

Introducing a Technical Interview Preparation Activity in a Data Structures and Algorithms Course

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ABSTRACT

Technical interviews have predominantly been used by companies to recruit students for software-related and other computing jobs. Since the content of the interviews has an overlap with Data Structures and Algorithms (DSA), we introduced a mock interview activity to promote students' awareness of the technical interview process and build students' confidence in problem-solving in a DSA course. In this short paper, we (1) describe the logistics for embedding such an intervention, and (2) explain the affordances and opportunities for improvement of the activity through student perspectives. Students were explained the technical interview process and asked to interview each other twice during the semester on coding problems. Students received the intervention positively describing that the activity helped them to understand the technical interview process, prepared them for future interviews, built their confidence to secure a job, and supported them in knowing their strengths and weaknesses. Opportunities for improving the activity include providing interview questions explicitly, offering an alternate activity for students who are not interested in computing careers, and reducing the length requirement for interviews. Given students' positive reception of the intervention, we recommend that instructors adopt these mock interview exercises in computing courses to improve students' access to professional development opportunities.

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1 INTRODUCTION

Technical interviews are used as a primary recruitment tool for hiring software engineers in the tech industry. Well-known tech companies such as Microsoft, Apple, Google, and Facebook have been using technical interviews to hire software engineers [1]. In these interviews, candidates are expected to write code

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either on a text editor or a whiteboard and interviewers' try to assess a candidate's problem-solving ability and interpersonal skills [4]. While hiring managers have reported that the current technical interview format allows them to create a standardized and meritocratic process [1], candidates and developers have criticized the interview process for inducing unnecessary anxiety and frustration [1, 2]. Given that the current interview process has become standardized across tech companies [4] and the evidence that supports that these interviews are anxiety-inducing and stressful for applicants [1, 2], we introduced a mock interview activity in our DSA course for building students' confidence in technical interview challenges. In this activity, students researched a problem and interviewed each other twice during the semester. This paper discusses the logistics and students' perception of embedding our activity in coursework.

2 STUDY CONTEXT

Our intervention of mock interviews was introduced in a DSA course in a large public R1 university in the south-east USA in Fall 2020. At the research site, participation in internship(s) before graduation is not mandatory. The DSA course is required for CS/Computer Engineering (CE) majors and CS minors. It follows the CS1, CS2, and Discrete Mathematics courses. Our course covers conceptual definitions, implementation, and problem-solving using different DSA related topics such as lists, trees, heaps, graphs, sorting, greedy algorithms, etc. The students use a build and practice programming system called Stepik to implement DSA and solve problems using DSA in C++. The course is worth 4 credits and students attend three lectures led by the Instructor and one discussion every week led by a Teaching Assistant (TA).

In Fall 2020, the course lasted 15 weeks and followed a hybrid format due to Covid-19. The first author taught the course which had an enrollment of 345 undergraduate students. Of the 345 students, 279 gave consent (Response rate: 80.9%) to use their data from the mock interviews for research, in an end of the term larger study survey for which they received 1% extra credit for participation. Of the 279 students who consented, 72.4% were males, 26.2% females, and 1.4% other genders. Most students were CS majors (66%), followed by CE majors (18%), CS minors (10%), and other majors (6%). A majority of students were in sophomore (Year 2: 62%) and junior (Year 3: 26%) year of their academic program.

3 LOGISTICS

The mock interview activity was designed after taking input from the students in Week 2 of the Fall 2020 course regarding

their familiarity with the technical interview process. 59% of the 279 students were not familiar with technical interviews and over 90% never participated in them. Given that a significant majority of our students were not aware of the technical interview process, we hosted a panel in Week 5 of the course. The panel consisted of four undergraduate TAs and was moderated by the Instructor. All TAs had worked as an intern before in top tech companies including Google and Microsoft. The panel revolved around the technical interview process, their experiences of preparation for interviews, and the strategies they used for successfully securing an internship. This panel was conducted outside of course hours and lasted 45 minutes. Also, the Instructor spent another 45 minutes preparing for the panel.

