

Implementation and Evaluation of Technical Interview Preparation Activities in a Data Structures and Algorithms Course

Amanpreet Kapoor, Sajani Panchal & Christina Gardner-McCune

Engaging Learning Lab

Department of Computer & Information Science & Engineering

University of Florida



Motivation

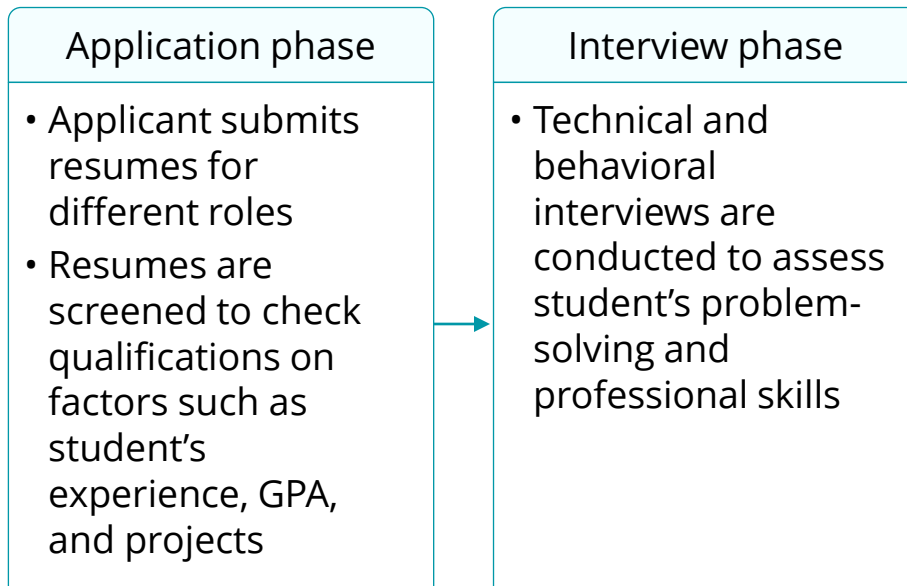


Process of Recruitment

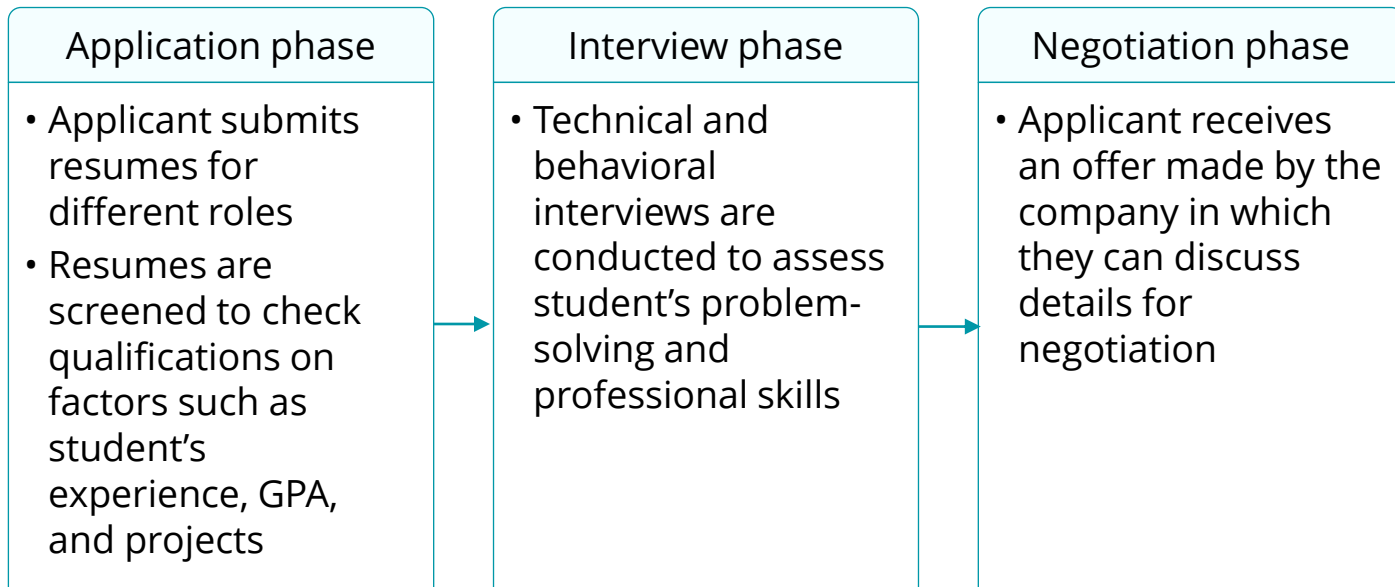
Application phase

- Applicant submits resumes for different roles
- Resumes are screened to check qualifications on factors such as student's experience, GPA, and projects

