

The MSCS New Pathways Consortium – a National Invitation

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Abstract— High tech is the U.S. economy’s fastest growing sector. Yet, the current tech talent pipeline falls far short of meeting demand. What’s more, the demographics of the tech workforce remain stubbornly out of sync with the overall population. This is in large part because our education system still struggles to attract diverse people into computational disciplines. Women represent more than 50% of Bachelor’s degree recipients, but only 19% of computer science (CS) graduates. Similarly, underrepresented minorities represent 25% of Bachelor’s degree recipients, but just 10% of CS graduates. The diversity of thought, race, background, and gender in CS is essential to building a robust, high quality, and ethical tech sector.

One place where innovation might bridge the gap – a place historically overlooked by higher education – is the Master’s degree. Since 2013, Northeastern University’s Khoury College of Computer Sciences has been testing, refining, and growing the Align program, a Master’s of Science in computer science (MSCS) for people who studied something *other* than CS as undergraduates.

The goal is to create a new pathway or onramp to CS for all students, paying particular attention to the recruitment and success of women and underrepresented minorities. In mid-2019, we launched the MSCS New Pathways Consortium – an effort to collaborate with colleges and universities across the country to scale this approach. Here, we invite others to join the Consortium and, together, make the MSCS the new MBA, a professional degree that people can access regardless of prior experience and knowledge of computing.

Keywords—*Computer science education; diversity; non-majors*

I. NORTHEASTERN’S ALIGN PROGRAM

Align [1] is novel in several ways

1. Students start the program with an intensive two-semester bridge. The bridge brings students from any discipline up to speed, preparing them to take to take Master’s level CS courses right along with students who were CS majors as undergraduates. (Students who are concerned with the depth or recency of their Math backgrounds can opt for a two-week Math Prep seminar before their first semester.)

2. Students also have the opportunity to enhance their degree work with experiential learning in the form of an internship or co-op, usually after the second of the three semesters in the MS program. A great learning opportunity, it also provides them with proof of their newfound skills for their resume.

3. The Align staff provides specialized marketing and recruiting that reaches prospective students who represent a diversity of background, socioeconomic, race, ethnicity and gender. They also provide all students with an inclusive environment and a range of academic support and career advising that ensures their success.

From a start in Seattle with just 11 students in 2013, the program has grown quickly. It is now offered at four sites in the Northeastern University Network: Boston, Seattle, Silicon Valley, and San Francisco; three additional sites, in Vancouver, Toronto and Portland, ME will open in academic year 2020-2021. As of this semester, 1016 students are enrolled and 195 have graduated. The students have come from more than 100 different undergraduate disciplines, ranging from history and biology, to fine arts. Of the currently enrolled population: 48% identify as women, and of the domestic students, 21% are from the groups traditionally underrepresented in CS. The Align program is now experimenting with ways to incorporate research experiences along with possible program modifications to support students who may want continue on to a Ph.D. program.

We began this work with the premise is that CS skills are essential to our economy – today *every* company is a tech company – and that the MSCS degree should be made accessible to graduates from any discipline, much like the MBA or JD. The MSCS degree, however, won’t achieve MBA or JD-like status through the efforts of Northeastern alone. A much larger community is needed.

II. THE MSCSNEW PATHWAYS CONSORTIUM

To begin building that larger community, Northeastern has joined with four other institutions – Columbia University, the Georgia Institute of Technology, the University of Illinois Urbana Champaign, and the University of North Texas – to form the MSCS New Pathways Consortium. The Consortium

is an open-source, collaborative, and precompetitive effort to establish accessible onramps to MSCS degrees for a broad range of individuals across the United States.

Members of the consortium may have very different implementations of their MSCS programs but they share the common goal of making their programs broadly accessible and they share a common set of values and practices:

On-ramp. We will design Master’s programs that have on-ramps that meet individuals where they are at and then catch them up such that they can enter the traditional direct-entry MS in CS programs and ultimately be competitive in the marketplace.

Diverse. We employ outreach and recruitment strategies in pursuit of a student body with demographics that match those of the overall United States undergraduate population - 85% domestic, 50% women, 25% underrepresented minorities.

Pedagogical. We will recruit faculty who are motivated by a diverse audience, do not ascribe to a “geek gene,” and are interested in building a more inclusive tech talent pipeline.

Co-curricular support. We will complement dedicated faculty with student advisors who work closely with students and who support them in particular during the on-ramp.

Transparency. On a regular basis, we will share with one another – in a format that is comfortable and appropriate for each institution – information regarding enrollment, demographics, student performance, etc. And, where possible, we will collaborate to share our learnings more broadly, for example speaking at conferences and writing articles.

The Consortium will be structured much like a Networked Improvement Community (NIC) as promoted by the Carnegie Foundation for the Advancement of Teaching [2]. That is, Consortium members share a common goal with specific, measurable outcomes, and they collaborate to develop best practices in achieving that goal, aiming not just to understand “whether some practice works,” but to understand “how to make it work reliably and across a range of universities and colleges.” We expect that the Consortium will be a source of innovation, providing social connections to accelerate testing and understanding new approaches to recruitment, curriculum, teaching, and student support services across different academic environments. This will allow institutions to choose among innovations and best practices wisely, adapt them appropriately for their local environment, and identify where innovation is needed. It is our hope that these joint efforts will speed the development and deployment of additional MSCS programs across the country.

III. THE INVITATION

We invite and encourage other universities and colleges to join the MSCS New Pathways Consortium and, together, be a part of building a dynamic and collaborative consortium of colleges and universities across the country that will make the MSCS like the new MBA – accessible to all.

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[1] C. Brodley et al., “An MS in CS for non-CS majors: moving to increase diversity of thought and demographics in CS,” Proceedings SIGCSE ’20, in press.

[2] A. S. Bryk, L. M. Gomez, A. Grunow, and P.G. LeMahieu, Learning to Improve: How America’s Schools Can Get Better at Getting Better, Cambridge, MA: Harvard Education Press, 2015.