WIP: Technical Interview Preparation Initiative: Promoting Faculty Awareness and Intervention with Computing Majors

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This innovative practice WIP paper describes an initiative that seeks to promote faculty awareness and interventions towards student-based technical interview preparations. In the field of Computing, there is a trend for having a *high* demand of jobs in industry and a *low* supply of candidates to fill them. Literature indicates notable challenges that could pose as influential factors for this job/candidate ratio discrepancy in the field: 1) student retention challenges in computing areas at the collegiate level; 2) fostering stronger K-12 student interests and engagement towards computing fields as a career choice; and 3) representation barriers that exist within marginalized groups in computing. Yet, computing majors' inability to showcase their developed computational skills as prospective candidates to tech employers and hiring managers can persist as another barrier. Candidates are typically expected to demonstrate their computational skills and abilities practically. A candidate's inability to demonstrate such skills and abilities effectively could lead to missed job opportunities and even lucrative career pursuits in tech.

One notable approach used by tech industry companies to examine the skillset compositions of their candidates is through technical interviews. This interview-based examination allows a hiring manager(s) to observe a candidate's ability to solve problems computationally in a think-aloud format, which also enables these professionals to gauge the candidate's verbal and communication skills during this interaction. When cross referencing the practice of technical interview examination in industry with the styles of learning and application fostered in computing classrooms in the academy, there exists a potential contrast between this expectation imposed by tech industry companies and professional preparation protocols fostered at academic institutions. There are computing-focused departments/schools and institutions at large that have identified the need to educate and prepare their computing majors for technical interviews. Yet, there still exists a greater disparity for institutional awareness and effective preparation when observing academia altogether. Such a disparity presents an opportunity to promote the importance and need for effective technical interview preparation strategies and enhanced awareness in the academy on a larger scale.

In partnership with the STARS Computing Corps and KARAT, the authors of this manuscript created a faculty-targeted workshop in such efforts to increase academic awareness to the technical interview process. Faculty from a variety of institutions across the U.S. are participating in this workshop with the sole purpose of: 1) gaining first-hand exposure to the technical interview process, and 2) developing initiatives that can be implemented back at their home institutions to better prepare their students for the technical interview process.

Pre and post surveys have been administered to the participating faculty to gather feedback about their experiences while matriculating through this workshop. Notable outcomes indicate that the participating faculty value this workshop and its intended impact to promote effective technical interview preparation practices. Likewise, these faculty are developing and adopting applicable initiatives to be employed back at their home institutions to better prepare their students for technical interviews. Overall, these faculty feel more equipped with preparing their students to successfully conduct technical interviews.

Keywords—technical interviews, workshop, computing faculty, preparation initiatives

I. Introduction & Motivation

Effective approaches for training computing majors to be proficient computational programmers have been an important research topic for some time. One reason is due to the high demand of jobs in the field of computing and low supply of candidates to fill them. For instance, recent data showed that in 2020 there were 400,000 computer science (CS) graduates looking for jobs in the industry, which had nearly 1.4 million computing jobs available. If this candidate to job opportunity ratio were quantified into a monetary value, then there were $500 billion worth of unfilled positions that occurred that year [1].

This demand and supply discrepancy speaks to a larger issue in the field of Computing. Potential factors that have aided this discrepancy varies. One notable factor is the low retention rates in computing programs [2-4], which has been due to the challenge of engaging and maintaining computing majors as they matriculate through a collegiate computing curriculum to acquire their terminal degrees. A related factor has been the fostering of stronger engagement and interests towards the field of Computing at the K-12 level [5-6]. Initiatives like CS4All [7] have sought to address this

challenge with K-12 students directly with the hope to increase aspirations toward the field of Computing as a career choice. From a representation standpoint, the marginalization of certain groups based on their race, gender, and ethnicity can also pose as another factor that assist in this discrepancy [8-10]. Yet, there exists another factor that may also feed this discrepancy. For computing majors who are: 1) choosing a computing field as a career choice, 2) committed to a collegiate computing program, and 3) matriculating through a curriculum effectively, they are typically faced with the expectation of showcasing their learned skills in practical and professional settings as job candidates, especially if they are pursuing job/career opportunities in the tech industry sector. These students' inability to effectively apply their learned computational skills during professional interactions with employers/hiring managers could result in missed opportunities to secure internships and even a job/career in tech upon graduation. These unsuccessful encounters can in turn pose as another factor that feeds the supply/demand discrepancy that exist in the field of Computing.

