CSE degrees. The project currently has 10 students, and 8 of them are ready to seek their co-ops or internships. All the S-STEM students are Pell-eligible; 50% of them are female and 30% are Hispanic.

For students from low-income backgrounds, their educational journeys often differ significantly from those of their wealthier peers [1, 2]. Beyond facing challenges like limited academic preparation and fewer social connections, low-income students encounter additional factors that can impact their academic success. For example, Research by Kezar et al. [1] indicates that these students tend to work more hours and participate less in campus activities. While it is important to provide financial support for low-income students, it is also crucial to develop curricular and cocurricular activities to support their success. To this end, the S-STEM project has improved the CSE gateway courses, engaged S-STEM students in regular cohort meetings, preparing them for co-ops or internships, and providing undergraduate research opportunities. In this paper, we will focus S-STEM students' experience in their co-ops and internships.

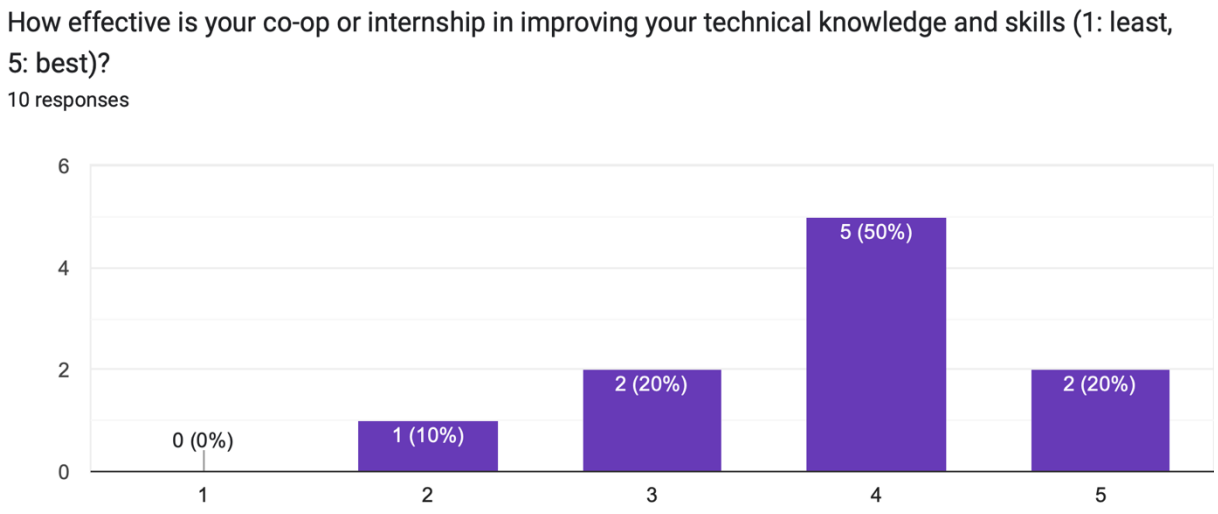
## 3. Co-op and Internship Support

The Speed School Engineering has 200+ co-op partners, and the Career Development and Co-op Office provides full career services to students, ranging from the exploration of engineering disciplines and cooperative education placement to full-time employment coaching and guidance. Through the sequence of 3 co-ops, students build relationships with employers, gradually gaining responsibility, skills, and knowledge. The S-STEM project team has worked closely with the Career Development and Co-op Office to provide students both academic and career-related advice and to get feedback from employers about students' performance, our curriculum and the skill sets needed by industry. The project team has also invited the co-op/internship advisor to talk to S-STEM students about the services they provided throughout the co-op or internship application process. During cohort meetings, industry professionals were invited to share their experiences and discuss opportunities at their companies, helping S-STEM scholars expand their professional networks and access mentoring opportunities. The cohort meetings also serve as a platform for peer mentoring, allowing new S-STEM students to learn from senior scholars about their co-op/internship search process and project experiences, while fostering social support and enhancing their sense of belonging.

## 4. Results

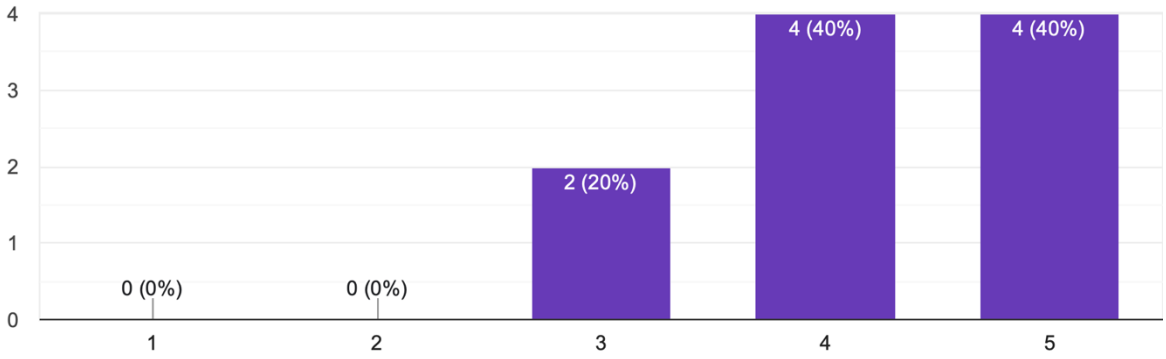
The national job market in computer science or computer engineering this year and last fall was not as good as before, due to a large number of layoffs from Silicon Valley and technology companies elsewhere. It has some impact on student's placement in co-ops or internships, though Louisville's market does not necessarily follow the national trend exactly. Eight out of ten S-STEM students were able to find one or more co-op or internship opportunities. Some of them have already completed three co-op rotations. One co-op student has also joined a summer REU (Research Experience for Undergraduate), which provided a full-time research project experience similar to a co-op or internship. One out of ten students have not yet found any internship opportunity yet, who is in the process of active searching and hopefully can find one for the summer of 2025.

