

Training the Regenerative Medicine Workforce for the Future: A Workshop

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INNOVATEBIO

National Biotechnology Education Center

Topics and Questions Addressed

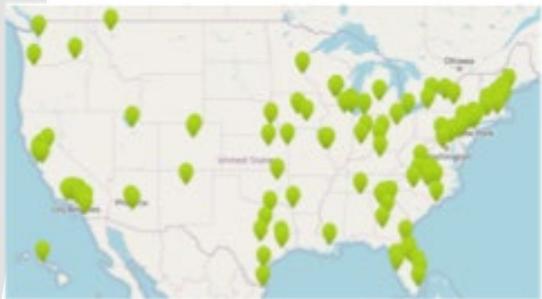
- ▶ What challenges in education or professional development deserves more attention? What are potential solutions? Are there examples?
- ▶ What skillsets are needed across the different sectors of regenerative medicine?
- ▶ What kind of education, training, or professional development programs could help address these needs?
- ▶ What key career junctures need more support to better expand and retain the workforce in regenerative medicine? How do you define training throughout career paths?
- ▶ What are the challenges and incentives for creating a diverse pipeline



Snapshot: InnovATEBIO

A national network for biotechnology workforce education
www.innovatebio.org

134 College Programs



39 States*

Industry Relevant Education



86 Industry
advisory boards

38 Biotech degrees / certificates:

Biotechnology Biomanufacturing

Brewing Science, Medical Devices, Regulatory Affairs, Stem Cell Technology, ...

Foster Career Paths

54

Articulation agreements
with 4 yr colleges

17

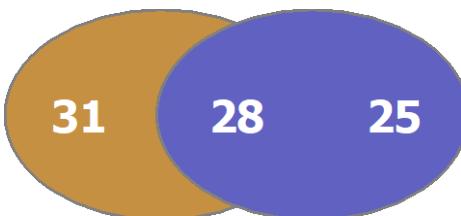
High school
partnerships

23

Dual credit high
school partnerships

\$\$ Program Funding \$\$

NSF ATE Other



83 have received grant support

Programs Benefit Economies



750 Employers have hired
InnovATEBIO students

18 Provide incubators or services

Collaborate with
Manufacturing
Institutes, BIO, and
industry

*Includes Puerto Rico & Washington DC
 Data sources: InnovATEBIO.org, Biotech-Careers.org, NSF.gov

Updated 5-19-2022

Creating the Biotechnology Talent Pipeline

- Public Awareness
- Emphasize Creating a Diverse Workforce
- Multiple Entry and Exit Points from Industry to Education
- Focused on Mastering Industry Validated Competencies
- Project Based Education
- Combine Economic Development with Education
- Student Centered
- Seamless Articulations



