Team BDL
125 Spence St
College Station, TX 77843

April 21, 2023

Dakshika Srivastava
President of Aggie Coding Club
400 Bizzell St
College Station, TX 77843

Dear ACC President Srivastava:

As previously agreed on, our team has been conducting research to determine ways to improve the quality of the Aggie Coding Club's meetings and workshops. This research has been conducted through a variety of methods including surveys, interviews, and analyses of online sources. The following report, *Aggie Coding Club Recommendation Report*, is the culmination of our research and findings.

Throughout our research, we had several goals in mind, including, determining the current state of the Aggie Coding Club, acknowledging the current requirements of the tech industry, and understanding useful technical and soft skills that may be needed in a coding-related job. In order to achieve these goals, our data collection for this report involved several methods of research that ranged from conducting a survey among the members of the Aggie Coding Club, conducting an interview with a senior software engineer, as well as analyzing several online sources.

From our data, we have come to the conclusion that the Aggie Coding Club should not only host more meetings and workshops, but have them focus on skills that can be applied to the industry. This is due to the fact that current members tend to join to gain skills to put on their resume.

We recommend hosting more workshops that focus primarily on mock coding interviews and teaching members how to dissect a coding problem as well as what to expect going into a coding interview. We also recommend hosting more socials that allow members to build their communication and teamwork skills. In doing so, members of the Aggie Coding Club would be able to build up technical and soft skills that will better prepare them for the industry that they plan to go into.

Thank you for giving us the opportunity to conduct this research; and as a team, we hope that our findings will be beneficial to your organization. If you have any further questions or concerns, please contact our team manager, Dennis Dang, using the email, ddang04@tamu.edu.

Sincerely,

Team BDL

Blake Davis, Dennis Dang, Luke Schumann
Team BDL

Aggie Coding Club Recommendation Report

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Team BDL

April 21, 2023

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Executive Summary

The Aggie Coding Club is an organization at Texas A&M that offers students the opportunity to explore and learn more about the tech industry, get hands-on experience through group projects, and connect with other students with similar passions. Through surveys, interviews, and analyzing online sources, our team has conducted research in order to find ways to improve the quality of the Aggie Coding Club's meetings and workshops.

From the survey that we conducted among Aggie Coding Club members, we found that members tend to join to obtain knowledge and skills that can be applied to the career that they plan to pursue. From the interview that we held with a senior software engineer at Microsoft, it was revealed that communication skills and the ability to work with others is a very valuable skill in the field. Furthermore, our analysis of online sources also allowed us to find different topics, ranging from artificial intelligence to data science, that can be taught during meetings to inform members of the current and future state of the tech industry. Therefore, we suggest that the Aggie Coding Club host more workshops and socials that focus on building technical skills such as solving coding problems and building soft skills such as team coordination and communication. We also recommend having some meeting topics based around emerging technologies to keep members informed of the current industry. This would allow for members to gain relevant skills and knowledge that can be applied to their future careers, increasing the overall quality of the Aggie Coding Club's meetings and workshops.

Introduction

The Aggie Coding Club is a student-led organization here at A&M that offers its members several opportunities to explore and learn about the tech industry and the coding field in general through presentations and company talks that are often held during each meeting. The club also provides the chance for members to get hands-on experience with coding through team projects and officer-led workshops.

Due to how often the tech industry is evolving, some of the topics taught during the workshops and presentations may not be as relevant as other topics. Therefore, members may be given information that is out of date and not applicable to the current industry. The goal of our research was to determine the current trends in the industry and to identify vital technical skills and soft skills that may be necessary for someone pursuing a career in tech. We then planned to use the results gathered from said research to make a recommendation report that would help improve the quality of the Aggie Coding Club's meetings and workshops so that they are able to better prepare members for the current tech industry requirements.