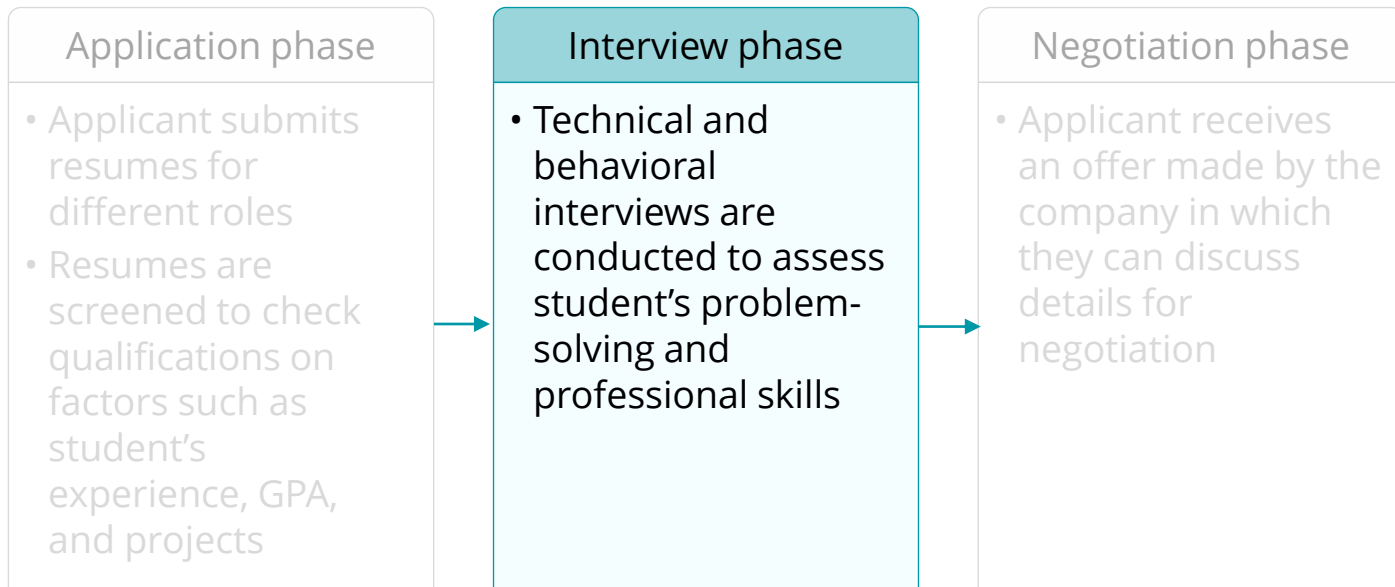
Process of Recruitment



Process of Recruitment



Process of Recruitment



Debilitating Factors that Were Taken Into Consideration



Limited time and access to
resources outside of
curriculum



Debilitating Factors that Were Taken Into Consideration



Limited time and access to
resources outside of
curriculum



Inadequate preparation
causing anxiety and stress

Debilitating Factors that Were Taken Into Consideration



Limited time and access to resources outside of curriculum

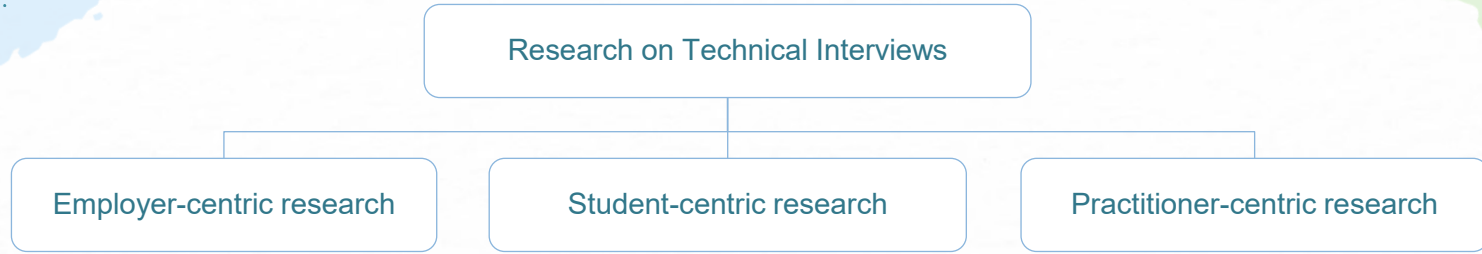


Inadequate preparation causing anxiety and stress

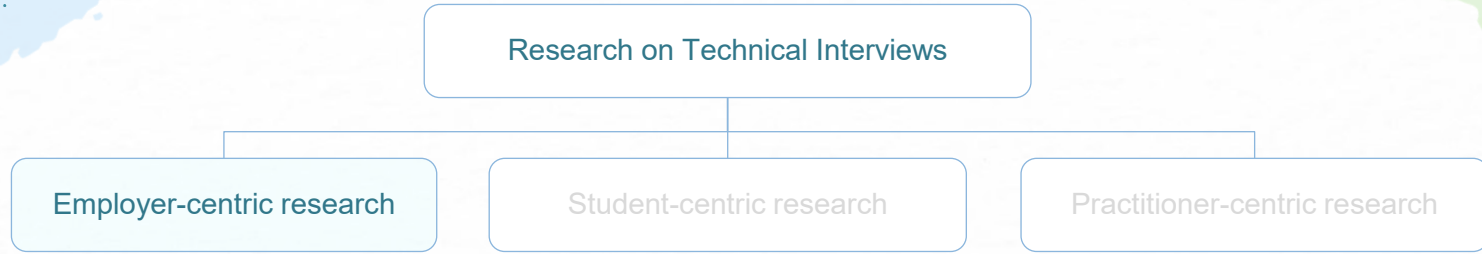


Lack of exposure and experience in technical interview setting

Prior Work

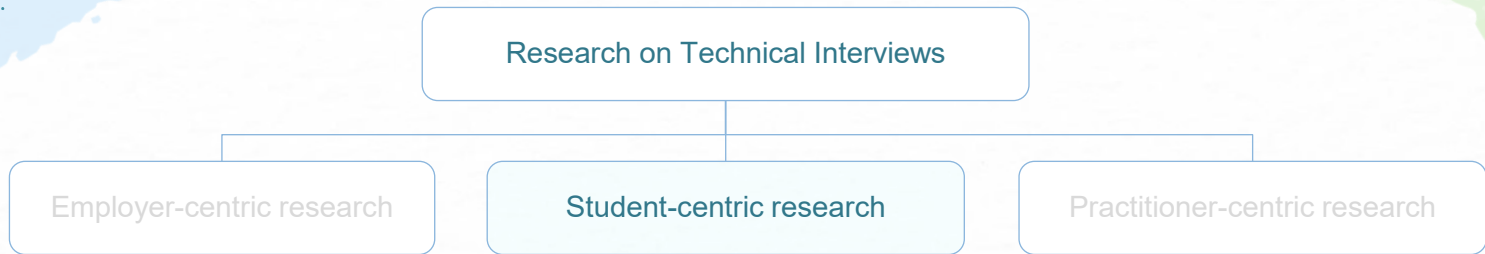


Prior Work



- Structure and expectations in a technical interview
- Interviewers placed importance on interpersonal skills as much as problem-solving abilities (Ford et al., 2017)

Prior Work



- Technical interview participation and factors that influence success
- Findings of African American students' participation in technical interviews showed that anxiety decreased as they partook in more interviews (Hall and Gosha, 2018)

Prior Work



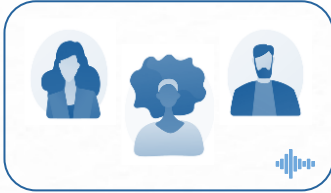
- Designing interventions for interview preparation
- Introduction of coding exercises that resemble technical interview questions in a CS2 course in the form of individual programming assignments (Urness, 2017)

Background of Study

- Purpose: help students prepare for technical interviews
- Intervention introduced in a Data Structures and Algorithms course at the University of Florida in Fall 2020

Background of Study

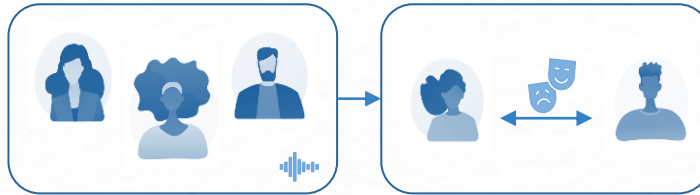
- Purpose: help students prepare for technical interviews
- Intervention introduced in a Data Structures and Algorithms course at the University of Florida in Fall 2020



Panel on Internship Application
Process, Experiences, and
Strategies (45 minutes)
Week 5

Background of Study

- Purpose: help students prepare for technical interviews
- Intervention introduced in a Data Structures and Algorithms course at the University of Florida in Fall 2020



Panel on Internship Application
Process, Experiences, and
Strategies (45 minutes)
Week 5

Role Play on Technical
Interviews by Teaching
Assistants (50 minutes)
Week 6

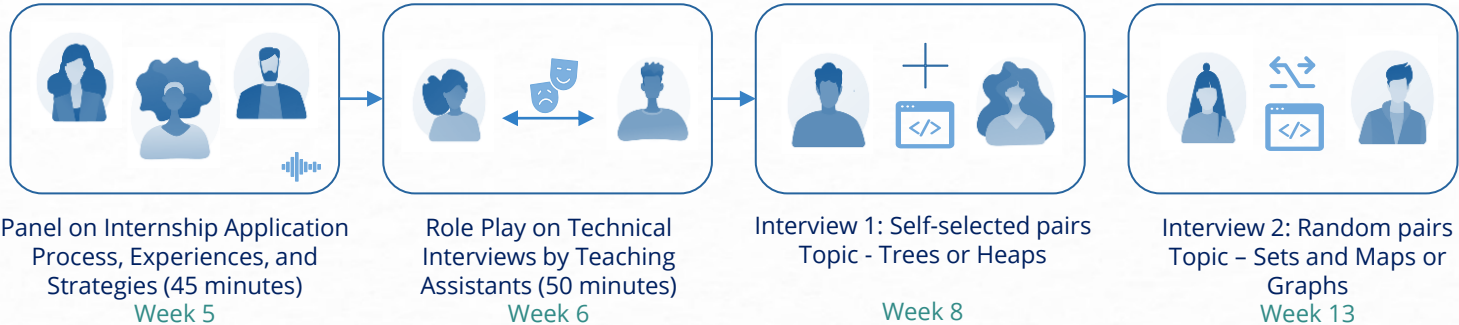
Background of Study

- Purpose: help students prepare for technical interviews
- Intervention introduced in a Data Structures and Algorithms course at the University of Florida in Fall 2020



