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

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Motivation

Internships

Integral part of employers' recruitment process

🎯💻 Apply classroom knowledge to real-world problems
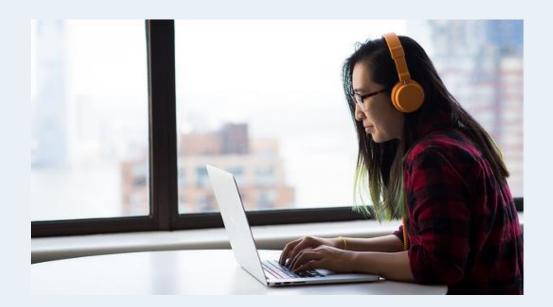🤝🔧 Work with modern technologies collaboratively and gain hands-on experience

46%

Employers consider prior experience when hiring new grads

Source: National Association of Colleges and Employers. 2014. The Class of 2014 Student Survey Report.

Motivation

Who is participating in internships?

- **40%** of CS undergraduate students **intern before graduation (N=536).**

- **59%** of the **graduating** CS undergraduate **students** (Year 4-5-6) **intern.**

Source: Kapoor & Gardner-McCune. Exploring the Participation of CS Undergraduate Students in Industry Internships. SIGCSE 2020

Motivation

Why are students not participating?

CS students fail to participate in an internship due to :

Psychological constraints
E.g. low self-efficacy

Social constraints
e.g. family responsibilities

Financial constraints
e.g. work responsibilities

Recruitment-process constraints
e.g. technical proficiency, involvement in projects & extra-curricular activities

Source: Kapoor & Gardner-McCune. Barriers to Securing Industry Internships in Computing. ACE 2020

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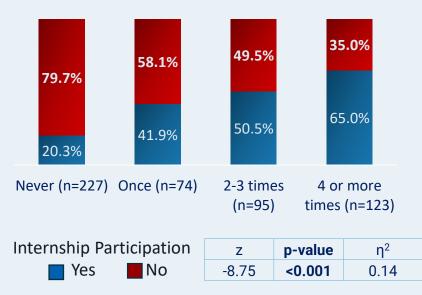
Financial constraints
e.g. work responsibilities

Recruitment-process constraints
e.g. technical proficiency, involvement in projects & extra-curricular activities

Participation in Internship vs Practice Problems for Technical Interview (N=519)

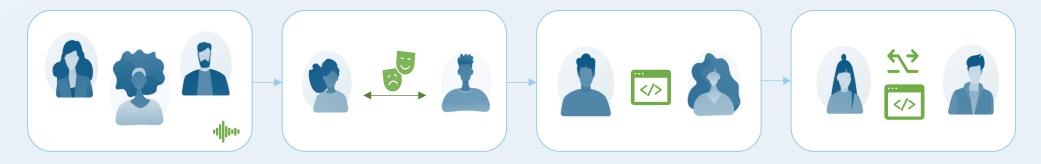| Never (n=227)	Once (n=74)	2-3 times (n=95)	4 or more times (n=123)
No: 79.7%	No: 58.1%	No: 49.5%	No: 35.0%
Yes: 20.3%	Yes: 41.9%	Yes: 50.5%	Yes: 65.0%

Internship Participation		z	p-value	η^2
☐ Yes	☐ No	-8.75	**<0.001**	0.14

Source: Kapoor & Gardner-McCune. Barriers to Securing Industry Internships in Computing. ACE 2020

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Internship Recruitment Process

Apply	Screening	Interview

Apply
- Applying at Career Fairs
- Online for Paid/Unpaid/Co-op Internships in Computing Disciplines

Screening
- Resume by Application Tracking System,
- Referrals, or
- Recruiters or a
- Technical/Aptitude Test

Interview
- 0-4 remote or in-person Technical
  Requires: Coding + Data Structures + System Design
- Behavioral interviews.

Expectations:
- Technical Skills
- Professional Skills
- Working outside the curriculum

Intervention

Intervention: **Hire Thy Gator Technical Interview Exercises** - introduced in a Data Structures and Algorithms course at the University of Florida in Fall 2020

Panel on internship experiences
Week 5

Role play on Interviews by TAs
Week 6

Interview 1: Self-selected pairs
Week 8

Interview 2: Random pairs
Week 13

Source: Kapoor & Gardner-McCune. Implementation and Evaluation of Technical Interview Preparation Activities in a Data Structures and Algorithms Course. SIGCSE 2023

Prior Work: Key Findings

RQa. What do undergraduate computing students gain from participating in mock interview exercises?