Moreover, this anticipated style of professional interactions raises another concern regarding possible disparities that exist between industry and academia on the basis of *industry expectation* vs. *academic preparation* for computing majors. It is possible that how academia determines ideal computational proficiency for preparing computing majors during their matriculation may not reflect how the tech industry measures this aptitude. Therefore, addressing these potentially diverging perspectives around computational proficiency that exist between academia and the tech industry are critical to bridging this gap.

In an effort address such expectations posed by the tech industry, a faculty workshop was created to expose academic entities to practices used by the tech industry when hiring computing majors as professional candidates. This workshop centers around technical interviews, which is a common interview-based examination practice used by companies in the tech industry to gauge the computational proficiency and related professional skills of a candidate. The objective of this workshop is to increase academic awareness that is faculty-focused to this specific interview examination posed by a variety of companies in the tech industry, while also empowering faculty to develop initiatives to assist their computing majors' preparation for such examinations.

II. Literature Review

A. Institutional Interventions

There is a growing effort in the academy to address technical interview preparation for computing and related majors who aspire for careers in the tech industry. Institutions are modifying their computing curriculums, developing extracurricular events outside of the classroom, and even empowering their career centers to provide resources and initiatives to better prepare their computing majors for the technical interview process [11]. Moreover, instructors have begun employing technical interview practices as ad-hoc assessments and interventions in their classrooms [12-13].

B. Related Research around Technical Interviews

Scholarly research surrounding the technical interview process and its impact on computing majors are also expanding. For instance, Behroozi [14-15] and Ford [16], respectively, have conducted systematic studies around the technical interview process as part of their dissertation work due to the novelty of this topic. Lunn et al. [17-19] have studied the impact of technical interview experiences and preparation challenges for computing majors from the aspect cultural experiences while also examining the possibility for more equitable practices by the tech industry.

III. Innovative Practice

A faculty technical interview workshop was created with the intent to: 1) take a given cohort of faculty through a workshop series that informs them about the technical interview process; 2) enlighten them about the potential challenges that students are facing during this process as prospective candidates; 3) expose them firsthand to the technical interview process; and 4) help them adopt or develop initiatives that can be employed to assist their students' preparation for technical interviews. This workshop was developed in partnership with the STARS Computing Corps Alliance and KARAT. The STARS Computing Corps is an NSF-funded broadening participation in computing alliance with the mission to "increase computing persistence and promote career advancement for undergraduates, graduate students, and faculty, with a focus on addressing systemic and social barriers faced by those from underrepresented groups in computing" [20]. KARAT is a professional interviewing company that assist industry-based companies with hiring top talent in the fields of Computing and Engineering [21]. One of the strategies used by KARAT to meet this goal is to work with prospective job candidates as clients to master the technical interview process.

The workshop series was introduced as a pilot during the 2022-23 school year. Twelve computing faculty members from STARS-affiliated institutions were selected to participate in this 8-session workshop series. During Year 2 of this workshop, which was held during the recent 2023-24 school year, ten computing faculty members were recruited to partake in this series. Due to the growing momentum of this workshop, there were faculty members not directly affiliated with the STARS alliance who applied and were selected during this second cohort. Since these faculty resided at different institutions across the United States, each session was held virtually using Zoom as the meeting platform. Each of the 8 sessions took place on a Wednesday evening and lasted at most 2 hours during both years.

A. Faculty Participants' Background

For both cohorts of faculty participants, their computational, gender/ethnicity and academic backgrounds varied. When observing their computational backgrounds, the participants' expertise comprised of: *BioHealth Informatics, Computer Information Technology, Computer Science, Computing & Engineering Education, Engineering & Technology, Health Information Management, Information Studies (iSchool), Information Systems, Information Technology,* and/or *Software Engineering.* From a gender/ethnicity standpoint, Year 1's participants were

comprised of 7 *females* and 5 *males*; 3 identified as *Asian/Asian-American*, 4 identified as *Black/African American*, 3 identified as *White/Caucasian*, 1 identified as *White/Jewish*, and 1 did not provide this information. Year 2's participants were comprised of 6 *females* and 4 *males*; 1 identified as *Asian/Asian-American*, 3 identified as *Black/African American,* 3 identified as *Hispanic/Latinx*, and 3 identified as *White/Caucasian*.

