Board 352: NSF S-STEM: Inclusive Hackathon Themes to Attract Underrepresented Community College Students into Computing Disciplines

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Abstract

There is a broad agreement that part of the solution in attracting more underrepresented students to computing disciplines is to influence students early on in their educational pathways. The NSF S-STEM Scholarship program at a minority serving institution organized Hackathons with inclusive themes as one of the strategies to attract and recruit more underrepresented, underserved, and under-prepared community college students transferring into computing disciplines. This initiative successfully attracted underrepresented student groups (2022: 62 students, 52% Hispanic, 27% female, 2021: 39 students, 23% Hispanic, 16% female) to these Hackathons conducted in an in person as well as in an online format. The Hackathon brought together individuals from 2-year community colleges and a 4-year rural minority serving institution to work on challenging computing projects in a short amount of time. The main objectives of these Hackathons were to (i) create a strong sense of community and an environment where every student felt welcomed; (ii) engage students from different backgrounds to learn about each other and come together to solve computational problems; (iii) to strengthen the communication between students early on in their computing experience and student who are relatively new to the field of computing. This paper will discuss the design of inclusively themed Hackathons, the logistics involved during planning, the execution, the challenges faced, and the impact it created to broaden the participation of underrepresented, underserved, and underprepared community college students in computing related activities.

Introduction

Hackathons have grown in popularity as a venue for computer enthusiasts and aspiring inventors to network and realize their ideas. Hackathons are also popularity used as a tool to increase interest in STEM education these days [1]. The gatherings of developers, designers, businesspeople, and other creatives are often brief occasions where they can work together to create fresh technology-based solutions. A hackathon is a computing technology focused event which allows participants to become involved in building software-oriented projects. These types of events also often include various activities such as workshops, mini-games, expert-panels, career fairs, and many more. Hackathons give its participants the opportunity to take the knowledge they have learned and apply it to creative ideas and applications while simultaneously encouraging collaboration with fellow participants. There are no guidelines on what should take place at a hackathon or how to host one because every hackathon is unique. Hackathons are often tailored for achieving specific goals. These goals range from focusing on a specific computing disciplines to promoting the inclusion of certain groups within technology.

Traditional hackathons have, however, frequently come under discussion for lacking inclusivity and diversity. Technology is a crucial component of contemporary society, and those who develop it should consider the varied viewpoints and experiences of the consumers they serve. Inclusive hackathons are a crucial step in developing a more diverse and equitable IT sector. These events assist in ensuring that the goods and services we use daily reflect the needs and interests of all people by giving underrepresented groups a platform to participate in and contribute to the development of technology.

Hackathons with inclusive themes have been increasingly popular in recent years [2-11], with the goal of fostering the development of a more equal and diverse tech sector. These hackathons aim to encourage participation from underrepresented groups like women, people of color, and persons with disabilities while also promoting diversity, equity, and inclusivity within the software industry. The Partnership on AI, a non-profit group devoted to furthering the development and use of artificial intelligence in a responsible and inclusive manner, organized the "Diverse Voices in AI" hackathon in 2018 as an example of one such event. The hackathon sought to give underrepresented communities a platform to contribute to the advancement of AI and guarantee that the technology considers the needs and interests of everyone [12].

The Google-organized "AI for Social Good" hackathon, which took place in 2019, is another inclusive hackathon. The gathering brought together a variety of people to collaborate and use AI to address some of the most critical social and environmental concerns facing the world, including AI researchers, activists, and community leaders [13].

It has been demonstrated that inclusive hackathons benefit both participants and the software sector. For instance, a study conducted by academics at the University of California, Berkeley discovered that inviting hackathons enhanced the engagement of underrepresented groups and aided in building a community that was supportive of all participants [14].

The College of Engineering at WTAMU University organized inclusive Hackathons through the NSF S-STEM program during the year 2021 and 2022 with the following goals. The local Association for Computing Machinery (ACM) student chapter was also involved with event planning and execution.

Goal 1: Connect with regional underprepared, underrepresented, and minority community college students and provide them information about WTAMU's college of engineering, particularly the computer science program.

Goal 2: Offer inclusive educational workshops on relevant technologies and tools which can be utilized throughout a student's coursework and/or their professional career.

Goal 3: Provide a fun event which encourages building connections with a diverse set of students and creating a more cohesive inclusive computing community.

1st Goal: Connect with regional underprepared, underrepresented, and minority community college students.

West Texas A& M University (WTAMU), a minority Hispanic serving university plays a major role in providing an affordable option to students looking to continue their education after attending a community college. The computer science program at the College of Engineering (COE) provides students from community colleges the opportunity to join the program with ease. The classes offered at community colleges often correlate to the computer science curriculum, thus reducing the learning curve of transfer students that is often experienced when attending a new institution.