Next, in Week 6 of the course, the undergraduate and graduate TAs role played acting as an interviewer and an interviewee in the discussion sessions to show what students should expect in a technical interview. The TAs spent 3 hours preparing for the role-play exercise and the actual discussion lasted another 50 minutes. After the role-play, students were asked to work in pairs for the mock interview exercises first in the middle of the semester (Week 8) and second in the second-last week of the course (Week 14). They were asked to work with self-selected peers in the first interview and if they could not find a partner, the matching was facilitated by the Instructor. In the second interview (Week 14), we randomly paired them with another student. This was done so that we could scaffold the social interaction and reduce the interview anxiety. In both sets, students were given a few representative interview questions but were encouraged to research their own question on the web. For the first set of interviews, the interviewers were supposed to pick a question on Trees or Heaps and for the second on Graphs or Sets/Maps/Hash Tables which was aligned based on the topics covered during respective times.

Students were asked to submit the link to the recorded video interview, a Google doc link used for solving the problem, and a 15–20-minute survey after each interview. We also asked the interviewers to use the first 40–45 minutes of the interview for a technical interview challenge followed by a 15–20-minute session on giving actionable feedback to the interviewee. The activities were graded based on participation and carried 8% of the points of final grade (4% for acting as an interviewee and 4% for being an interviewer). Students' self-reported time for preparation and participation in the interview was 2 hours for acting as an interviewer and 1 hour 55 minutes for acting as an interviewee.

4 STUDENT EXPERIENCES

We asked the students in a survey at the end of the course, “How was your experience in the interview exercises? Should they be a part of future course offerings?”. 258 students answered this open-ended question, and we categorized their responses through an inductive thematic analysis [3] based on the affordances and opportunities for inefficiencies. 91.9% of the 258 students (n=237) received the exercises positively and described that the exercises should be continued in the future offering of our course as-is or with minor modifications.

4.1 Affordances

Students who received the intervention positively described that the mock interviews impacted them in different ways. The prominent affordances of the activity from students' viewpoint included: (1) awareness of the technical interview process, (2) preparation for future technical interviews, (3) motivation to apply for internships/jobs, (4) opportunity for applying the coursework more practically, (5) building students' confidence to succeed in an interview, (6) reducing anxiety/fear of interviews, (7) providing a low stakes environment, (8) scaffolded interview practice, and (9) self-evaluation of one's strengths and weaknesses. One student's quote that belonged to the (1) and (3) affordance categories was: “*The [interview] exercises taught me a lot about what to expect in a technical interview. Usually, I use my portfolio to get [me] small jobs freelance, but a full-scale interview got me very excited to someday do an internship*”.

4.2 Opportunities

The students who stated that these exercises should be discontinued or those who mentioned improvements in future offerings of the mock interview exercises highlighted the inefficiencies of the exercise. A majority of students who didn't like the exercises mentioned they were not CS majors or were not interested in computing jobs. For instance, a student stated, “*I didn't prepare for them seriously because as an accounting major, I will not undergo technical interviews to get a job. I think they are very valuable for computer science majors*”. Some students also mentioned that the exercises were stressful for them and demanded too much time. Other suggestions for improvement were primarily logistical. Students recommended to provide them an interview question list from which they can pick a question, allow using text editors instead of a Google doc, offer the exercises as a part of extra credit opportunities rather than the course grade, reduce the interview time length requirement, add a segment on behavioral questions apart from the technical ones, and match the partners based on skill levels.

5 CONCLUSION

In conclusion, the technical mock interviews were well received by the students and required minimal time by the course staff for managing logistics. Since the activities can help the students in exposing them to technical interviews and build students' confidence to succeed in future interviews, we recommend educators introduce these exercises, especially in DSA courses as they overlap with the DSA course content.

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