Sharing Courses, Faculty, and Resources across Universities

An Argument for Cross-Institution Courses and Localized Support Structures

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Abstract

We present the results of multi-year collaborations among Harvard University, Yale University, and Miami Dade College in which students on all three campuses took the same introductory course in computer science. We present our respective motivations therefor and discuss how the course, CS50, has been both adopted and adapted for localized needs and constraints. Faculty at Harvard provided the course's lectures on video as well as assignments, while faculty at Yale and Miami Dade provided localized support structures, including sections (i.e., recitations) and office hours, with faculty oversight. We argue that this sharing of resources should become more common across otherwise independent campuses so that faculty on each can focus their most precious resource, time, on their own students as well as on other academic pursuits. We offer reassurance that these collaborations have not led to a reduction of resources on any of our campuses. We propose how other institutions could collaborate similarly in ways that benefit all parties. We argue that COVID-19, all things considered, was a missed opportunity for universities to lean on each other at scale, too. And we reserve much of the panel's time for discussion of attendees' perspectives, questions, and concerns.

CCS Concepts

• **Social and professional topics** → **Computing education**; • **Applied computing** → **Education**.

Keywords

collaboration, computer science education, online education

1 Summary

We propose to begin with a quote, from McPherson and Bacow's article on "Online Higher Education: Beyond the Hype Cycle" in the *Journal of Economic Perspectives*: "in 2014, Yale agreed to import

Harvard's most popular course: 'Introduction to Computer Science' (Bernhard 2014). Yale students will watch the Harvard lectures online and will be taught in sections by Yale faculty and graduate students, whose efforts will be coordinated with colleagues from Harvard. However, this ... example is likely to be atypical. We suspect that computer scientists are outliers in their openness to digital learning and are likely to remain so for a good while." [1]

We daresay that such collaborations remain rare, not only in higher education but in computer science specifically. Even during COVID-19, when digital learning could have enabled new forms of cross-registration, with students at one institution taking courses at far-away others, thereby reducing the number of faculty who needed to learn overnight how to teach effectively online, we perceived an unpreparedness at best, and disinterest at worst.

We aspire with this session, then, to provoke attendees to reconsider how we all approach our own classes and how we might lean on each other all the more. As is already longstanding tradition with research, we argue via this panel that universities should be collaborating on teaching as well, with faculty across campuses not only co-teaching but sharing each courses as well. And we welcome skepticism and corroboration alike.

1.1 Background

CS50 is Harvard University's introduction to the intellectual enterprises of computer science and the art of programming, an amalgam of courses generally known as CS1 and CS2, freely available as OpenCourseWare. Previously only available to students on campus, the course became part of the university's distance-education program in 2007, at which point continuing-education students could take the course for credit entirely online, attending lectures, sections, and office hours virtually. In 2012, meanwhile, the course became freely available as a massive open online course (MOOC) via edX, at which point anyone online could take the course noncredit as well, albeit without opportunities for sections and office hours.

1.2 Motivation

More recently, CS50 has aspired to implement a hybrid model, whereby the course has fostered localized support structures with the help of colleagues at other schools. In Spring 2015, Miami Dade College, together with LaunchCode, a nonprofit, adopted CS50's curriculum as a vehicle via which to introduce students to programming and prepare them for technical apprenticeships with area companies. And in Fall 2015, Yale University adopted the course's curriculum as well, collaborating with Harvard all the more intimately on local implementation of the course's sections, office hours, and more.

In these cases and others, the course's localized instances have been identical curricularly and technologically to CS50 on Harvard's own campus. Moreover, we have sought to preserve the course's characteristic mix of accessibility, community, and rigor so that students on all campuses feel part of a collective, shared experience. Key to success in all cases has been to implement a robust support structure for students.

1.3 Implementation Details

That the course in question happens to be Harvard's CS50 is, we argue, but an implementation detail. Our most powerful takeaway from this collaboration has been the opportunity to share resources. Whereas Malan has focused much of his time at Harvard on the course's curriculum and lectures on video, Erat has focused his time at Yale primarily on the course's administration, allowing him sufficient cycles to teach other courses as well. Kulthm, meanwhile, focused his time on multiple cohorts of students in Miami, empowering them to succeed all the more thanks to an instructor with even more bandwidth. The collaborations have not obviated the need for faculty on any of the campuses. Rather, it has enabled faculty to focus their most precious resource, time, on additional academic activities and pursuits. And students' learning outcomes have not, in fact, been for the worse. At Harvard and Yale, for instance, performance is identical across campuses, even though lectures are filmed at the former. And evaluations of the course at Yale have sometimes been even higher than at Harvard.

2 Panel Structure

Malan will speak to how the initiative began, offering advice on how on- and off-campus policies and politics were navigated. Erat will address Yale's experience with "importing" and also "exporting" a course. Kulthm will speak to Miami Dade's experience collaborating with private institutions and professional opportunities for students. Both Erat and Kulthm will speak to how Yale and Miami Dade, respectively, modified the course over time to fit their own teaching style and demographics.

Much of the panel's time will be reserved for audience discussion of faculty concerns, cross-campus logistics, and potential pitfalls. And we will welcome debate, particularly with so many faculty skeptical of this vision for sharing courses across institutions.

3 Position Statements

While panel sessions ordinarily "provide an opportunity for expert panelists to present their views on a specific topic, and then to discuss these views among themselves and with the audience," it's worth noting that this panel's participants share a common vision for sharing of courses across universities. As such, a panel session seems more apt than a special session. But their experiences toward that end have differed significantly. Malan will speak primarily to his experience navigating the initial politics of sharing a course with another institution and the operational challenges since. Erat will speak primarily to his experience taking the reins of that same course at a research institution. Kulthm will speak primarily to his experience adapting the course at a community college and the opportunities created by sharing resources. We elaborate next on each panelist's background.

3.1 David J. Malan

Malan has taught CS50 since 2007, having taken the course himself as an undergraduate some years ago. His research interests include computer science education, distance learning, collaborative learning, and computer-assisted instruction. Together with colleagues at Harvard and beyond, he oversees the CS50's communities, curriculum, staff, and tools.

3.2 Ozan Erat

Ozan Erat has taught at Yale since 2022. His research interests include digital image processing and computer vision applications. The introduction of CS50 to Yale involved both substantial administrative and policy changes to be implemented to which Erat will speak, including Yale's first use of undergraduates as section leaders, as well as additions to CS50 curricular offerings. Erat has since managed those challenges and more.

3.3 Sari Kulthm

Kulthm taught programming, microprocessors, and electronics at Miami Dade College for four years. He was the program lead for the establishment of CS50x Miami at The Idea Center, offered in conjunction with Harvard and LaunchCode, a local nonprofit. After partnering with LaunchCode, and choosing CS50 to be the curriculum for entry-level technical job placements, he built a local support structure for CS50 including lectures, sections, coding hours, and events to bring the unique culture of CS50 to Miami Dade College and the South Florida community at large.

References

[1] Michael S. McPherson and Lawrence S. Bacow. 2015. Online Higher Education: Beyond the Hype Cycle. *Journal of Economic Perspectives* 29, 4 (November 2015), 135–54. https://doi.org/10.1257/jep.29.4.135