In order to achieve this goal, our team examined previous Aggie Coding Club meetings and workshops, conducted a survey among club members, carried out an interview with someone currently in the field, and analyzed several online sources. From our research, we have determined that members of the Aggie Coding Club tend to join the organization in order to obtain knowledge and skills that they can put on their resume and use in their future careers. Furthermore, other members also use the organization as a way to network with others and find people with similar passions. Therefore, we recommend hosting more workshops that focus primarily on teaching members how to dissect a coding problem as well as what to expect going into a coding interview to better prepare members for future job interviews. We also recommend hosting more socials that allow members to build their communication and teamwork skills as well as a way to network with others. In doing so, members of the Aggie Coding Club would be able to build up technical skills, soft skills, and connections that will better prepare them for the industry that they plan to enter.

The following sections of this report will describe, in further detail, the methods used throughout our research, the results of said research, a conclusion of the results, and finally, courses of action, based on our data, that can be taken in order to improve the quality of the Aggie Coding Club's meetings.

Methods

The following are the variety of methods of research that we used in order to obtain the data for this report.

Task 1: Analyzed meeting and workshop topics from previous Aggie Coding Club meetings.

In order to gain a better understanding of the current state of the Aggie Coding Club's meetings and workshops, we, as a team, decided to look through the organization's Discord in order to see what topics were being discussed in previous meetings and workshops. From the data collected, we created a list of the topics currently being discussed and used them as a starting point for our additional research and as a way to ensure that our newly suggested topics would not overlap with the current ones.

Task 2: Determined the attitude of current Aggie Coding Club members.

For the second task of our research, we wanted to gauge the current attitude of the members of the Aggie Coding Club. Specifically, we wanted to gather their thoughts on how they thought the meetings and workshops were being run and if the topics being discussed were helping them in any way. In order to achieve this, we created an online survey using Google Forms and distributed it to the members in the organization's Discord server and requested that they complete it. Furthermore, to not violate any ethics, we ensured responders that all responses were anonymous and that the data would be used only in our report. By analyzing the data, we were able to understand which topics or skills were wanted and which ones were not as wanted by members of the club.

Task 3: Identified common topics that are discussed and tested during coding interviews.

For our third task, our group analyzed several online sources to pinpoint important information about coding interviews. We conducted this portion of the research to gain a better understanding of what some good topics to use in the coding workshops in the Aggie Coding Club. We researched topics including questions and problems most asked during a coding interview, and the top coding languages used during interviews. We then configured data graphs to better present the data. One of the sources we used was one of the top coding questions asked in an interview are (Sufiyan). Another source we used was about the top problems asked in a coding interview (*AlgoMonster)*.

Task 4: Discovered the necessary technical skills that are needed for a software engineering job in today's current job market.

To gain an understanding of the current industry's requirements and what skills could be valuable to someone in the tech industry, we decided to conduct an interview with a senior software engineer at Microsoft. In terms of ethical considerations, we made sure that the interviewee filled out a consent form and ensured them that their responses would only be used for our research and this report. We then used the data to shape what topics and skills we would recommend to ensure that they would be relevant and useful for the club's members.

Task 5: Identified useful soft skills for someone pursuing a software engineering career.

For this task, we wanted to gain an understanding of the types of soft skills that industry professionals use in the programming and development industry. In order to accurately collect the proper data, we researched through multiple sources to find the most common and specific soft skills that were recommended and encouraged throughout the programming/developing industry. We looked at three different sources, and while they all mentioned similar skills, each one had a focus. The first focused more on communication (Brewster), the second one on marketability (Rutert), and the third on goal-setting (Petrova). After collecting the data for the specific types of soft skills, we looked for any overlap and formed a general consensus of the soft skills that should be prioritized.

Task 6: Explored coding technologies that are projected to be used in the future.

For our last task, we wanted to research emerging technologies that would become widespread in the future. The goal was to find topics that could be discussed during the club's meetings so that members would be informed and well-prepared for the industry that they are planning to enter. To achieve this, we analyzed a variety of sources ranging from articles discussing the trends in the industry (Raymond) and describing the emerging areas in computer science (Simmons) to research reports of what technologies are already being explored in today's society (Huang). We were then able to use the data to create a list of relevant topics that could be used in future Aggie Coding Club meetings.