Gap Analysis for the Workforce

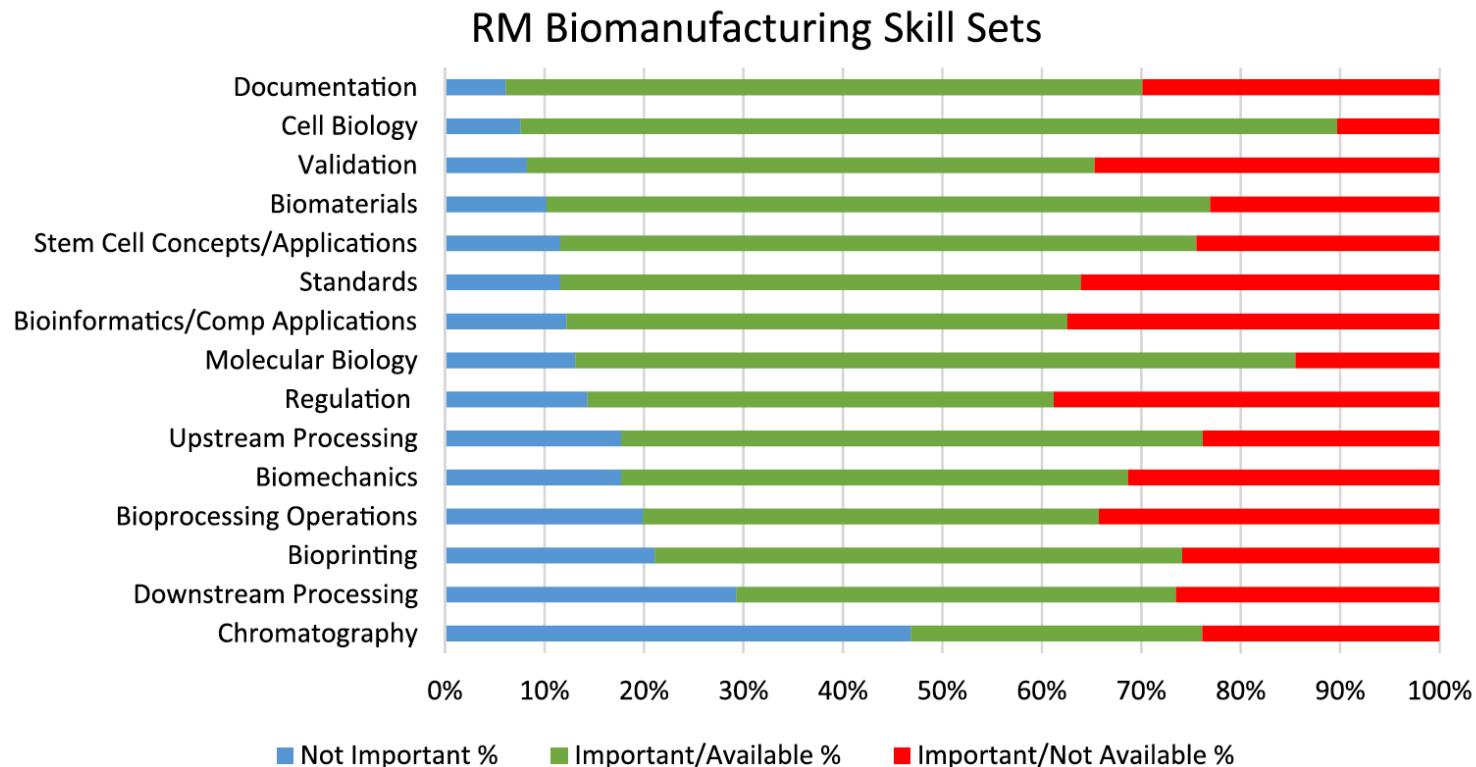


FIGURE 1 Illustrates the ReMDO survey results that address skills needs (green and red) and skill gaps (red only) for the 15 identified skill sets for the regenerative medicine skilled technical workforce

Recommendations for workforce development in regenerative medicine biomanufacturing Gary M Green, Russ H Read, Senyong Lee, Thomas Tubon, Joshua G Hunsberger, and Anthony Atala *Stem Cells Translational Medicine* 2021;10:1365-1371

