EDC Education Development Center

Contact us at
datascience@edc.org

ISSUE BRIEF

Expanding Access to Data Science Careers

Panel 3: New Pathways for a Data Science Workforce

Executive Summary. In Massachusetts and across the U.S., there is an urgent need to enhance and expand data science education. Doing so is key to preparing students to navigate a world of big data and to building a workforce that can analyze large data sets to solve complex challenges. To respond to this need, and with the support of over $11M in National Science Foundation (NSF) grants, Education Development Center (EDC) is leading innovative preK–16 initiatives that are charting a new course for data science education and career preparation.

In this brief, we share highlights from the fourth in a series of online panels co-led by EDC, Massachusetts Life Sciences Center, and Massachusetts Biotechnology Education Foundation. During the panel, leaders from EDC and Bunker Hill Community College (BHCC) highlighted key features of their data science work. The leaders are synthesizing learnings from NSF grants to build a foundation for a middle school through community college date science pathway and launch a new early-stage data science initiative. This initiative can, in collaboration with the work of EDC's partners, provide a major new platform for growing the size and diversity of the Commonwealth's data science workforce. The initiatives that panelists discussed are described in this brief.

Key Initiatives Discussed:

Oceans of Data Institute

(https://go.edc.org/ODI)

- In its 2015 "Call for Action to Promote Data Literacy," EDC noted, "Our current education systems are not equipped to produce either the workforce or the citizenry with the skills, knowledge, and judgment to make wise use of the data streams that our technologies are delivering." Amid an increasing demand to expand and diversify the data science workforce, the Institute leads a strategic slate of initiatives focused on supporting all learners in acquiring the data skills they need to make informed decisions and thrive in the workplace. In one current stream of work, the Institute offers a suite of services and tools to help community colleges launch Data Science and Analytics programs aligned with the skills, knowledge, and behaviors students need to succeed in their region's business environments and supports a Data Workforce Education Community of Practice.

Mentoring New Data Pathways in Community Colleges

(https://go.edc.org/NewPathways)

- In this National Science Foundation (NSF)-funded initiative, EDC is is guiding community college faculty in designing programs to prepare diverse groups of students for Data Science and Analytics careers. The initiative responds to the NSF's call for innovative work focused on "harnessing the data revolution" and is reaching community colleges in six states (Hawaii, Maryland, Tennessee, Texas, Utah, Washington) selected for their eagerness and readiness to build data science programs.

Innovation Pathways to Data Careers

(https://go.edc.org/BigDataCareers)

- EDC is collaborating with the Massachusetts Department of Elementary and Secondary Education (DESE) and Burlington, Chelsea, and Everett school districts to develop, test, and institutionalize K-12 pathways focused on data science and careers. The goal is to accelerate the expansion of student access to, participation in, and successful completion of pathways that culminate in meaningful postsecondary and workforce credentials. The pathways and courses (e.g., Data Visualization, Python+Data) will be available to all Mass. students. The initiative's focus on equitable access, guided academic pathways, enhanced student support, relevant connections to careers, and partnerships have the potential to support diverse groups of students in entering data-centric careers.

Creating Pathways to Big Data Careers

(https://go.edc.org/BigDataCareers)

- EDC is building on its five years of supporting four community colleges in preparing students for careers in big data. In the new phase of work, EDC is conducting a study tour of European work-based learning programs focused on Data Analytics for faculty from the colleges.

Amgen Biotech Experience Program Office

(https://go.edc.org/EDC-ABE)

- Funded by the Amgen Foundation, the Amgen Biotech Experience (ABE) program

provides cutting-edge biotech equipment, curriculum, and teacher professional learning to almost 900 schools. To date, the program has supported over 3,600 science teachers in engaging nearly 850,000 students across 13 countries. For seven years, EDC has served as the ABE Program Office, providing technical assistance, resource development, and program site support and working closely with Amgen to improve access to STEM education. A $16M, 3-year continuation grant is supporting EDC in adding new curriculum and program sites, resulting in over 26 sites around the world.