Event in 2021: The planning committee reached out to multiple community colleges in the Texas Panhandle region to invite underprepared, underrepresented, and minority community college students to attend the event. There were 39 students who attended the Hackathon and it was

made up of 23% of Hispanic students 16% of female students. The hackathon specifically hosted events for community college students and provided them with information about opportunities at WTAMU. A transfer talk event was hosted by a former community college, current WTAMU minority female student, who discussed her experience of transferring to WTAMU's computer science program.

Event in 2022: Two of the planning committee members went to the Amarillo College campus and spoke to four different classes and were able to give information to roughly 30 students in total. Each transfer student who attended was given information about WTAMU's computer science program. In total, 8 community college students signed up for the event and 2 attended. There were 62 students who attended the event and it was with 52% of Hispanic students and 27% of female students. One major issue we faced while getting community college students to attend the hackathon is that many of them have jobs and families. This makes it difficult for them to find time to come to various events. The planning committee is looking for ways to account for this issue.

2nd Goal: Offer Useful Educational Workshops through inclusive events.

Event in 2021: The tools and methods taught in the workshops were relevant to today's demand and provide a good starting point for a student interested in expanding their skill set. Learning and demonstrating one's knowledge of these technologies can lead to landing an internship or a job offer. The following inclusive workshops were offered during the hackathon.

- Android App Development to solve a social problem: With smartphones becoming vital to every part of life, knowing how to develop mobile applications is a skill in high demand. By letting the students choose a project from an inclusive theme to solve current social problems, we were able to draw interest from minority student groups.
- Command Line Interface/Vim: Knowing how to utilize the CLI and Vim are extremely crucial skills to learn for many computing careers such as network systems engineer, system administrator, and backend engineer. Use of modern tools in computing to drive away the fear of programming has also seen to increase the interest of computing amongst underprepared, underrepresented, and minority students.
- Git and the Importance of Version Control: One of the most utilized tools in software development is version control. Git is a popular version control technology that is utilized by many companies to let their developers track the lifecycle of software and allow collaboration amongst multiple programmers.
- Is GameStop a Viable Stock Option?: This workshop focused on showing how to implement machine learning algorithms to create models which try to predict stock prices. Data science is one of the fastest growing sectors of computer science and knowing how to leverage data without gender bias is a marketable skill in a wide range of careers.
- Building the Snake Game: The workshop showed how to build a simple game of snake using python. Building a simple game is a great way for beginners to practice coding. This activity was designed to demonstrate to these students that the field of computing can be more than just boring programming.

Event in 2022: Hackathons give students an opportunity to collaborate and socialize with other students who have an interest in computing technologies. With social effects of Covid-19 still being felt, the planning committee wanted to emphasize the importance of providing students the opportunity to interact with one another. In total, 46 WTAMU students attended the event, which is roughly half of the computer science students at WTAMU. The following activities were offered in hopes of creating a stronger inclusive computer science community at WTAMU.

- Guest Speaker: We had the pleasure of hosting WTAMU alum Charlotte Lewis, the Deputy Director of Enterprise Applications at CNS, as our female guest speaker. She specifically spoke about her story in the field of information technology and computer science. Additionally, she spoke about job opportunities and the skills needed to ensure success in the ever-changing computing industry.
- Wiki Races: A game which challenges competitors to navigate from one Wikipedia page to another by only using the page links. This was designed to let students' network and have fun.
- Data Science and Inclusive Data Science project: A 2-hour session was held to introduce students to the concepts in data science and also to introduce them to simple programs in Python, and packages such as scikit, numpy, keras, pandas, etc. Staying with the theme of data science and inclusion, the main competition of the hackathon involved creating a inclusive themes data science project. This competition introduced students to many new concepts pivotal in data science. The competition had seven teams of two students each participate. The teams were judged on their ability to implement the system, demonstrate inclusive nature, and how well they understood the concepts they were presented.
- Git and the Importance of Version Control: One of the most utilized tools in software development is version control. Git is a popular version control technology that is utilized by many companies to let their developers track the lifecycle of software and allow collaboration amongst multiple programmers.
- Web Scraping Workshop: A key component to data science is extracting the data in various ways. A very common method of collecting this data is through web-scraping various web pages. This workshop introduced students to the concept of web scraping and writing python scripts to automate this collection method.
- High Performance Computing Workshop: A mechanical engineering professor at WTAMU hosted a workshop about high performance computing and the utility it has in a variety of disciplines. The students who participated had the opportunity to actually SSH into the WTAMU HPC cluster and run various distributed systems scripts. Tentative 2-Day Hackathon schedule can be found in Figure 1.