Student survey results indicate that for 70% of S-STEM students in our program, the co-op or internship experience has significantly improved their technical knowledge and skills. All students responded agree that the co-op or internship experience has improved their professional skills and job readiness. In addition, 90% of the S-STEM students think working with the co-op and career office is effective or very effective. However, 20% of the S-STEM students believe it is very challenging to find their last co-op or internship, even with the help from the co-op and career office. This is not surprised, considering the recent national job market trend in computer science, where tech giants that were expanding aggressively just a few years ago now have less need for entry-level hires —or are shedding jobs [3].



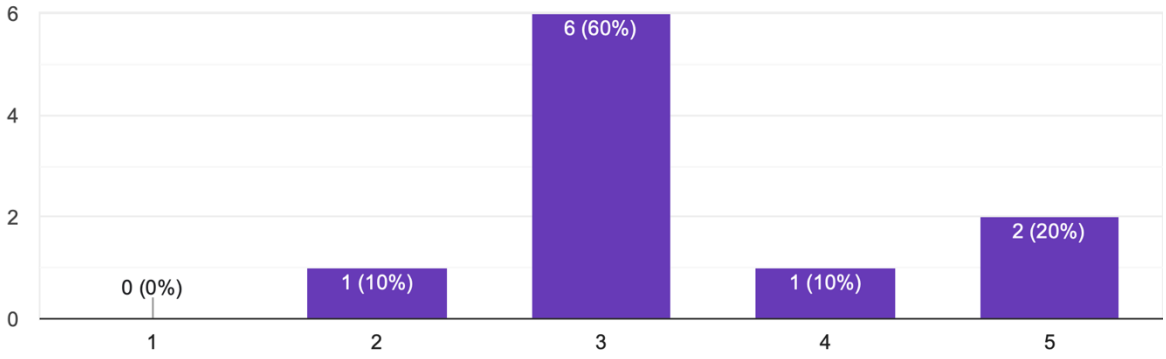
How effective is your co-op or internship in improving your professional skills and job readiness (1: least, 5: best)?

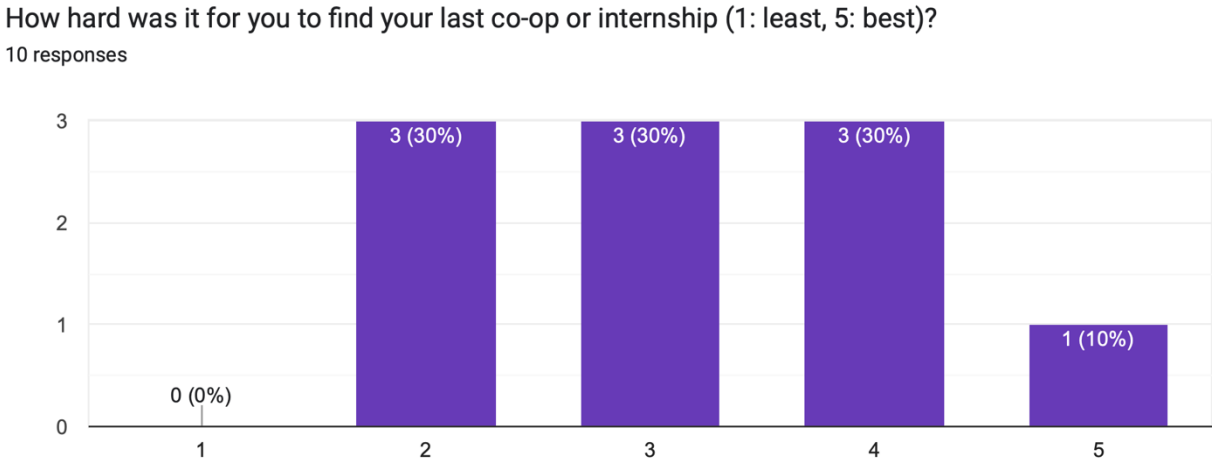
10 responses




How effective is working with the co-op and career office in helping you find the co-op or internship opportunities (1: least, 5: best)?

10 responses






**5. Concluding Remarks**

This paper summarizes the co-op and internship experiences of students in our S-STEM project. The majority of S-STEM students expressed appreciation for these opportunities, noting that they significantly enhanced their technical knowledge, professional skills, and job readiness. However, 20% of respondents indicated that securing a co-op or internship was highly challenging, possibly due to recent shifts in the national computer science job market.

**Acknowledgement:** This project is funded by the NSF S-STEM grant 2030427.

**References:**

[1] Kezar A., Walpole, M. & Perna, L, Engaging Low-income Students. In Quaye, S. J., Harper, S. R. (Eds.), Student Engagement in Higher Education, NY: Routledge, 2009.

[2] Jennifer Blue. Brielle Johnson, Amy Summerville, and Brian P. Kirkmeyer. Beliefs and Behaviors of First-generation and Low-income Students in Early Engineering Courses. The Collaborative Network for Engineering and Computing Diversity Conference, April 2018.

[3] Kate Warren, Corrie Driebusch, and Lindsay Ellis. Computer-Science Majors Graduate into a World of Fewer Opportunities: Those from top schools can still get jobs. They are just not all going to Facebook or Google. The Wall Street Journal, May 20, 2024.