Google

Morehouse College creates Android programming course and provides exposure to coding culture

At a Glance

What they wanted to do

- Expose students to hands-on programming and coding culture
- Offer a for-credit course so students could spend classroom time learning programming skills they otherwise might not have time to learn in their off hours
- Help students be better prepared to compete for top technology jobs

What they did

- Developed 75-minute classes held twice a week for 16 weeks focused on Android programming skills
- Partnered with Google engineers to design new, culturally-relevant activities for HBCU students that could be added to expand the course content and support student ramp-up into Java

What they accomplished

- Provided hands-on Android programming experience for 11 students in for-credit course
- Enabled students to use Advanced Data Structures principles in creating Android apps
- Got students excited about learning how to code and engaged in programming coursework

Challenge

At the Historically Black College (HBCU), Morehouse College, students are focused on liberal arts. The computer science degree is geared more toward conceptual understanding and preparing students for graduate studies in the field, with less of an emphasis on CS career readiness after graduation. For those students who are interested in CS-related jobs and want a deeper dive into hands-on programming, there are a limited number of credit classes to take.

Students are also laser-focused on keeping their GPA up to maintain scholarships. That means for students who are interested in CS careers, there's not as much spare time to take on non-credit classes or extracurricular projects to learn practical skills like programming that can help them get jobs in the competitive tech marketplace.

Solution

To give Morehouse upperclassmen a chance to practice data structures and algorithms and get hands-on mobile development experience in a for-credit class, Assistant Computer Science Professor Kinnis Gosha worked with the Applied CS content and Google software engineers to design a special integrated programming course. He took a summer to prepare the specialized course and combined Advanced Data Structures course materials in Java with existing Applied CS course material from Google via a grant and partnership with the United Negro College Fund (UNCF).

The course, entitled "Mobile App Development with Advanced Data Structures (ADS)," combined lecture, class discussion and in-class assignments targeted at learning Java, ADS and the basics of Android programming. It was the first course at the university focused specifically on mobile app development with a group of 12 students. The Applied CS classes ran for 75 minutes and were held twice a week for 16 weeks in the fall semester of 2016.

"By giving students the opportunity to learn Java and Advanced Data Structures and make apps, they realized that if they work hard enough they too can be software engineers, even though most programmers they encounter don't look like them."
—Kinnis Gosha, Assistant Professor, Morehouse College

Benefits

Developing a culture of coding

Google's involvement in developing content and providing resources for the program raised awareness about coding for students and exposed students to the culture of coding and the experimental aspect of it, according to Gosha. For example, software engineers in industry jobs know that not every line of code has to be perfect on the first try and that errors are valuable learning

About Morehouse College

- Established as Augusta Theological Institute in 1867, two years after the end of the Civil War, in Augusta, Georgia, and later moved to Atlanta and renamed Morehouse College
- Morehouse is the largest men's college in the U.S. with more than 2,000 students

www.morehouse.edu

lessons in programming. This concept applies to the real world, as well, and it's important that students break software, learn to troubleshoot and fix it, and just keep coding, he says.

"Students don't realize they should be writing code and banging on keys constantly to learn the craft; that you should code because you're a coder, not just because you have an assignment due."

Part of what students learned in the course is that programming involves not only learning how to implement advanced data structures, but also deciding when to use them. "The course presented students with CS challenges and the students chose their tools, so they had to truly understand all of the advanced data types, when to use them and how they work internally without referring to any resources" Gosha says. "In software development time is money. Students need to know the concepts, but to also be able to make decisions quickly and under pressure."

Preparing students for careers in tech

Applied CS content enabled students to understand, apply and implement advanced data types using a mobile application platform that more than two billion devices run on today. The application development skills they got gave them something tangible they could use after graduation to create software, products and even companies. By the end of the course, the students were more confident and better prepared for both tech interviews and industry jobs, Gosha says.

"A lot of these students get into computer science because they're entrepreneurs and they need to understand the platform to generate revenue," he says. "Often that's through mobile app development, because it's more lucrative and sexy than traditional static web development." So learning coding in a platform-specific environment, like the Android Studio SDK, is a great way to prepare them for software engineering challenges and exposes them to processes and workflows they will encounter when using any platform or system for actually making their code run.

The hands-on programming helped show students the practical applications of the concepts they learned. "When you have a program like this where students can see the end goal, they realize why they have to learn those fundamental skills and advanced concepts," Gosha says. "Now students have extra motivation to learn these skills to solve the programming problems."

Future of Applied CS

In the future, Gosha would like to use new Applied CS video modules in the course so students can learn from seeing concepts visualized. Second, he'd like to further customize the class by making some of the programming exercises more culturally suitable for his students. For example, instead of having them create a generic dice game to learn the concept of first-in, first-out programming, students could create a game that explores the metaphor of a barbershop, which typically serves as a community hub for African American neighborhoods. Finally, Gosha recommends pairing online courses with the Applied CS program so students could spend more time learning the programming concepts outside of class at their own pace and devote the class time to collaborating on projects in groups.

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