B. Workshop Infrastructure

The infrastructure for this 8-session workshop series is two-fold. The first four sessions are designed to expose the faculty participants to the technical interview process firsthand. During this period of the workshop, the faculty undergo a series of mock technical interviews with KARAT representatives who serve as mock hiring managers, and another series of mock technical interview sessions amongst themselves in assigned groups. The objective is to provide the faculty simulated experiences of what their students encounter during a professional technical interview. The remaining four sessions of this workshop series are designed to assist the faculty in developing and/or adopting initiatives that can be employed back at their home institutions to assist their students' preparation with technical interviews. At the beginning of this workshop series, a pre survey is administered to capture the faculty's perceived expectations for this workshop. Likewise, a post survey is administered during the 8th and final session to capture the faculty's overall experience, planned initiatives, and discerned impacts of this workshop. The next section details notable findings and outcomes that were captured during both the pre and post surveys for Years 1 and 2 of this workshop. Just to note: pre and post focus group assessments were administered during Year 2 of this workshop. Outcomes from these focus group assessments have recently been accepted for publication into the *American Society for Engineering Education* [22].

IV. Current Findings & Outcomes

A. Pre-Survey

The objective of the pre survey was to capture foundational information about: 1) prior/personal experiences with technical interviews, 2) prior/current applications of technical interview practices employed in their computing courses, 3) level of preparedness to assist their students' preparation for the technical interview process, and 4) confidence-based questions for fulfilling the expectations for this workshop.

1) Personal Experiences with Technical Interviews: Table I provides descriptive details about whether the participating faculty had personal experiences with technical interviews prior to their participation in this workshop. It was found amongst both cohorts that majority of the faculty had personal experiences with technical interviews prior to participating in this workshop series. For many of these faculty, these experiences occurred while they pursued careers in the tech industry prior to their current academic appointments.

2) Applying Technical Interviews in Computing Course: Table II provides descriptive details about the faculty's prior efforts for applying technical interview practices in their computing courses. It was found that majority of the faculty cohort in Year 1 did apply aspects of the technical interview process in their computing courses in some capacity. This was not found to be true for Year 2's faculty cohort. Rather, majority of the faculty during Year 2 did not apply such practices in their computing courses.

TABLE I. Technical Interviews – Personal Experiences

Personal Experiences with Technical Interviews		
Workshop Series	***Year 1 (N=12)***	***Year 2 (N=9*)***
Faculty Response	Yes: 67% No: 33%	Yes: 67% No: 33%
**one participant did not complete Pre-Survey*		

TABLE II. Technical Interviews– Course Applications

Application of Technical Interviews in Computing Courses		
Workshop Series	***Year 1 (N=12)***	***Year 2 (N=9*)***
Faculty Response	Yes: 67% No: 33% NR: 25%	Yes: 33% No: 56% NR: 11%
**one participant did not complete Pre Survey; NR = No Response*		

3) Level of Preparedness to Assist Students' Preparation: Table III provides descriptive details about the faculty perceived level of preparedness to assist their students with preparing for the technical interview process. This response was based on a 5-point Likert scale (*where 1 = not prepared at all, 5 = absolutely prepared)*. It was found that both cohorts of faculty exhibited a mean of ~3 out of 5 as their response regarding their level of preparedness to help in their students' preparation for technical interviews.

TABLE III. Level Of Preparedness To Help Students Prepare

Level of Preparedness to Help Student Preparation (with Technical Interviews)		
Workshop Series	***Year 1 (N=12)***	***Year 2 (N=9*)***
Faculty Response	Mean: 3.17 SD: 0.83	Mean: 3.00 SD: 1.12
**one participant did not complete Pre Survey; SD = standard deviation*		

4) Confidence Towards Workshop Expectations: This was captured through a series of three questions that were based on a 5-point Likert scale (*where 1 = not confident at all, 5 = absolutely confident)*:

- ***Question #1:*** *I am confident that I can meet the expectations for workshop participants.*
- ***Question #2:*** *I am anxious about meeting the expectations for workshop participants.*
- ***Question #3:*** *I am prepared to help my students obtain a job in their chosen field of study after they graduate.*

Table IV provides descriptive details about the level of confidence that both faculty cohorts exhibited as it pertained to the posed expectations of this workshop. It was found that both cohorts of faculty exhibited a mean of ~3 out of 5 as their response regarding the level of confidence to meet the expectations of this workshop.