Science+C

(https://go.edc.org/SciencePlusC)

- In the Science+C project, EDC is collaborating with DESE to integrate Computational Thinking and Data Science, creating new high school courses in Computational Biology, Computational Chemistry, and Computational Physics. These courses will be made available to all high schools in the Commonwealth beginning in the 2022-2023 school year. By June 2022, an estimated 1,875 students in 75 classrooms will have participated in the courses.

Bunker Hill Community College Internship Program

- In coordination with Tufts University, BHCC is launching an internship program for data science students. The program will place data science students in local businesses, giving students an opportunity to apply their data science knowledge in real-world settings.

Data Analytics Certificate at Bunker Hill Community College

- In response to demand for workforce-ready data analysis professionals, in 2017 BHCC created a 3-semester Data Analytics Certificate program. Students who complete this program will be prepared for internships and entry-level data analysis positions in a wide variety of industries. Graduates who earn this Certificate will be able to:
  - Design and code complex queries in SQL and PSQL.
  - Demonstrate the use of procedures, cursors, triggers, collections, and manipulation of tables.
  - Use existing databases, and convert data into analyzable formats in R and Python.
  - Demonstrate the use of Pandas and scikit-learn libraries in Python.
  - Design basic algorithms associated with machine learning such as CART and Regression in R.

Data Analytics Associate Degree at Bunker Hill Community College

- BHCC is also offering a 4-semester Associates Degree in Data Analytics to help students prepare for the high-tech workforce. Graduates who earn this Degree will be qualified to pursue internships or junior data practitioner jobs in the field of data analytics, and will have the following skills:
  - Collect, clean and prepare data from various sources for analysis.
  - Utilize R and Python computer languages to generate insight from data.
  - Handle data with an ethically conscious approach and understanding.

Conclusion

Panelists shared insights and findings from the data science education and workforce development initiatives they lead at EDC and BHCC. They also discussed early plans for a data science pathways initiative that has the potential to provide a major new platform for growing the size and diversity of the Commonwealth's data science workforce. The new initiative will be designed to be systemic, sustainable, and scalable. The following implications arose from the discussion:

- Building a diverse and highly skilled data science workforce must begin long before college. In thinking about the data science workforce of the future, we must focus efforts on youth from communities that are underrepresented in the STEM workforce. Similarly, schools must create a trajectory that will lead to all youth being data literate by the time they either go to college or enter the workforce.
- Weaving data science learning into courses and across the curriculum can help spark students' interest in data science and help them see its relevance to their lives. Data science learning can be blended into science courses, social studies and civics classes, art instruction, and more.
- To be sustainable and scalable, data science initiatives must focus on building the capacity of teachers, schools, and districts to foster students' data literacy and skills. Most teachers are not prepared to engage students in data science explorations and learning. A systemic approach to supporting teachers, including professional development (PD) focused on data science, is pivotal to creating and sustaining preK-16 data science learning trajectories.
- To ensure learning trajectories and PD keep pace with the rapidly growing data science industry, it will be vital to engage industry leaders as advisors and partners. The data science field evolves at the speed of light; preK-16 data science education will need to evolve, too.
- Institutions of higher education are also vital partners. Through data science certificate programs and Associate Degree majors, community colleges can play a key role in preparing youth for entry-level data science careers, particularly for youth and adults from groups that are underrepresented in the data science workforce.

Panelists

A special thank you to our panelists for their time and thoughtful contributions to the discussion.

- **Michael Harris**, Professor, Bunker Hill Community College
- **Randy Kochevar**, Director, EDC Oceans of Data Institute
- **Rebecca Lewis**, Director, Amgen Biotech Experience Program Office at EDC
- **Joyce Malyn-Smith**, Director, Innovation Pathways for Data Careers
- *Moderator*: **Sarita Pillai**, EDC Vice President and Director of STEM & Workforce Success

Education Development Center (EDC) is a global nonprofit that advances lasting solutions to improve education, promote health, and expand economic opportunity. Since 1958, we have been a leader in designing, implementing, and evaluating powerful and innovative programs in more than 80 countries around the world.

EDC Education Development Center

Massachusetts LIFE SCIENCES CENTER The capital of scientific revolution.

MassBioEd Massachusetts Biotechnology Education Foundation