Results

As our group finished up our research and tasks, we looked back on some of the findings that we have made through each task we worked through. We will discuss the results from those tasks in this section.

Task 1: Analyzed meeting and workshop topics from previous Aggie Coding Club meetings.

From our analysis of the organization's Discord, we saw that the meetings were mainly used for company talks with companies like Google, Microsoft, and Paycom as well as for individuals who have experience in the tech industry. Furthermore, some topics that were being discussed during the workshops included Discord bots, PyGame, JavaScript libraries, and APIs. Overall, meetings were focused on providing information about the industry and workshops were focused on technical skills and exploring the possibilities achievable through coding.

Task 2: Determined the attitude of current Aggie Coding Club members.

From the results of our survey, members of the club seemed mostly satisfied with how it was being run.

Figure 1. Member satisfaction ratings for current club meetings and workshops

However, there were also several suggestions that were made to help improve the overall quality of the club. Many responses stated that they would like to see some more specific applications of the things that they were being discussed as well as more advanced coding topics. For example, two respondents stated that they would like for more data science topics to be included in the

workshops. Furthermore, some members also expressed the desire for more socials to connect with other members and make new friends.

Task 3: Identified common topics that are discussed and tested during coding interviews.

During our research for this task, we realized that coding interviews were a very important topic that was not being discussed enough in the current meetings and workshops. Therefore, we began our research on topics that could be taught during workshops to better prepare members for their interviews. From the data that we collected, the top three coding problem topics were depth first search (DFS), basic programming, and pointers.

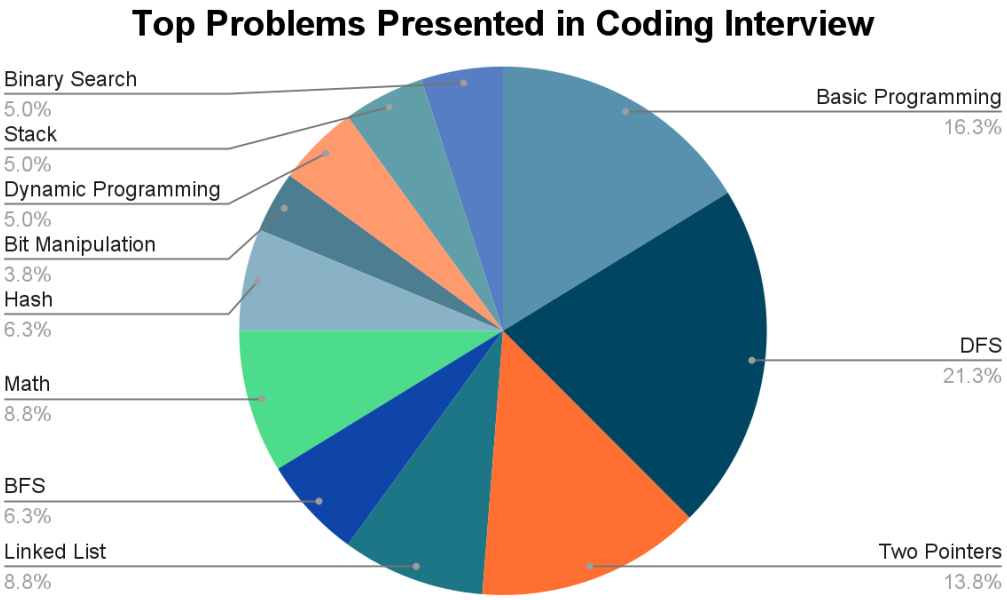

Figure 2. Types of problems presented in coding interviews

Besides finding the types of problems that are usually presented during a coding interview, we also looked into the top coding languages that are allowed to be used during these interviews in hopes of finding which language should be prioritized during the Aggie Coding Club's workshops. From our research, Java was allowed in 100% of interviews, Python was allowed in 88% of interviews, and C was allowed in 71% of interviews, with several other languages being 50% or below.