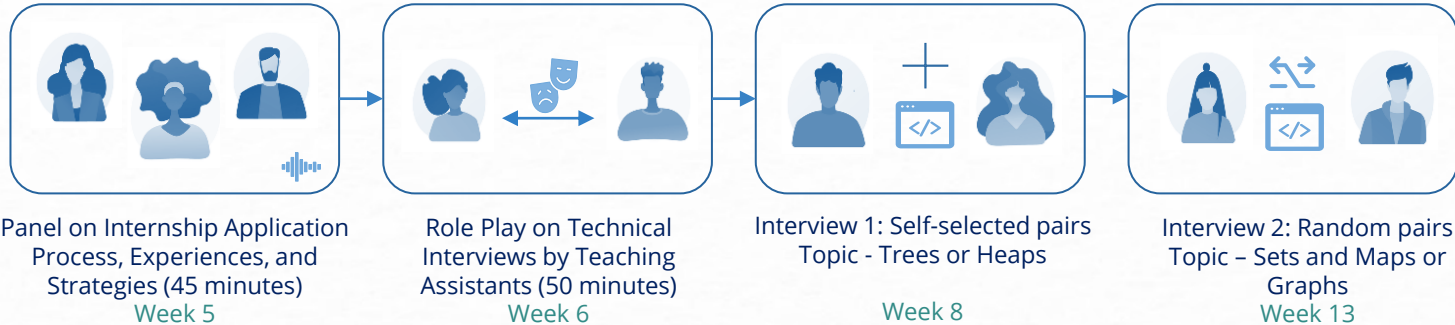
Background of Study

- Purpose: help students prepare for technical interviews
- Intervention introduced in a Data Structures and Algorithms course at the University of Florida in Fall 2020



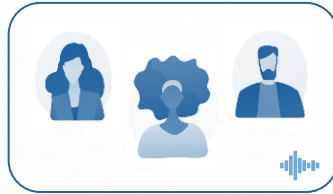
Background of Study

- Purpose: help students prepare for technical interviews
- Intervention introduced in a Data Structures and Algorithms course at the University of Florida in Fall 2020



- Increase students' confidence levels by the end of the semester for technical interview preparation

Creating a Solution with Hire Thy Gator Activities



Panel on Internship Application Process,
Experiences, and Strategies

Week 5

Creating a Solution with Hire Thy Gator Activities

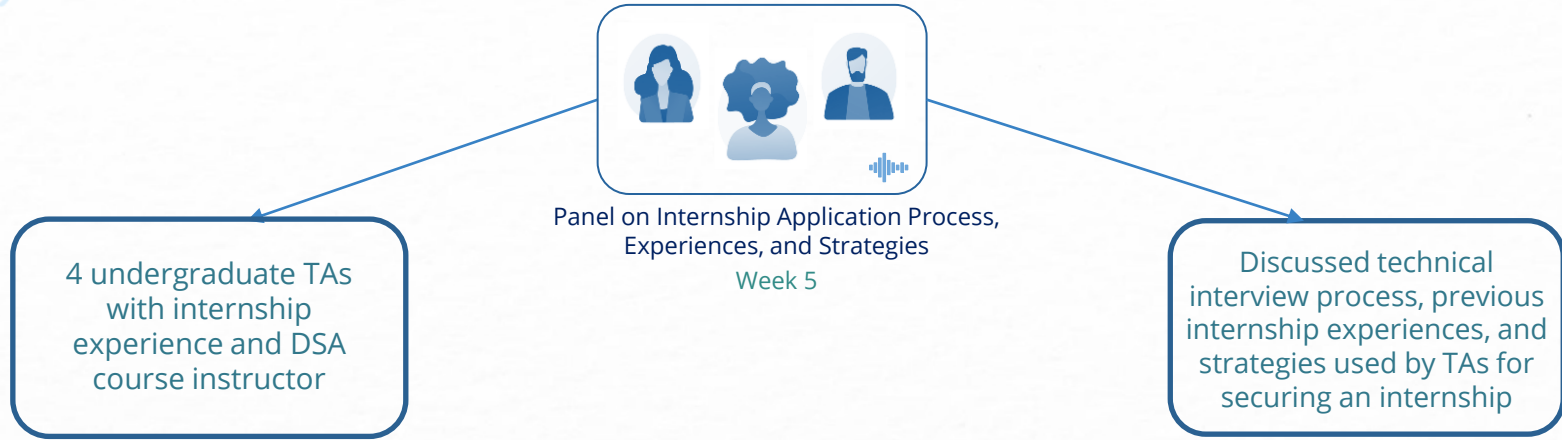


Panel on Internship Application Process,
Experiences, and Strategies

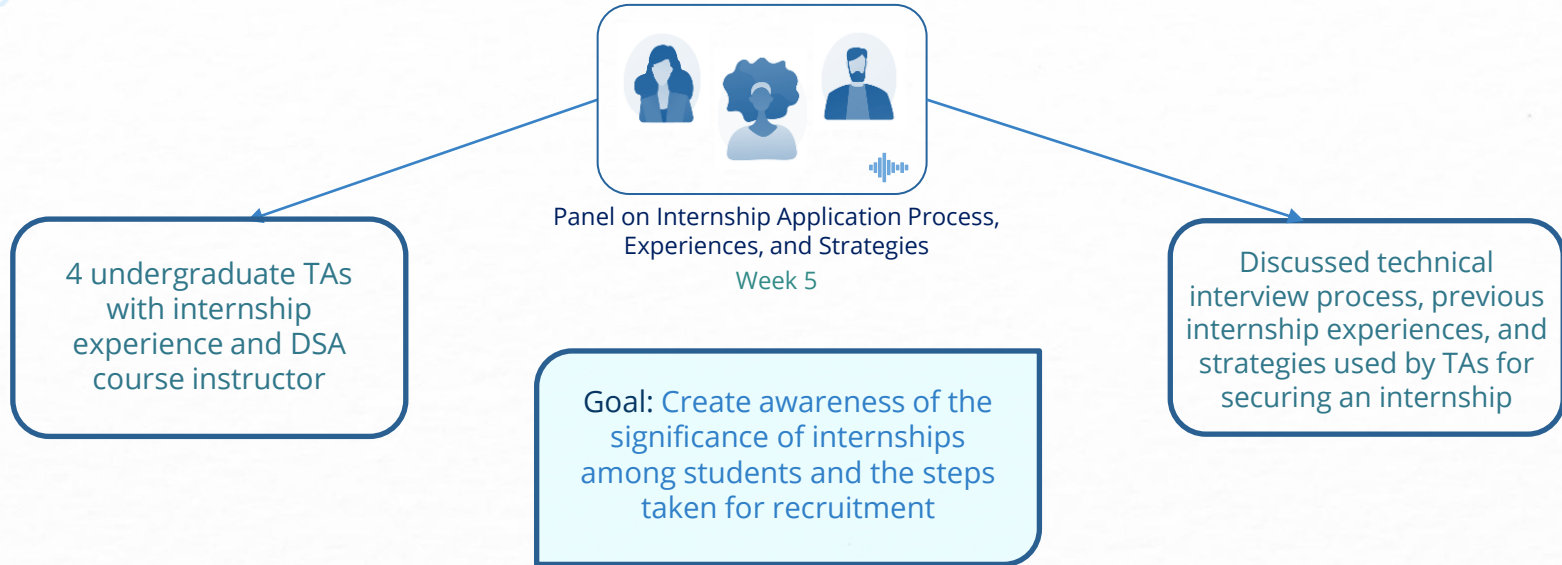
Week 5

4 undergraduate TAs
with internship
experience and DSA
course instructor

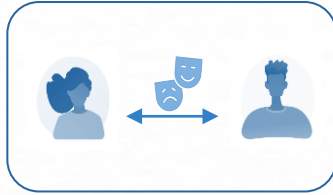
Creating a Solution with Hire Thy Gator Activities