Analysis: Inductive content analysis on "How was your experience in Hire Thy Gator Interview Exercises? Should they be a part of future course offerings?" (Kapoor et al., SIGCSE 2023)

92%
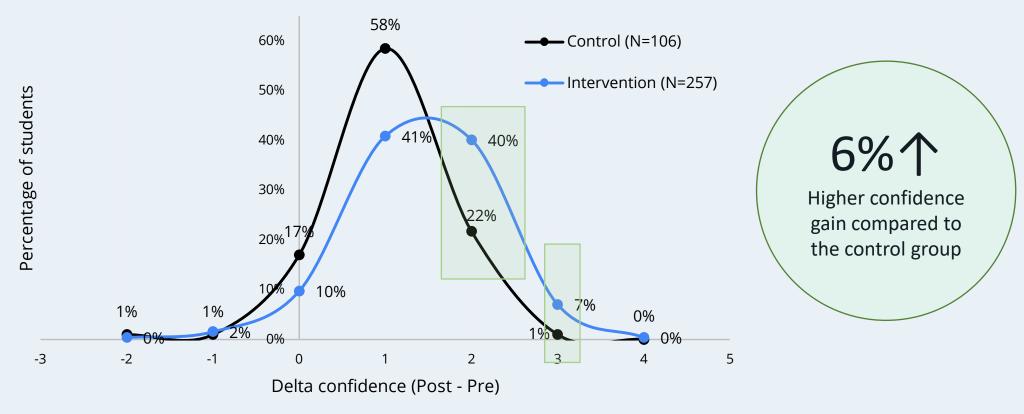
Activity should be continued as-is or with minor modifications

- awareness of the technical interview process

- preparation for future technical interviews

- motivation to apply for internships/jobs

- building students' confidence to succeed in an interview

- self-evaluation of one's strengths and weaknesses

Prior Work: Key Findings

RQb. How does participation in technical interview preparation activities influence students' perceived confidence levels for programming in a technical interview? (Kapoor et al., SIGCSE 2023)

Percentage of students with specific confidence increase

6%↑
Higher confidence gain compared to the control group

Average normalized confidence gain: Control = 0.36 | Intervention = 0.42
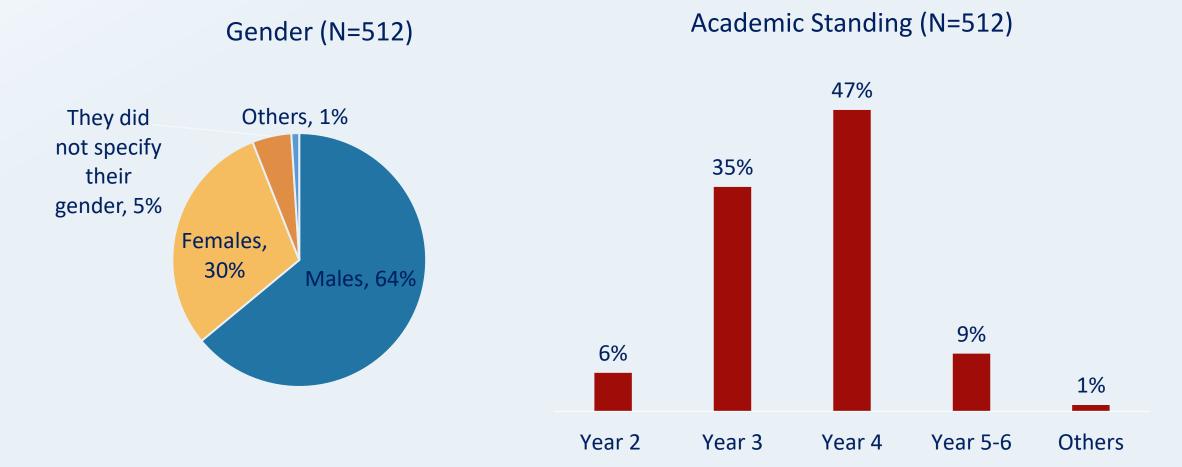
Research Question & Study Design

- **Goal:** Evaluate the effectiveness of Hire Thy Gator exercises (n-semesters later) on:
    - future technical interview preparation
    - securing an actual internship or job

- **Research Question**: How effective are Hire Thy Gator Technical Interview Exercises in preparing computing undergraduate students for securing industry internships?