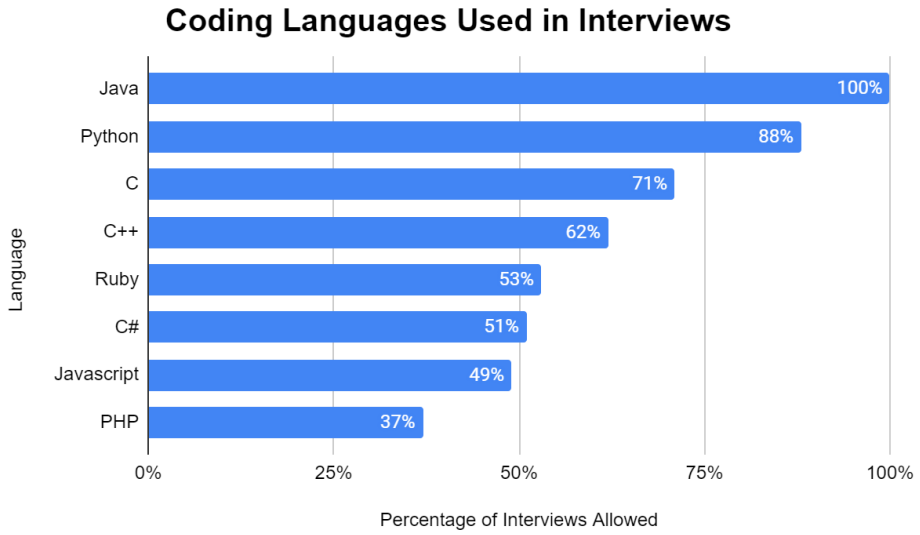

Figure 3. Different coding languages and the percentage of interviews that allow them

Overall, our research allowed us to gain an understanding of not only the importance of preparing for coding interviews but also what to specifically prepare for and with.

Task 4: Discovered the necessary technical skills that are needed for a software engineering job in today's current job market.

This task was another source of information that was vital to our recommendation report. For this task we conducted an interview with a senior software engineer at Microsoft. From the interview, we were able to gain new insight to specific skills that were valuable and relevant for a software engineering position. When asked what daily tasks were usually completed during a work week, the interviewee answered with, "The job usually contains a mix of coding, designing, workstream synchronization meetings, technical discussions, code reviews, analysis of customer feedback, and technical support for customer issues.". When asked about what skills interns should have, the interviewee answered with a lot of soft skills like communication, teamwork, and presentation. Furthermore, the interviewee gave the advice that those who are entering the tech industry should "focus on building team working skills, networking, and especially develop a continuous learning mindset and habit.". Overall, the interview allowed us to gain insight on the daily life of a software engineer as well as gather data on what relevant technical and soft skills Aggie Coding Club members should be taught.

Task 5: Identified useful soft skills for someone pursuing a software engineering career.

Based on the data collected, being able to market oneself seems to be the most important soft skill to have in the industry, with communication and goal setting not too far behind. According to Rutert, the better you are at marketing yourself, the easier time you will have in industry.

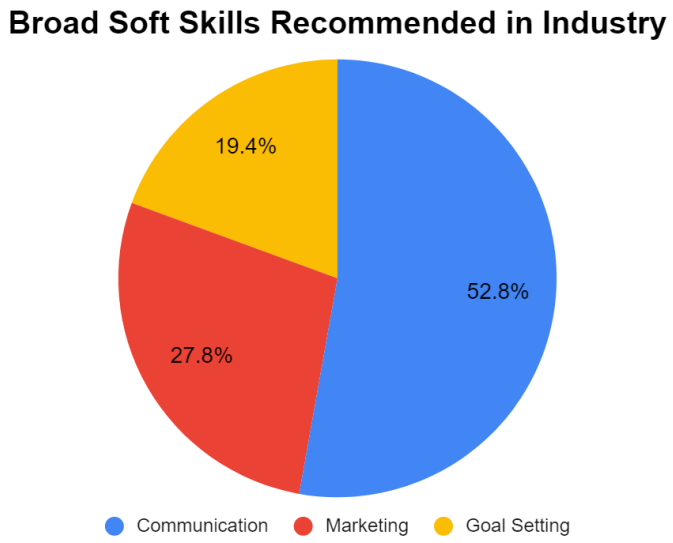

Figure 4. Distribution of broad soft skill sets that are predominantly recommended in the industry