Creating a Solution with Hire Thy Gator Activities



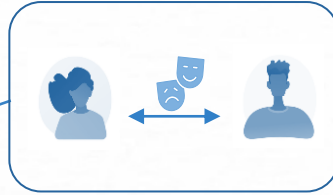
Creating a Solution with Hire Thy Gator Activities



Role Play on Technical Interviews by Teaching
Assistants

Week 6

Creating a Solution with Hire Thy Gator Activities



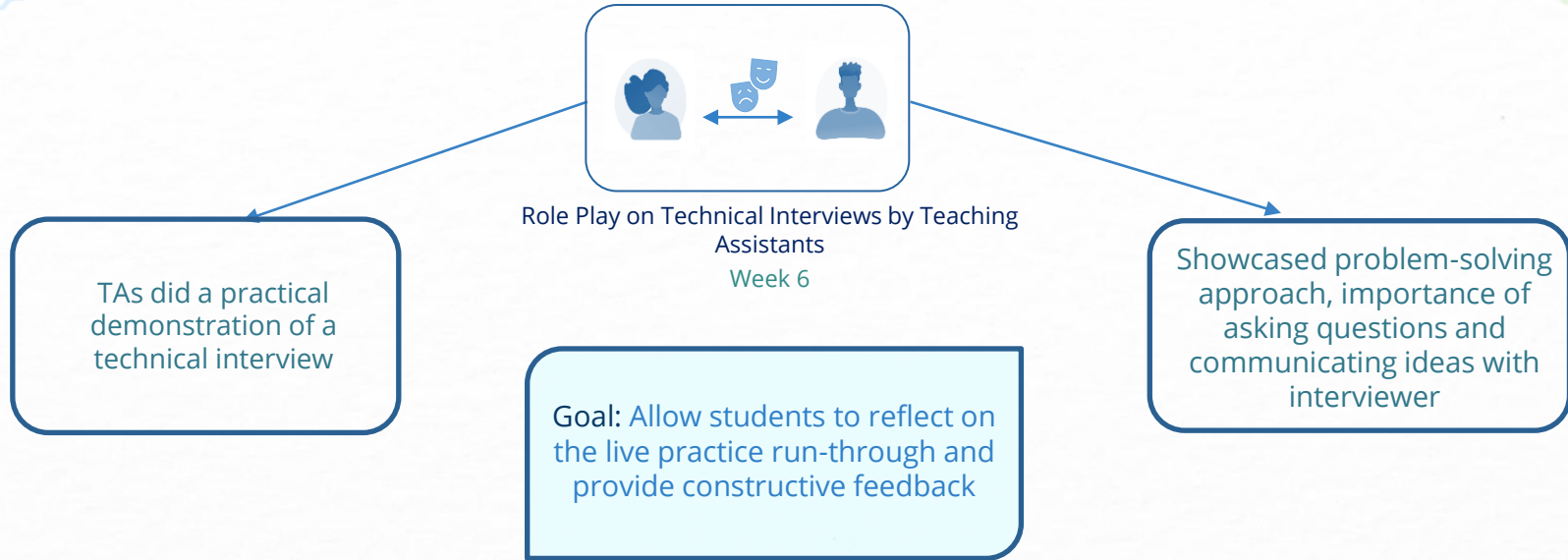
Role Play on Technical Interviews by Teaching Assistants
Week 6

TAs did a practical demonstration of a technical interview

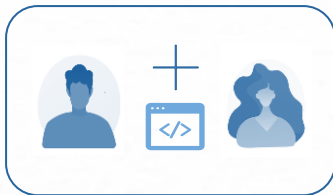
Creating a Solution with Hire Thy Gator Activities



Creating a Solution with Hire Thy Gator Activities



Creating a Solution with Hire Thy Gator Activities



Interview 1: Self-selected pairs

Topic - Trees or Heaps

Week 8

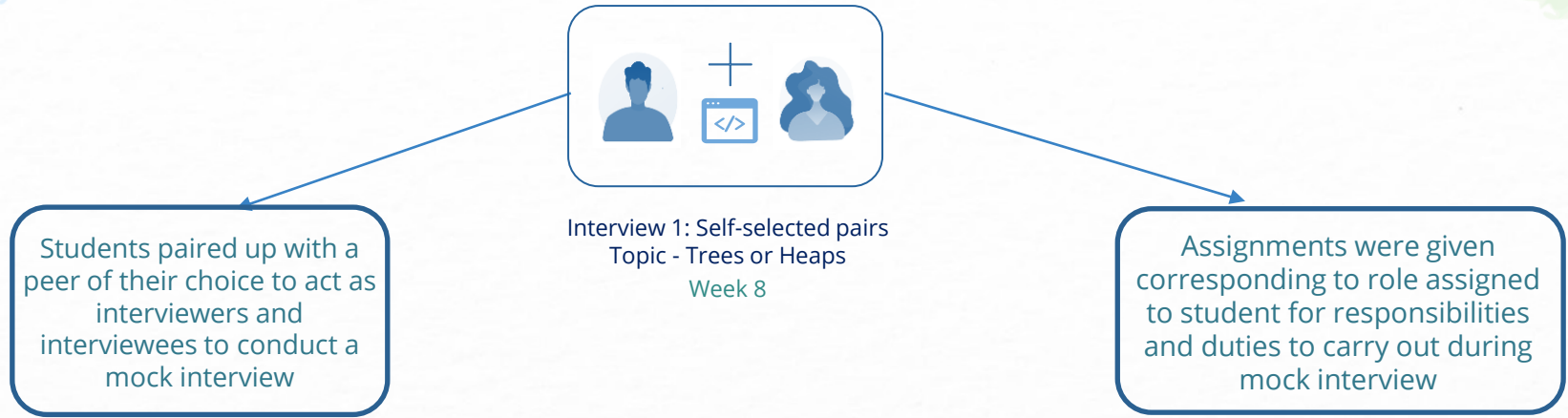
Creating a Solution with Hire Thy Gator Activities