Day	Time	Event
Friday	9:30 – 10am	Sign In/Registration
Friday	10 – 10:30am	Opening Ceremony
Friday	10:30 – 11am	Guest Speaker
Friday	11 – 11:30am	Web Scraping Workshop
Friday	11:30 – 12pm	Wiki Links Game
Friday	12 – 1pm	Lunch

Friday	1 – 4pm	Data Science Workshop
Friday	4 – 4:15pm	Snack Break
Friday	4:15 – 5pm	HPC Workshop
Friday	5 – 6pm	Dinner/Closing Talk
Saturday	9:30 – 10pm	Sign-In
Saturday	10 – 10:30am	Git Workshop
Saturday	10:30 – 11am	Data Science Project Work
Saturday	11 – 12pm	Competition Presentations
Saturday	12 – 1pm	Prizes + Lunch

Figure 1. Tentative 2- Day Hackathon Schedule

3rd Goal: Provide Events for a Diverse Set of Students to Interact

Event in 2021 and 2022: The themes of the hackathon were "Mind the Gap" and "Hack the Canyon and both events focused on encouraging diversity and inclusion in the computing community which ultimately generates more creative ideas. The following activities were offered in hopes of creating a stronger inclusive computing community:

- Speed Typing Race: A game to see who can type the quickest.
- Guest Speaker: A current employee for Hoppy Lobby gave some words of advice and recounted her experience working as a software developer throughout her professional career.
- Fortnite Game: An online multiplayer game to encourage game enthusiast to be a part of the Hackathon.
- Wiki Races: A game which challenges the competitors to try navigating from one wiki page to another by only using the page links.
- Inclusive themed Android App Development Competition: Design and development of an inclusive themed project using Android.
- Inclusive themed Data Science Project Competition: Design and development of an inclusive themed data science project using Python.

Logistics:

Event in 2021:

- How the Hackathon were Advertised:
    - Printed and displayed flyers (Figure 2) on multiple announcement boards throughout the WTAMU engineering building.

Figure 2. 2021 Flyer design

- Contacted professors from regional community colleges.
- Asked students to tell other students about the event, especially if they had connections to students at community colleges.
- Posted the flyers on the WTAMU ACM social media accounts.
- Had the College of Engineering student success coordinator send a mass text to every computer science major at WTAMU.

- How Communication was Established throughout the Hackathon:
  - The event was completely online meaning all interactions were strictly virtual. o A discord channel was specifically created for the hackathon which provided specific chat channels to communicate with the hackathon participants and remind them about upcoming activities.
  - Zoom was used to host meetings to conduct various events such as games, workshops, and provide voice communication between the presenters, moderators, and the participants.
- How Prizes were Distributed:
  - To encourages students to attend multiple events a point system was formed. Each activity a student participated in earned a student points. At the end of the hackathon the students with the most points received the grand prizes.
  - Each student who signed up for the hackathon received a T-Shirt, mask, and two stickers. Each item had the hackathon logo on it.

Event in 2022:

- How the Hackathon was Advertised:
  - Printed and displayed flyers (Figure 3) on multiple announcement boards throughout the WTAMU engineering building and other places in the University.

Figure 3. 2022 Flyer design

- Contacted professors from regional community colleges to tell students.
- Went to the Amarillo College campus to speak to computer science students directly about the hackathon.
- Asked students to tell other students about the event, especially if they had connections to students at community colleges.
- Posted the flyers on the WTAMU ACM social media accounts.
- Posted about hackathon in various discord channels which are specific to the computer science department.

- How Communication was Established throughout the Hackathon:
  - The event was completely in person.
  - Email was the primary form of communication between the attendees and the planning committee.
  - Additionally, various discord channels specific to WTAMU computer science students were utilized to disburse information.
- How Prizes were Distributed:
  - After each workshop, each student who attended the workshop had their name placed in a drawing. A random name was picked, and they received the prize. o For the grand prize (Nintendo Switch) we wanted to make sure each individual who attended the hackathon had an opportunity to win; however, we also wanted to encourage students to participate in as many events as possible. Thus, for each event a student attended, their name was placed in a drawing. This means the more events they participated in the more likely it is that they would win the prize.

Conclusion:

Being the very first hackathon WTAMU ACM has ever hosted in 2021 there were many lessons learned. In total a diverse group of 101 students from three different colleges participated in the 2021 and 2022 events. The 2021 event was completely online wherein 2022 was fully in person. The activities offered throughout the event inclusive in nature and were carefully planned to attack more underrepresented minorities students from the regional colleges. Both the years, the Hackathon was well received by the students who attended the event. The 2nd annual WTAMU hackathon in 2022 was a great success with a 23% increase in the number of students who attended.

We are still trying to explore ways in how to reach out to regional college students and to increase their participation. Despite the low community college student participation, we still believe that the event accomplished many of the goals we set for the event. Students not only had the opportunity to learn a wide variety of computing concepts, but also were able to interact with their fellow peers and leave with a sense of belonging in the field. Each year of hosting the event we learn more and more, and we hope to provide an even better hackathon next year. The focus of future events will be to continue building connections with nearby regional college students and create fun, educational opportunities for students in hope of building a stronger inclusive computer science community.

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