However, there are also a number of more detailed soft skills found below that are not exclusive to the broad groups above. For example, empathy is labeled as being an important soft skill to have. This is because being able to empathize with your recruiter and your clients is a way to not only market yourself as a valuable worker but also to effectively communicate with a team of clients. The same can be said for problem-solving and critical thinking. Being able to effectively communicate what you're thinking while problem-solving is good for all three sets of skills.

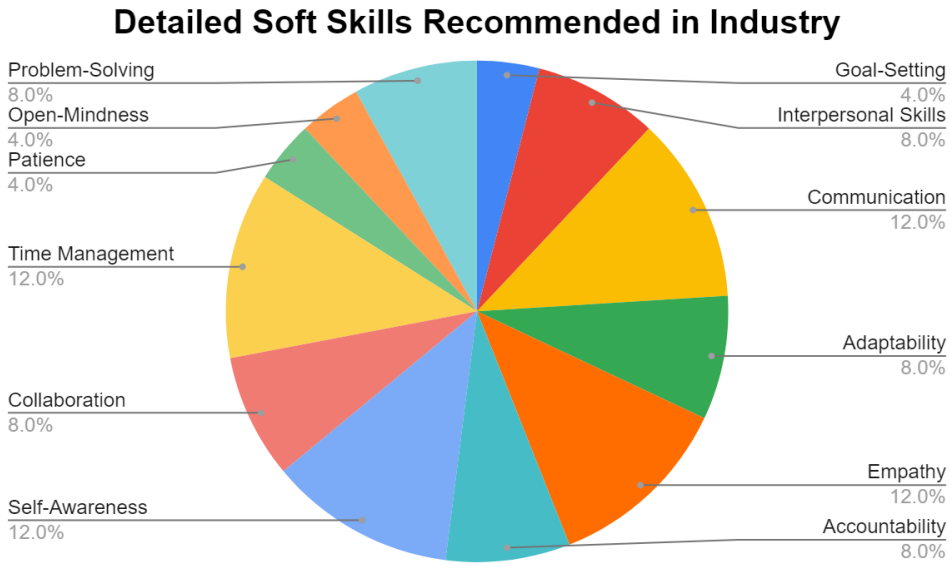

Figure 5. Detailed distribution of soft skills is predominately recommended in the industry

Task 6: Explored coding technologies that are projected to be used in the future.

Based on our research, 69.2% of surveyed companies expect AI demands to grow, 56% expect blockchain demands to grow, and 47% expect demands for daily technology to grow (Raymond).