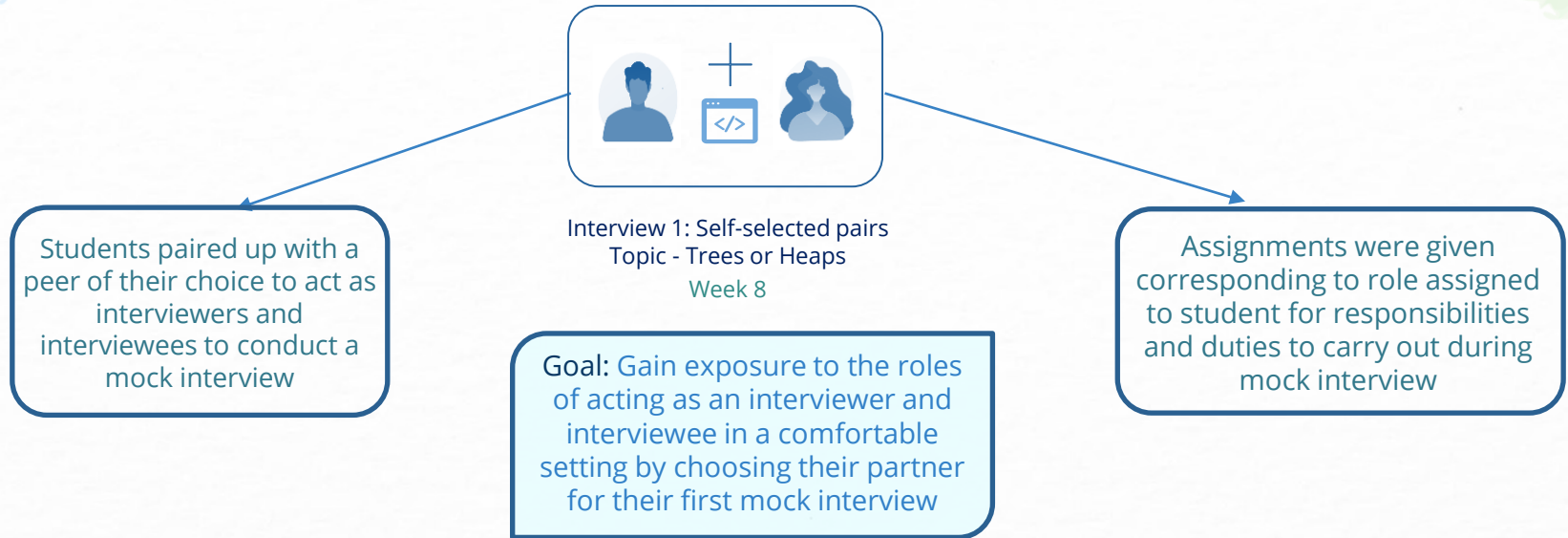
Interview 1: Self-selected pairs
Topic - Trees or Heaps
Week 8

Students paired up with a peer of their choice to act as interviewers and interviewees to conduct a mock interview

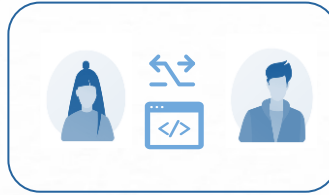
Creating a Solution with Hire Thy Gator Activities



Creating a Solution with Hire Thy Gator Activities



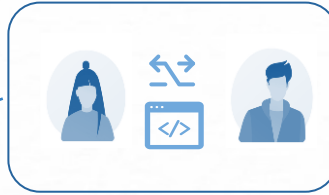
Creating a Solution with Hire Thy Gator Activities



Interview 2: Random pairs
Topic – Sets and Maps or Graphs

Week 13

Creating a Solution with Hire Thy Gator Activities

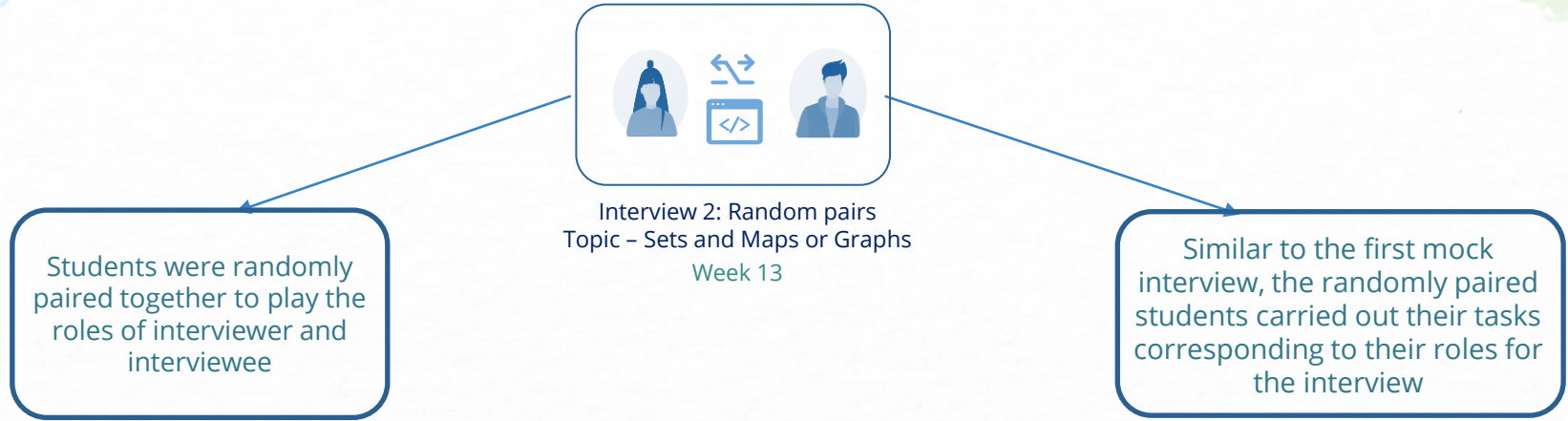


Interview 2: Random pairs
Topic – Sets and Maps or Graphs

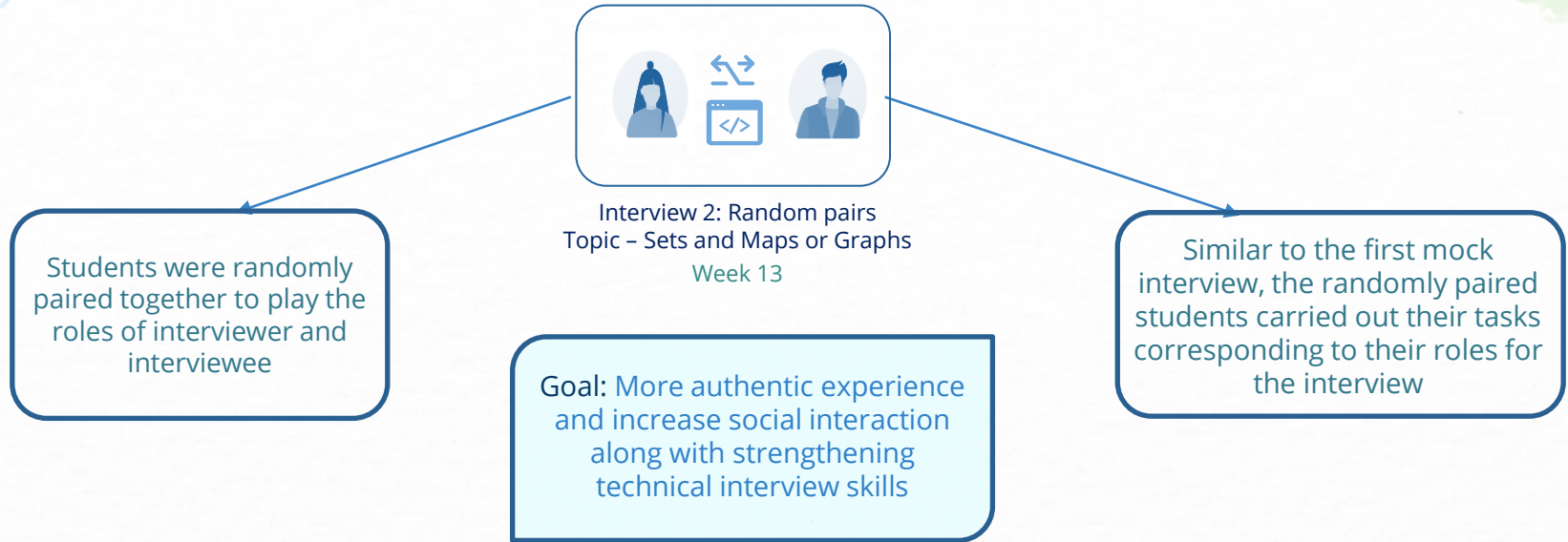
Week 13

Students were randomly
paired together to play the
roles of interviewer and
interviewee