TABLE IV. CONFIDENCE TOWARDS WORKSHOP EXPECTATIONS

Confidence for Meeting the Expectations of the Workshop Series		
Workshop Series	***Year 1 (N=12)***	***Year 2 (N=9*)***
Faculty Response	Mean: 3.61 SD: 1.05	Mean: 3.70 SD: 1.23
**one participant did not complete Pre Survey*		

B. Post-Survey

The objective of the post survey was to capture outcome-based information surrounding: 1) planned technical interview prep initiatives to bring back to home institution, 2) preparedness to assist their students' professional preparation, 3) overall impacts of this workshop, and 4) learned skills and experiences gained from this workshop to adopt back at home institution. Just to note: the response rates for this survey were lower than the pre-survey. The common reason for this reduction is due to some participants withdrawing from the workshop due to other academic obligations and unforeseen schedule/semester-based conflicts.

1) Planned Initiatives around Technical Interview Practices: The faculty's response to this question was captured in an open-ended format. Document analysis [23] was used to generate emerging themes from the faculty's responses. Table V provides descriptive details about these emerging themes.

TABLE V. PLANNED INITIATIVES AT HOME INSTITUTION

Planned Technical Interview Prep Initiatives
Emerging Themes (N=9; Year 1 and Year 2 participants combined)
- Hold Mock Technical Interview Sessions (In-Course) - Hold Mock Technical Interview Sessions (Extracurricular Events) - Create a Technical Interview Prep Workshop Series - Implement Technical Interview Assignments/Projects (In-Course) - Foster In-Course Interactive Learning & Real World Computational Problems - Making In-Course Computational Learning More Equitable

2) Preparedness to Assist Students after Workshop: This was captured through a series of two questions that were based on a 5-point Likert scale:

- ***Question #1:*** *I am prepared to teach/train my students to successfully complete a technical interview.*
- ***Question #2:*** *I am prepared to help my students obtain highly competitive jobs after they graduate.*

This response was based on a 5-point Likert scale (*where 1 = strongly disagree, 5 = strongly agree*). It was found that both cohorts of faculty exhibited a mean of ~4 out of 5 as their response regarding their level of preparedness to help in their students' professional preparation at the conclusion of the workshop series. Table VI provides descriptive details about both faculty cohorts level of preparedness to assist their students post the workshop series.

TABLE VI. PREPAREDNESS TO ASSIST STUDENTS'

Preparedness to Assist Students' Technical Interview Preparation		
Workshop Series	***Year 1 (N=4)***	***Year 2 (N=5)***
Faculty Response	Mean: 4.13 SD: 0.64	Mean: 4.40 SD: 0.52

3) Impact of Workshop Series: The faculty's response to this question was captured using both a 5-point Likert scale (*where 1 = strongly disagree, 5 = strongly agree*) and an open-ended response. Document analysis was used to generate emerging themes from the faculty's open-ended responses. It was found that both cohorts of faculty exhibited a mean range of ~4 to 5 out of 5 as their response regarding the impact of this workshop. Likewise, there were three emerging themes that were derived from the faculty's open-ended responses. Table VII provides descriptive details about how the faculty view the workshop's impact.

TABLE VII. IMPACT OF WORKSHOP

Workshop Impact		
Workshop Series	***Year 1 (N=4)***	***Year 2 (N=5)***
Faculty Response	Mean: 4.75 SD: 0.50	Mean: 5.00 SD: 0.00
Document Analysis – Emerging Themes - Technical Interview Experience (Firsthand) - Learning from Industry Experts (via KARAT) and Workshop Moderators - Building Expectations to Effectively Train & Prepare Our Students for the Technical Interview Process		

4) Learned Skills & Experiences from Workshop Series: The faculty's response to this question was captured in an open-ended format. Document analysis was used to generate emerging themes from the faculty's responses. There were six emerging themes that were derived from the faculty's open-ended responses to this question. Table VIII provides descriptive details about these emerging themes.

TABLE VIII. LEARNED SKILLS & EXPERIENCES

Learned Skills & Experiences from Workshop Series
Emerging Themes (N=9; Year 1 and Year 2 participants combined)
- The Structural Dynamics of a Coding Technical Interview - Diffferent Types of Technical Interviews - Developing Student-Based Peer Technical Interview Assignments - Effective Technical Interview Preparation Strategies - Employing Periodical Student-Based Technical Interview Sessions - Employing Technical Interview Practices in the Classroom

V. CONCLUSION

The main objective of this initiative is to increase academic awareness around technical interview expectations posed towards computing majors with the broader impact of addressing the differential constructs that exist between academic preparation and industry expectations. Current findings and outcomes from this workshop reveal promising impacts that can enrich faculty and academic institutions at large with such awareness and knowledge, while equipping them with interventive strategies and initiatives to assist their computing majors' technical interview preparation. Discussions are underway to continue refining this workshop and make it more impactful and convenient for future faculty to pursue.

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