- **Study Type**: Longitudinal panel survey study in Fall 2024 at the University of Florida
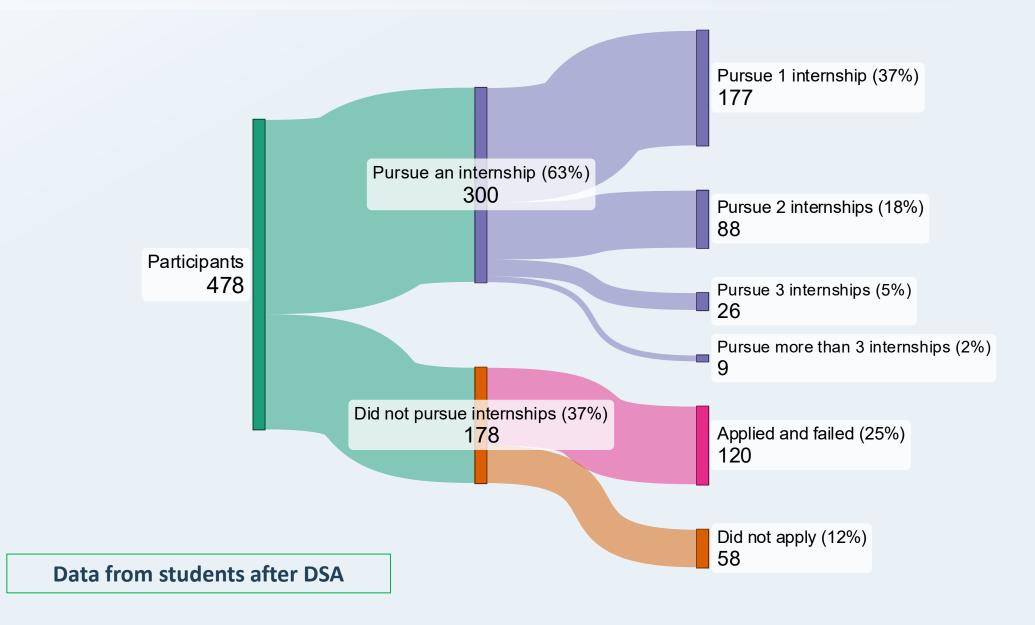
Participants

- **Population**: 3,526 undergraduate computing students in my Data Structures and Algorithms (DSA) course that was offered at the University of Florida from Fall 2020 to Summer 2024.

- **Expected Responses**: 10% of the overall population ~ 352 students (Gabel & Shindledecker, 1990)

- **Sample** : 15% of the overall population ~ **512 students**

- **Participant recruitment**: Courses after Data Structures & Algorithms + offering extra credit for the survey

Participant Demographics (N=512)
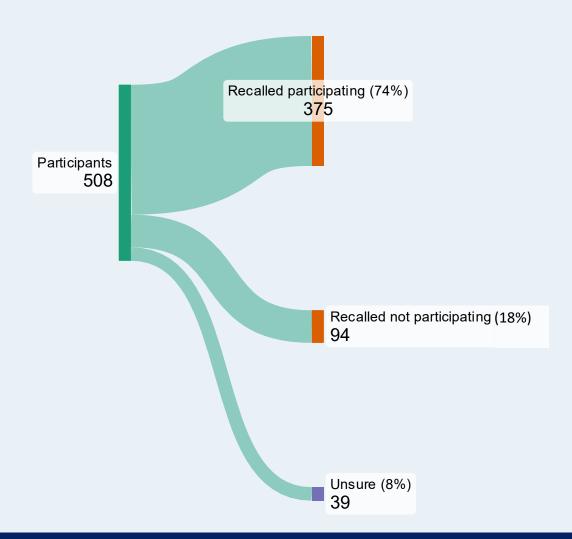
Gender (N=512)

Others, 1%
They did not specify their gender, 5%
Females, 30%
Males, 64%

Academic Standing (N=512)

Year 2	Year 3	Year 4	Year 5-6	Others
6%	35%	47%	9%	1%

Participant Demographics (N=478)