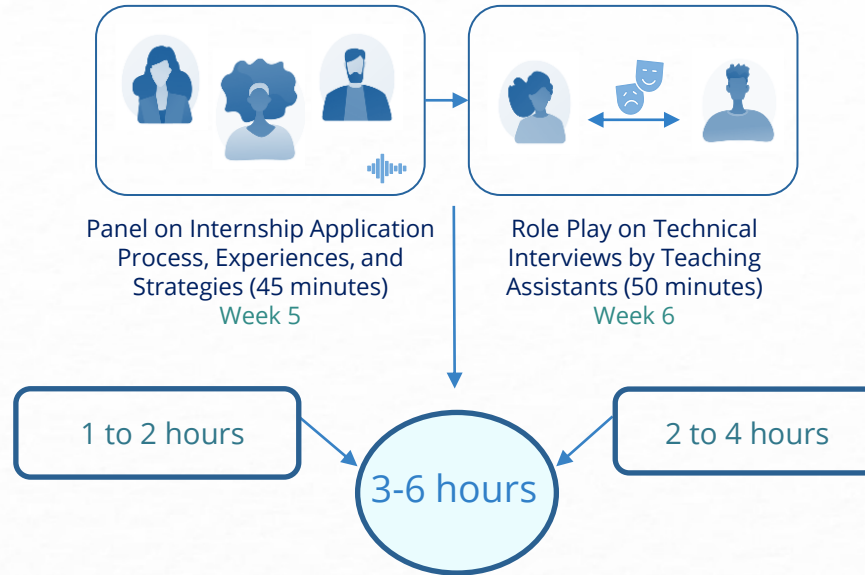
Creating a Solution with Hire Thy Gator Activities



Creating a Solution with Hire Thy Gator Activities



Time Requirements



Evaluation

Design

- Retrospective pre-post survey
- Helps in understanding key takeaways from students' inputs on partaking in technical interview exercises and changes in confidence levels
- Provided to students at end of control and intervention semesters
 - Control group: Summer 2020
 - Intervention group: Fall 2020
 - The course structure for the two groups was similar with the exception of introduction of technical interview exercises and minor changes in grading structure
- Research question
 - How does participation in technical interview preparation activities influence students' confidence levels for programming in a technical interview?

Evaluation

Design

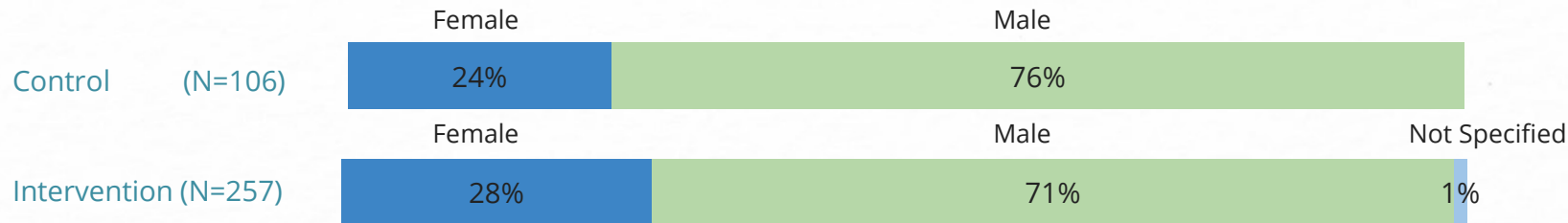
- Retrospective pre-post survey
- Helps in understanding key takeaways from students' inputs on partaking in technical interview exercises and changes in confidence levels
- Provided to students at end of control and intervention semesters
 - Control group: Summer 2020
 - Intervention group: Fall 2020
 - The course structure for the two groups was similar with the exception of introduction of technical interview exercises and minor changes in grading structure
- Research question
 - How does participation in technical interview preparation activities influence students' confidence levels for programming in a technical interview?

Study participation

- Summer 2020 (Control): 115 out of 143 students consented (80.4%) and N = 106 after excluding missing data
- Fall 2020 (Intervention): 279 out of 345 students consented (80.9%) and N = 257 after excluding missing data

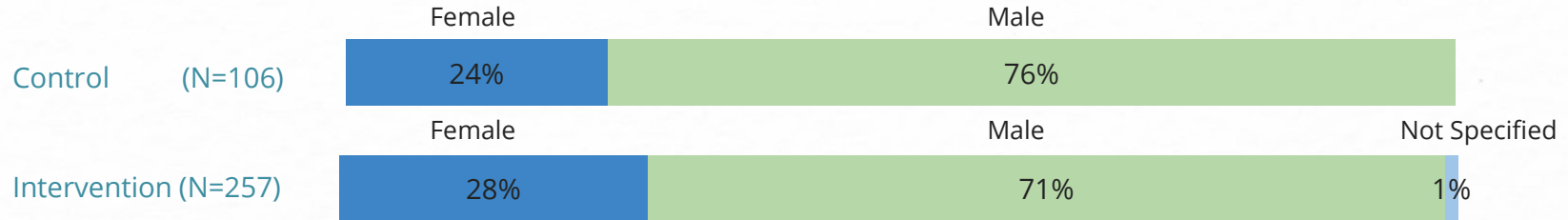
Demographics

Gender

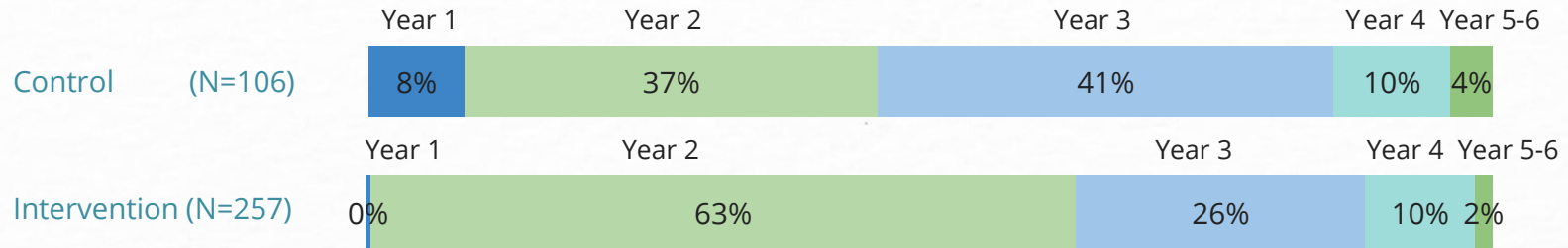


Demographics

Gender



Academic Standing



Evaluation

Survey questions

Qualitative

- Did you find the activity valuable?

-
- How confident were you with your ability to program in programming interviews before the starting of this course?

Quantitative

- How confident are you with your ability to program in programming interviews at the end of this course?
- 5-point ordinal scale questions
- Not confident (0) – Extremely confident (4)

Evaluation

Survey questions

Analysis

Qualitative

- Did you find the activity valuable?

- Coded using Inductive content analysis

- How **confident** were you with your ability to program in programming interviews before the starting of this course?

- Mann-Whitney U Test evaluate differences in mean confidence pre- and post-data

- Average normalized confidence gain,

$$\langle g \rangle = \frac{\langle \% \text{ Post} \rangle - \langle \% \text{ Pre} \rangle}{100\% - \langle \% \text{ Pre} \rangle}$$

Quantitative

- How **confident** are you with your ability to program in programming interviews at the end of this course?