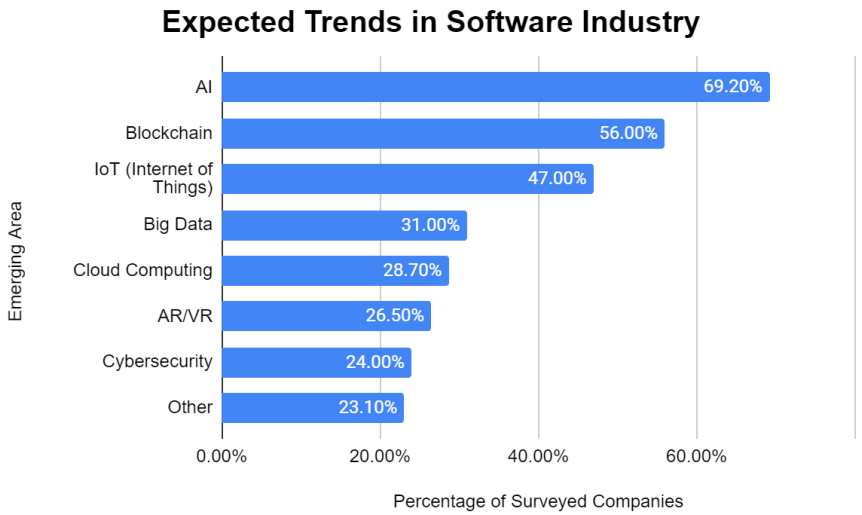

Figure 6. Emerging technologies that companies expect to see in the future

Furthermore, other sources such as the article by Simmons suggest that topics like artificial intelligence, edge computing, quantum computing, robotics, cybersecurity, and bioinformatics will become the focus of the industry in the near future. Augmented reality and virtual reality are also on the rise, especially in simulation, as highlighted in Huang's research report.

Conclusions

This section will discuss the conclusions that we have arrived at based on the collected data during our research.

Current State of Aggie Coding Club

As of right now, the organization seems to already do a great job at informing its members about the industry, allowing members to connect with tech companies, and teaching members different things that can be done with coding. Furthermore, members are generally satisfied with meetings and workshops. However, there is currently a heavy focus on technical skills and a lack of focus on soft skills. Developing soft skills like communication and teamwork is something that is not only recommended by many companies but also by senior software engineers. The topics being discussed during the workshops also seem to lean towards introducing members to different topics that do not have as many real world applications. For example, learning how to create a Discord bot may be interesting to learn, but does not have many applications outside of Discord. Overall, there needs to be a balance of introducing interesting and fun topics and ones with several real world applications that will prepare members for their future careers.

Results of Secondary Research

Based on our research, coding interviews are a very important topic that should be discussed to club members as a majority of coding related internships and jobs require one. In regards to coding interviews, the main topics that should be studied include depth first search, basic programming, and pointers, while the main coding languages that should be used or learned for these interviews are Java, Python, and C/C#/C++. Furthermore, soft skills like collaboration and communication should be something that every person pursuing a career in the tech industry should have. If a person solely focuses on technical skills, it is possible that their lack of soft skills will prevent them from succeeding in a tech-related career. There are also many different technologies that are slowly becoming popularized in the tech industry that members should be informed about. Technologies like artificial intelligence, augmented reality and virtual reality, and blockchain are slowly becoming the main focus of many projects in the industry. If someone were to pursue a tech-related career, having knowledge about these topics would allow them to have more opportunities at different job positions.

Recommendations

Based on our research we recommend hosting more workshops that are based around either mock coding interviews or solving coding problems that could show up on a coding interview. This would allow members to not only be more prepared for any coding interview they may take on but also allow them to develop their critical thinking skills, which is a valuable soft skill to have. Furthermore, we also suggest holding more socials if the budget and time allows for it. By holding more socials, members would be able to network with other members as well as build up their communication skills. These socials could also have different games that reinforce teamwork skills. Overall, workshops and socials in general could be used as a way that allows members to both enjoy their time in the organization and develop valuable skill sets that can be used in their future careers.

As for the meeting topics, the current uses of the meetings for company talks are great and should remain as is. However, the meetings can also be used to introduce members to topics like depth first search and pointers, allowing members to get a head start in preparing for coding interviews. If there are members who are already familiar with the topics, the meetings could also build upon these topics and showcase real world applications. They can also be used to discuss the importance of soft skills and how to develop them.

Ultimately, we suggest finding ways to teach members more applicable topics that would better prepare them for their future careers and skills that they can put on their resume.

Works Cited

Brewster, Cordenne. “10 Soft Skills Every Software Engineer Should Have.” *Trio Developers - Stop Searching. Start Building.*, Trio Blog, 13 Feb. 2023, https://www.trio.dev/blog/software-engineer-soft-skills?hs_amp=true.

Huang, Wanju. “Deep Learning Becomes a Reality When Emerging Technologies Meet Learning Design.” *TechTrends: Linking Research and Practice to Improve Learning*, vol. 67, no. 1, Jan. 2023, pp. 178–88. https://link-springer-com.srv-proxy1.library.tamu.edu/article/10.1007/s11528-022-00778-x

Petrova, Sandra. “8 Software Developer Soft Skills Every Engineer Needs in 2023.” *Adeva*, Adeva, 17 Sept. 2019, https://adevait.com/blog/workplace/7-soft-skills-developers-2019.