Data from students after DSA

Findings
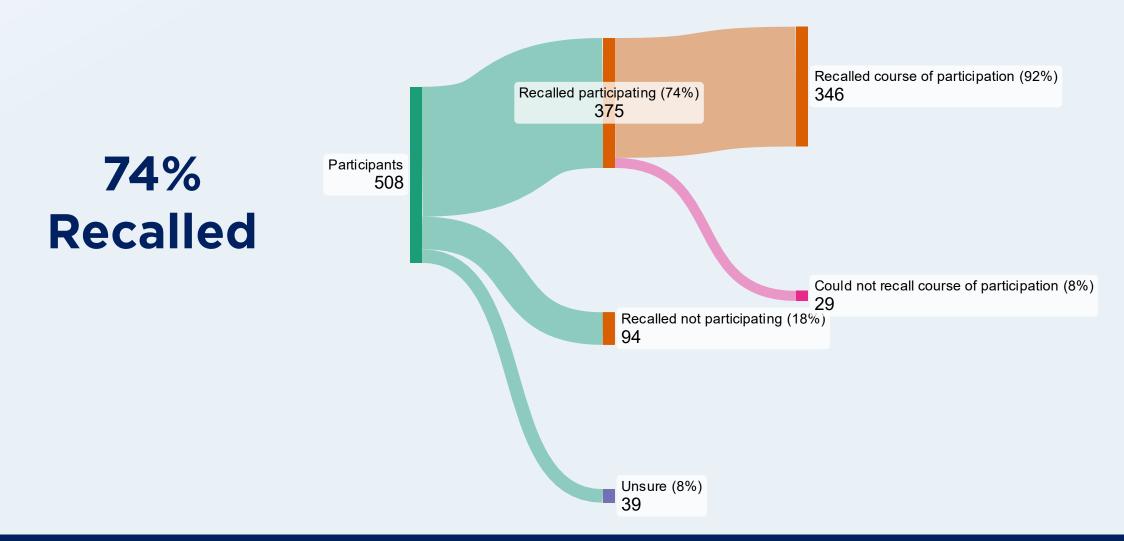
RQ1. **Recall**: *Are students able to recall participating in our activities?*

Participants
508

Findings

RQ1. **Recall**: *Are students able to recall participating in our activities?*

Findings

RQ1. **Recall**: *Are students able to recall participating in our activities?*

74% Recalled

Participants 508

Recalled participating (74%) 375

Recalled course of participation (92%) 346

Could not recall course of participation (8%) 29

Recalled not participating (18%) 94

Unsure (8%) 39

Findings

RQ2. *What are student opinions on the effectiveness of our activities, n-semesters after their participation?*

RQ	Metric	Likert Scale - (5- Strongly agree)				
		5	4	3	2	1
RQ.2	increased my familiarity with the technical interview ■	45%	47%	4%	2%	1%
	allowed me to understand my weaknesses and strengths ■	40%	41%	10%	6%	3%
	increased my self-confidence to succeed in a technical interview ■	23%	38%	23%	11%	5%
	are a useful activity that is beneficial for me to succeed in an interview ■	45%	42%	9%	3%	1%

RQ2. Metric	Likert Scale (0-4): 4 is Strongly Agree		
	Right After (N=256)	N-semesters After (N=363)	Delta (δ)
familiarity ■	3.46	3.33	-0.13
self-evaluation ■	3.34	3.09	-0.25
confidence ■	3.09	2.63	-0.46
usefulness ■	3.42	3.25	-0.17

Findings

RQ3. *Did our activities **motivate and prepare students** for subsequent interview preparation after our course as well as **foster their agency to apply for internships/jobs**?*

RQ	Metric	Likert Scale - (5- Strongly agree)				
		5	4	3	2	1
RQ.3	prepared me to - participate in subsequent mock interviews	26%	38%	28%	5%	3%
	prepared me to - participate in subsequent individual programming	33%	46%	16%	3%	2%
	prepared me to - apply for actual internships or jobs related to computing	26%	38%	26%	6%	3%
	motivated me to - participate in subsequent mock interviews	21%	33%	29%	13%	5%
	motivated me to - participate in subsequent individual programming	38%	40%	13%	7%	2%
	motivated me to - apply for actual internships or jobs related to computing	30%	34%	23%	9%	4%

After the activities,
- **82%** students practiced solving technical interview questions (e.g., Leetcode style) **independently**
- **19%** students practiced solving technical interview questions **collaboratively**
- **18%** students practiced **mock interviews** with a friend, peer, etc.
- **16%** students **did not participate in any subsequent preparation activities** after our intervention

Findings

RQ4. *What **role** did our activities play in helping students **secure an internship or job post their participation**?*

RQ	Metric	Likert Scale - (5- Strongly agree)				
		5	4	3	2	1
RQ.4	helped me in securing an internship/full-time job	6%	27%	49%	9%	9%