- 5-point ordinal scale questions

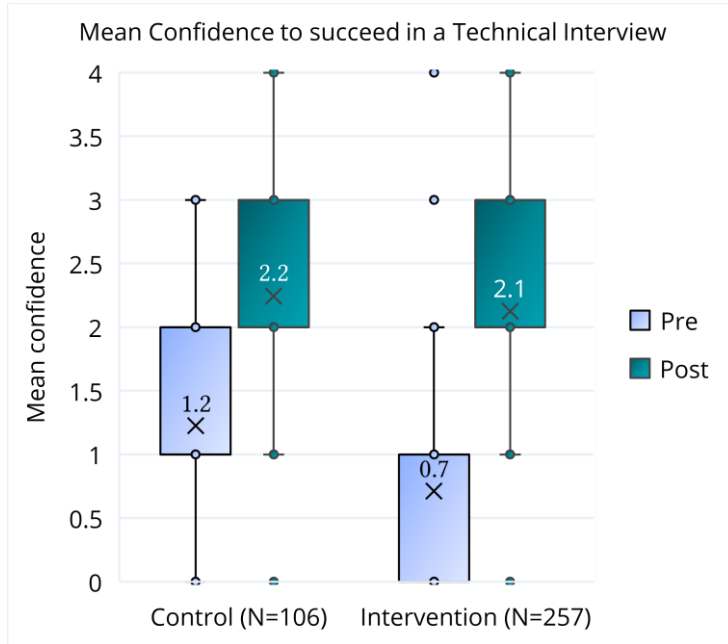
- Not confident (0) – Extremely confident (4)

Student Experiences

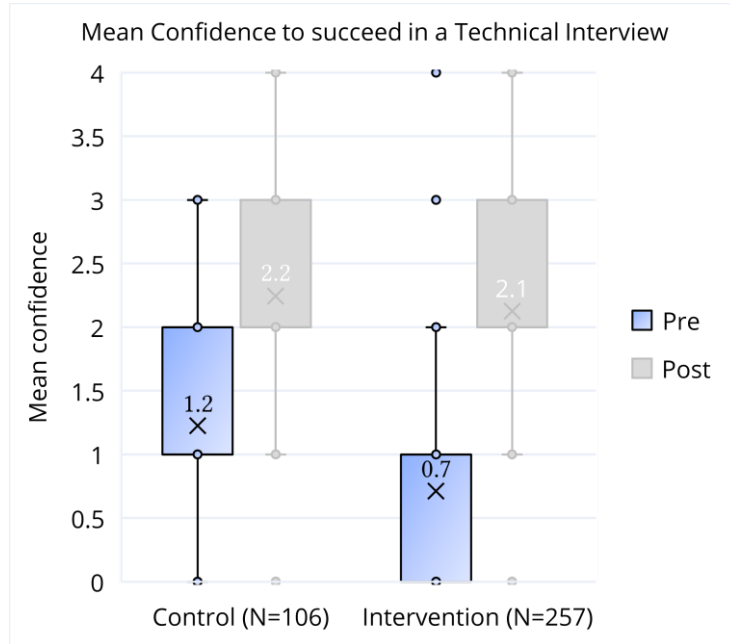
"...the [interview] exercises were important in getting familiarised with the programming interview process. This [was] especially true for people like [them] who had never done a live programming interview before".

"I liked them and they revealed things I need to work on before I do another technical interview".

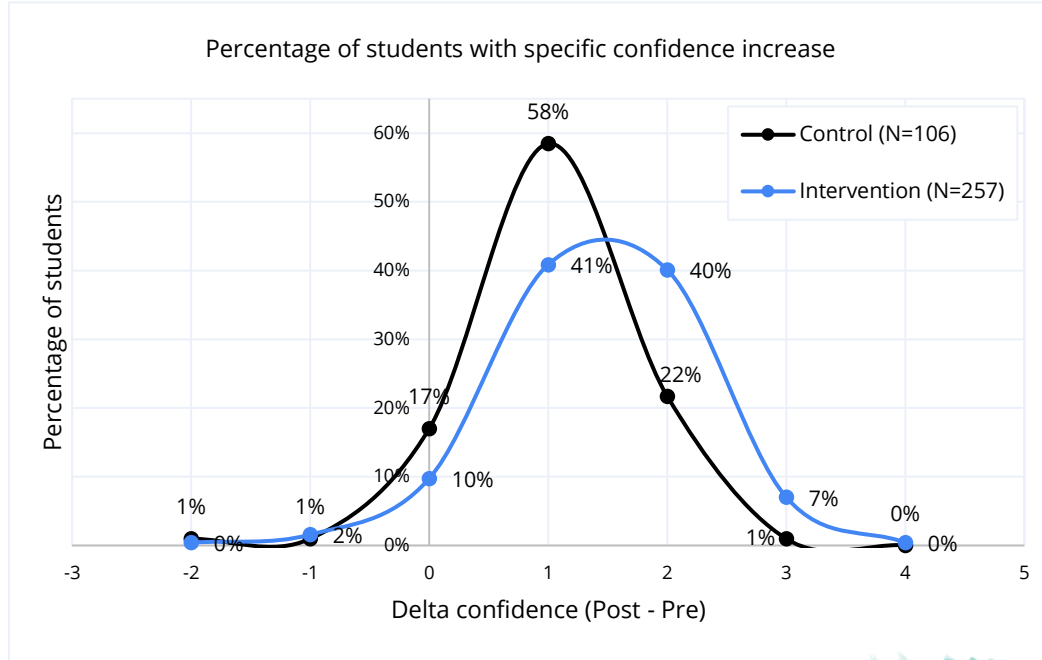
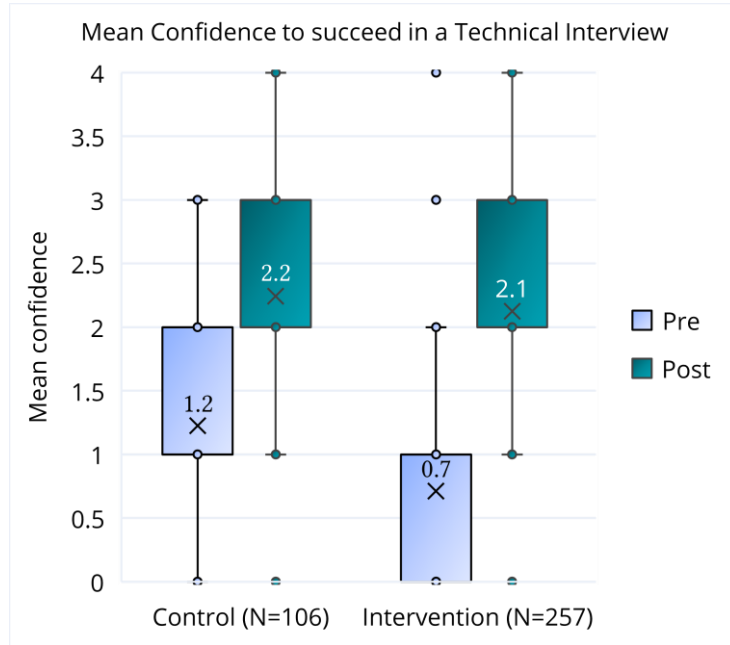
Results