Raymond, Mark. “Remarkably Useful Stats and Trends on Software Development: Goodfirms Research.” *GoodFirms*, Mark Raymond, 26 Sept. 2018, https://www.goodfirms.co/resources/software-development-research.

Rutert, Joscha. “14 Must-Have Soft Skills for Software Developers (Level up!).” *Simple Programmer*, 3 Feb. 2023, https://simpleprogrammer.com/soft-skills-for-programmers/.

Simmons, Liz. “Computer Science Trends.” *Code a New Career | ComputerScience.org*, 12 Sept. 2022, https://www.computerscience.org/resources/computer-science-trends/#Artificial-Intelligence.

Sufiyan, Taha. “Top 40 Coding Interview Questions You Should Know.” *Simplilearn.com*, Simplilearn, 9 Mar. 2023, https://www.simplilearn.com/coding-interview-questions-article

“Top Patterns to Conquer the Interview - Getting Started / Overview.” *AlgoMonster*, https://algo.monster/problems/stats

Trikha, Ritika. “Emerging Languages Overshadowed by Incumbents Java, Python in Coding Interviews.” *HackerRank Blog*, 2 Aug. 2016, https://www.hackerrank.com/blog/emerging-languages-still-overshadowed-by-incumbents-java-python-in-coding-interviews/.

Sufiyan, Taha. “Top 40 Coding Interview Questions You Should Know.” *Simplilearn.com*, Simplilearn, 9 Mar. 2023, https://www.simplilearn.com/coding-interview-questions-article

Appendices

Appendix A: Aggie Coding Club Survey Questions

Question 1: What motivated you to join the club? Has your motivation changed, and if so how?
Responses:

- I wanted to learn more about the industry I was going into & gain experience to put on my resume. The motivation is mostly the same -- but I also go to the meetings for the social aspect.
- I joined the club to learn more about coding , and stayed because I got a leadership role and I want more people to have coding resources & community!
- I wanted to learn new skills that could be useful in the future
- I joined mostly to meet other people who also enjoy coding.
- To learn more about the coding industry

Question 2: How would you rate the quality of the Aggie Coding Club's meetings and workshops?

- ☐ Poor **0%**
- ☐ Below Average **0%**
- ☐ Average **14.8%**
- ☐ Good **29.6%**
- ☐ Excellent **55.6%**

Question 3: Why did you give the rating that you did?
Responses:

- I've learned a lot from the meetings & met a lot of people!.
- I have been in this club for a large part of my time in college , and it has opened many doors for me.
- The meetings and workshops are really nice but sometimes don't contain topics that I find interesting
- I think the meetings and socials are a great way to network/meet more people
- The workshops are great for learning new things

Question 4: What are some topics you would like to see covered in the meetings and workshops?
Responses:

- More advanced coding topics, more data science
- More workshops!
- Data science or more mock coding interviews
- Making a website/More front-end topics
- Mock coding competitions

Question 5: What is one suggestion you have for improving the club as a whole?
Responses:

- Shorter meetings
- More workshops!
- Having more workshops
- More socials
- More advanced workshops

Appendix B: Interview Questions

Question 1: What company do you currently work at?
Answer: Microsoft

Question 2: What position do you currently hold at the company?
Answer: Senior Software Engineer

Question 3: What type of tasks do you usually complete during an average work week? (i.e. meetings, coding, designing, etc.)
Answer: Coding, designing, workstream synchronization meetings, technical discussions, code reviews, analysis of customer feedback, technical support of customer issues.

Question 4: What are the main coding languages that you typically use?
Answer: C++, C#, Python

Question 5: What are some skills that you believe a software engineering intern should have?
Answer: Coding, teamworking, communication, presentation and domain specific skills

Question 6: Do you have any other advice for people entering the tech industry?
Answer: Focus on building team working skills, networking and especially develop continuous learning mindset and habit.