Findings

RQ4. *What **role** did our activities play in helping students **secure an internship or job post their participation**?*

Qualitative analysis (N=347): What role did mock interviews play in helping you to secure an internship or a full-time job?
↓ 456 codes
↓ 29 unique codes
↓ 3 themes

Findings

RQ4. *What **role** did our activities play in helping students **secure an internship or job post their participation**?*

📌 **Theme 1: Derived value** (71%, 248 of 347 students)

✅ **Positive impact:** Activities were useful for preparing students for the recruitment process

❌ **No direct attribution:** Students did not explicitly state that the activities helped them secure a job

🔷 **Prominent Codes:**
- o Promoting awareness of the process – 155 students
- o Practicing technical interviews – 42 students
- o Building self-confidence – 33 students
- o Fostering self-evaluation – 21 students

Findings

RQ4. *What **role** did our activities play in helping students **secure an internship or job post their participation**?*

📌 **Theme 1: Derived value** (71%, 248 of 347 students)

I have **not technically secured an internship** as of today, but the HTG **activities provided strong hands-on experience of the process**. It certainly made me **gain** a substantial **amount of confidence** for my future technical interviews.

— S396, Fall 2023

The exercise helped **open my eyes to how much I need to prepare**. It's one thing doing problem on your own and another thing doing them in an interview setting.

— S27, Fall 2023

At the time I hated it, but **looking back it was essential** as that was my first introduction into how interviews for computing jobs work and **what is expected in a technical interview**.

— S182, Fall 2022

confidence   awareness

self-evaluation

awareness

Findings

RQ4. *What **role** did our activities play in helping students **secure an internship or job post their participation***?

📌 **Theme 2: Limited, unclear, or no role** (39%, 139 of 347 students)

❓ **No or unclear impact:** Activities played a limited role or had no role in them securing an internship

🔷 **Prominent Codes:**
- o Not securing an internship– 34 students
- o Applying to non-technical or computing roles without coding interviews – 13 students
- o Not having applied for internships – 8 students
- o Poor experience due to an unprepared interviewer – 5 students

Findings

RQ4. *What **role** did our activities play in helping students **secure an internship or job post their participation**?*

📌 **Theme 2: Limited, unclear, or no role** (39%, 139 of 347 students)

I have **yet to participate in a technical interview** for this hiring season, so I am **unsure**. It was valuable to learn what to expect, however.

– S283, Fall 2023

It didn't but that's because I think **much more preparation is needed** in addition to mock interviews, which I did AFTER the DSA one and then in Enterprise SWE I did the interview after preparing on my own and securing an internship

- S146, Fall 2023

None, I am going to work in the **Networking/ Cybersecurity** Engineering field and **my past interviews did not include coding** as they were not strictly programming roles where I interviewed.

– S284, Fall 2021

Findings

RQ4. *What **role** did our activities play in helping students **secure an internship or job post their participation**?*

📌 **Theme 3: Positive outcome** (2%, 7 of 347 students)

✅ **Direct attribution:** Students explicitly stated that the activities helped them secure an internship or clear an interview

🔷 **Prominent Codes:**
- clear technical interviews (n=2)
- secure an internship (n=5)

Findings

RQ4. *What **role** did our activities play in helping students **secure an internship or job post their participation**?*

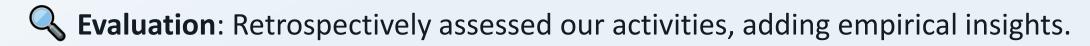📌 **Theme 3: Positive outcome** (2%, 7 of 347 students)

Helped me practice talking out loud while solving coding problem. Get to know my strengths and areas that needed improvement before a technical interview. **Helped me secure a software engineering internship** with JP Morgan Chase

– S166, Fall 2023

HTG helped me prepare for career fair and the Grace Hopper conference in which I had to interview with recruiters, and **ultimately ended up receiving an internship offer**.

– S23, Fall 2023

Discussion & Conclusion

🔍 **Evaluation**: Retrospectively assessed our activities, adding empirical insights.

📈 **Baseline Data:** Provides useful data for researchers and practitioners developing similar initiatives.

💪 🎯 **Efficacy:** Our activities made students **aware** of computing internship recruitment process and boosted their **self-confidence**, and **self-assessment** fostering **agency development.**

forethought

📚 **Supplementary Preparation:** While effective, our activities should be complemented with subsequent practice to secure an internship.

self-reactiveness

self-reflectiveness

(Bandura, 1989)

Questions

Questions?

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