Research Statement

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Research Overview

COVID-19 has changed how offices look, with many employers offering more flexibility to their employees by allowing them to work from home or have a hybrid home/office schedule. With this change in the workplace landscape, we need to ensure that students are being prepared to use online tools to effectively communicate and collaborate with their coworkers. There is a well-documented gap in the knowledge students graduate with and the knowledge they need to succeed in their careers [1, 2, 3]. Before the COVID-19 pandemic, students were shown to have a deficiency in their soft skills (communication, collaboration, teamwork, etc.) when entering the workforce [3]. Now that we are no longer under lockdown orders and have gone back to a new 'normal' involving more virtual meetings, how well are we preparing students for this new hybrid working environment? Overall, my research goal is to help ensure that students' learning environments, whether they are formal or informal, are meeting their needs and preparing them for their transition into the workforce.

To do this, I have used quantitative and qualitative approaches to 1) identify the informal learning environments students have access to, 2) determine the challenges that students face in both formal and informal learning environments, and 3) design an intervention tool that is integrated into their informal learning platform to help encourage soft skill growth.

Research Contributions

Identifying Communication and Collaboration Challenges in Hybrid/Remote Team Projects*

The transition to online teamwork during the pandemic led both student and professional software developers to use online tools for communication and collaboration. Pre-pandemic, employers noted that new grads were deficient in their soft skills. The transition to online learning and remote work created an entirely new environment in which both students and professionals were required to work. Identifying the challenges that students and professional developers face in remote and hybrid environments allows instructors and employers to be more aware of – and potentially curtail – the common issues faced by their students and remote employees.

I surveyed university students about the challenges they faced during their remote or hybrid team development project. I specifically asked them about what tools they used to work with their team and what challenges they faced during their project. Additionally, I combed through the research literature to identify the challenges faced by remote professional developers during the same timeframe as the students' team projects. I found that Discord was the most-used tool for communicating and collaborating by students and that the challenges students are facing during their hybrid or remote team development projects are similar to those seen by remote industry teams. Students and developers have similar

challenges when working on remote teams, including communication issues, missing notifications or messages, and inexperience with project software and tools. In summary, this study identified the challenges students face during their remote and hybrid team projects, found that students' challenges are similar to those seen within industry teams, and identified Discord as the most common tool used by students.

Why are Students using Discord?*

After identifying that students are using Discord during their group projects, we wanted to further understand how students are using Discord as an educational tool. Discord is an online communication tool that was created to solve the problem of being able to communicate with other people while playing video games. Since its inception, it has grown to be more than just a game communication platform; it now hosts a wide variety of communities from software developers to town libraries to departments at universities. During the pandemic lockdowns, Discord was a tool for university courses to help maintain student engagement and enhance the online learning environment.

In my previous study, the students I surveyed mentioned that they used Discord to communicate with their teammates and that they used Discord to communicate with their classmates and teaching assistants as well. In this work, I sought to further our understanding of Discord as an educational tool. I surveyed and interviewed students about why they joined Discord, what kinds of servers they participate in, and how they benefit from participating in those servers.

We found that students prefer using Discord because it provides a compartmentalized, customizable space for all their interests. Many have replaced texting on their phones with messaging on Discord, and Discord also provides them with niche academic help. They are able to contact their classmates, TAs, or even their professors on Discord to ask clarifying questions. These results support students using Discord as an informal learning community, laying the groundwork for future Discord-based informal learning studies.

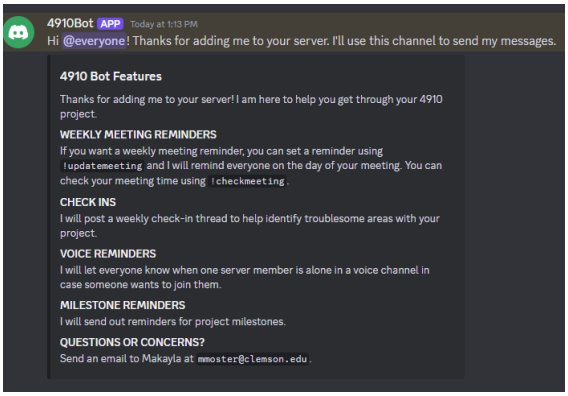

Figure 1: I designed an automated reminder bot within Discord. This bot provides student teams with different reminders and notifications to help mitigate miscommunication between team members.

Current Work: Improving Student Teamwork in a Software Engineering Capstone Course via Discord

From the two projects above, we have identified that students have challenges working as a team during development projects and that students prefer using tools that are familiar to them. Even though most university students are back in face-to-face courses, many opt to use online communication and collaboration tools to work with their groupmates. Due to the popularity of Discord in the computer science student community, I decided to implement a Discord bot, as shown in Figure 1, to automate communication reminders during students' senior

capstone team projects to help mitigate team miscommunication.

The Discord bot has four features. First, there is a weekly meeting reminder feature; once a week the bot will post a message reminding the team of their upcoming meeting. Next, the bot does a weekly "check-in" with each team; it asks what each student plans to work on during the week and what blockers they foresee. Additionally, the bot is constantly scanning all voice channels in the Discord server to identify when one team member is alone in a voice channel and will alert the other members. Lastly, the bot will send out reminders for project milestones that are coming due. This study is currently ongoing, so an analysis of the data collected is unavailable.

Future Research

In the future, I plan to continue studying how informal online learning communities, such as those found on Discord, impact students' learning. Questions I have include:

- How does providing an online forum, such as a Discord server, that is accessible 24/7 impact students' learning?
- What online forum features impact student willingness to participate in a course or departmental forum?

Additionally, I want to identify characteristics of successful, online, student-focused informal learning communities to help others foster their own student-based communities. Eventually I want to publish a guide, based on my research findings, on best practices for setting up and maintaining course-focused learning communities. My previous research studies can be expanded into this work as I continue to investigate how student learning in informal learning communities complements undergraduate learning and advise others on the best practices for curating these informal learning communities.

*Denotes projects that are currently under review for publication.

References

[1] Vahid Garousi, Gorkem Giray, Eray Tuzun, Cagatay Catal, and Michael Felderer. 2019. Closing the gap between software engineering education and industrial needs. *IEEE Software* 37, 2 (2019), 68–77.

[2] Wouter Groeneveld, Joost Vennekens, and Kris Aerts. 2019. Software engineering education beyond the technical: A systematic literature review. *arXiv preprint arXiv:1910.09865* (2019).

[3] Wouter Groeneveld, Joost Vennekens, and Kris Aerts. 2021. Identifying Non-Technical Skill Gaps in Software Engineering Education: What Experts Expect But Students Don't Learn. *ACM Transactions on Computing Education (TOCE)* 22, 1 (2021), 1–21.