Results

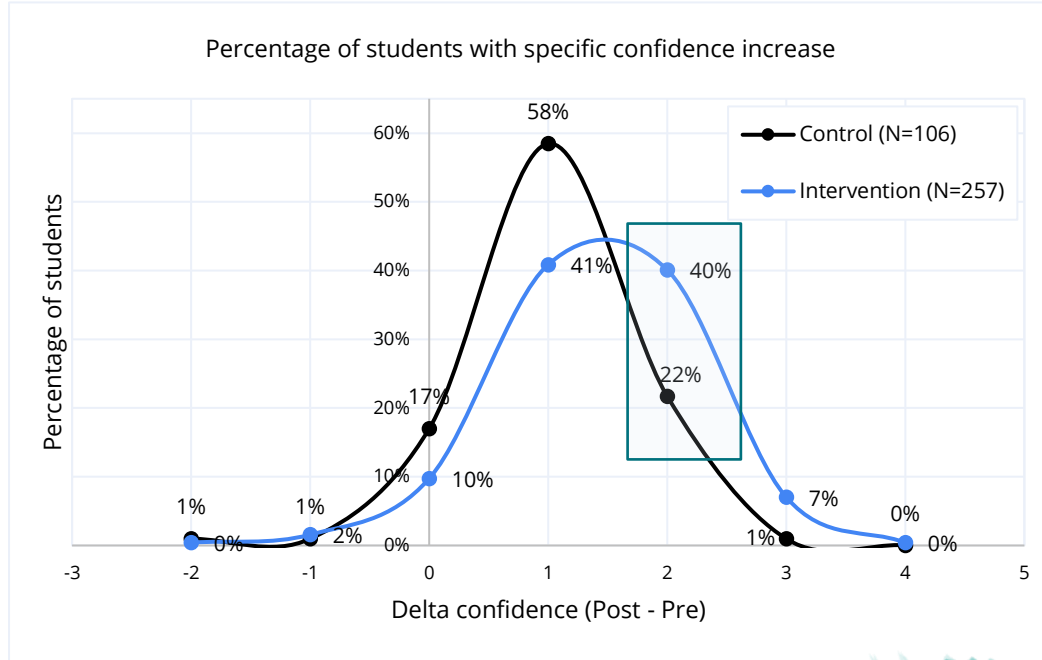
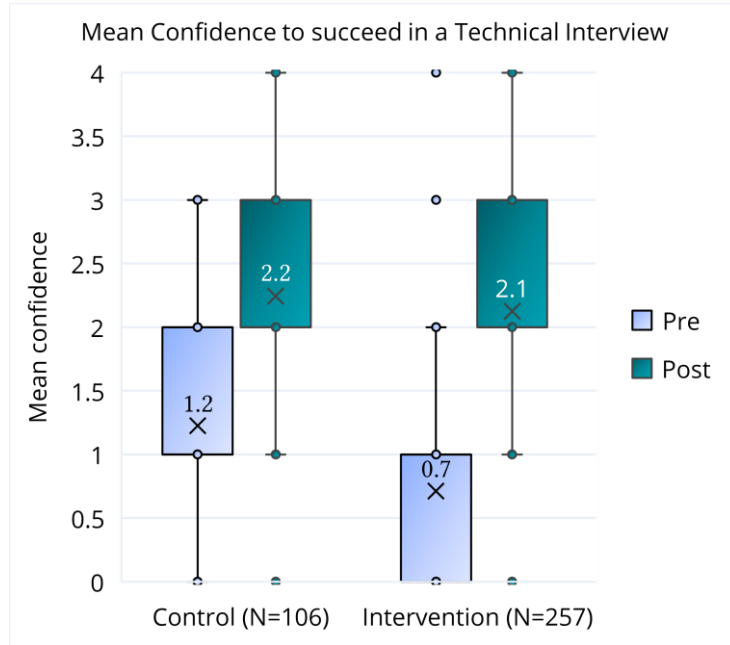


Results



Average normalized confidence gain: Control = 0.36 | Intervention = 0.42

Results



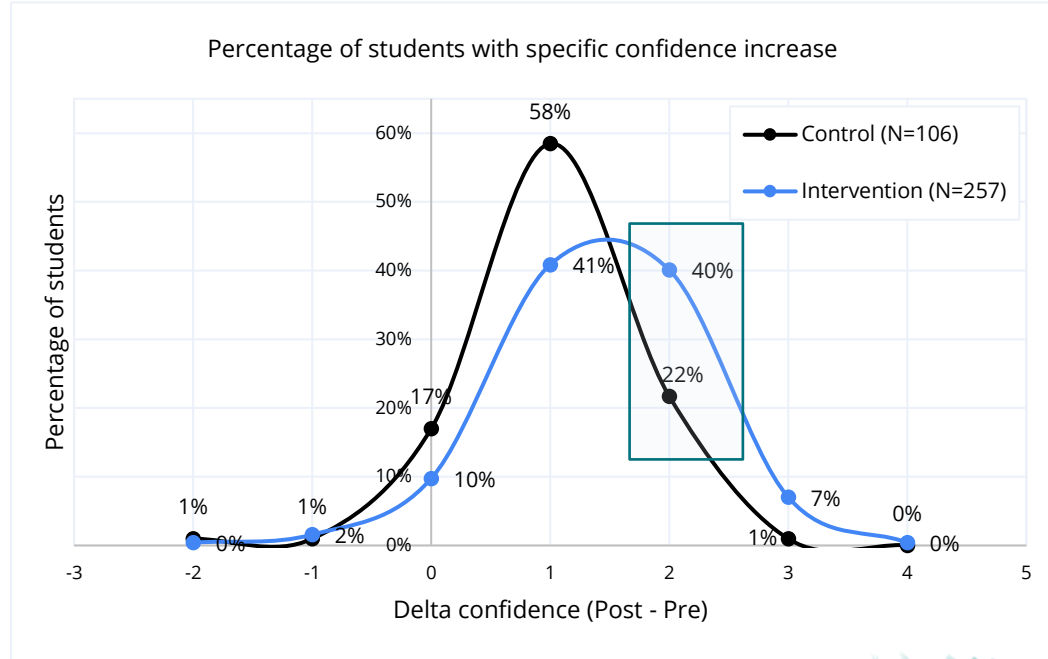
Average normalized confidence gain: Control = 0.36 | Intervention = 0.42

Takeaways

↑ Confidence gain

+ Student reflections

suggest our activities can positively impacting students in preparing for technical interviews



Lessons Learned

1. Pairing facilitation

- Problem
 - Lack of communication and scheduling issues with assigned partner
 - Reported by approximately 15-20% of students in the course
- Solution
 - Assigned a new partner who faced a similar issue

Lessons Learned

1. Pairing facilitation

- Problem
 - Lack of communication and scheduling issues with assigned partner
 - Reported by approximately 15-20% of students in the course
- Solution
 - Assigned a new partner who faced a similar issue
- Reflection
 - Should provide two deadlines for each interview activity
 - Communicate with partner and schedule times for interviews
 - Conduct the interviews and submit deliverables

Lessons Learned

1. Pairing facilitation

- Problem
 - Lack of communication and scheduling issues with assigned partner
 - Reported by approximately 15-20% of students in the course
- Solution
 - Assigned a new partner who faced a similar issue
- Reflection
 - Should provide two deadlines for each interview activity
 - Communicate with partner and schedule times for interviews
 - Conduct the interviews and submit deliverables

2. Alternate assignment

- 4% of students did not participate in activities due to social anxiety, lack of interest in CS jobs, or lack of time
- Given alternate coding problems to replace HTG exercises

Discussion and Conclusion

- Technical Interview Activities:
 - Receive exposure to technical interview setting
 - Reduced interview anxiety
 - Reflect on strengths and weaknesses for improvement
 - Increased confidence levels
- Students liked the environment in which the activities were incorporated as measures were taken to scaffold social anxiety
- Recommend other instructors to implement technical interview preparation activities in their classes, especially in DSA courses with overlapping content

Questions

Contact Emails



kapooramanpreet@ufl.edu



sajanipanchal@ufl.edu



gmccune@ufl.edu

Instructor Resources