RM Biomanufacturing Workforce Development Ecosystem

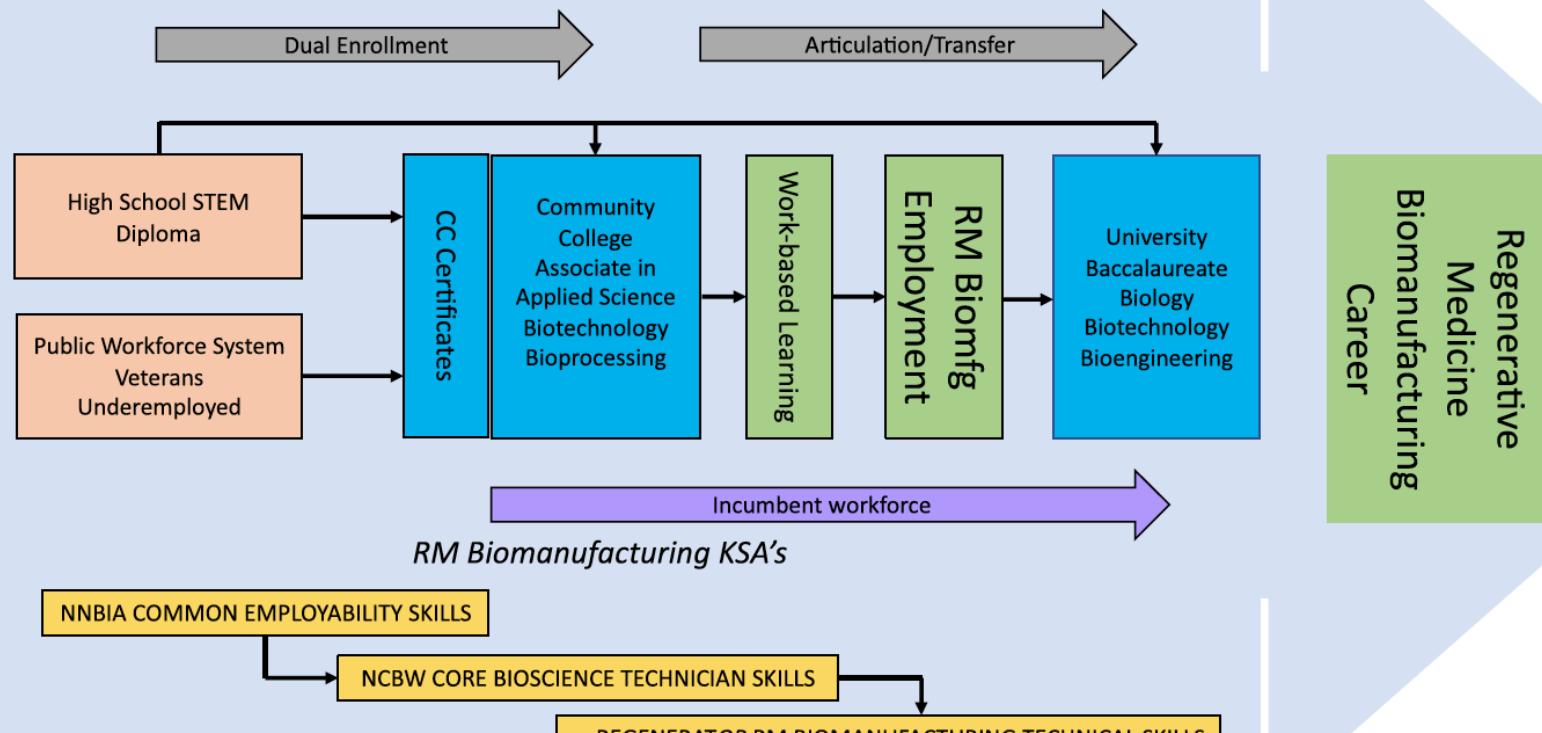


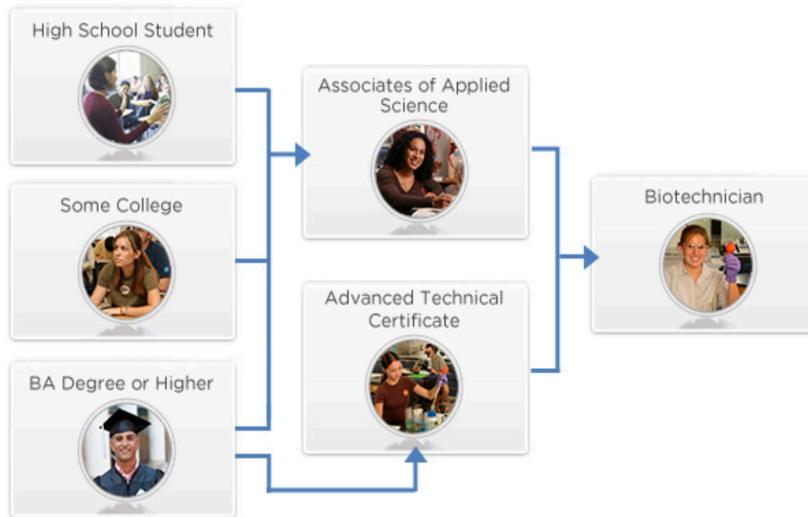
FIGURE 2 Depicts a model of the educational ecosystem for the skilled technical workforce for regenerative medicine biomanufacturing. The diagram shows the educational continuum from K-12 to university, the connectors that close the seams in the educational pathway (dual enrollment and articulation/transfer), and the defined KSAs that guide curricula.

Case Study: Austin Community College Biotechnology Program

www.austincc.edu/biotech/

- ▶ Service Area: Greater than the State of New Jersey
- ▶ Both Academic and Workforce Programs
- ▶ Hispanic Serving Institution
- ▶ No Entrance Requirements
- ▶ Offers Credit and Noncredit, 4-year, 2-year Degrees and Certificates in Workforce Education Besides Transfer Programs
- ▶ Offers Advanced Training in Cell Culture, Upstream and Downstream Bioprocessing, Medical Diagnostics (PCR), Instrumentation, Bioinformatics, Next Gen Sequencing, Regulatory Affairs, QA and QC, and Basic Laboratory Competencies in a Regulated Environment

Pathways to a Biotechnology Job



Combining Economic Development with Education

► Director, Nancy Lyon



The image shows the homepage of the Austin Community College Bioscience Incubator (ABI) website. The header features the ABI logo (a green geometric structure) and the text "AUSTIN COMMUNITY COLLEGE BIOSCIENCE INCUBATOR". The navigation menu includes links for ABOUT, COMPANIES, FACILITY, NEWS, APPLY, CONTACT, IMPACT, and EDUCATION. The main content area has a teal background. It features the text "LEASABLE WET LAB SPACE FOR BIOTECH STARTUPS" and two purple buttons: "APPLY FOR MEMBERSHIP" and "REQUEST A TOUR". To the right is a photograph of a modern laboratory workspace with various pieces of equipment and supplies. Below the photograph is the text "INCUBATING COMPANIES" followed by three small dots.

SERVICES



COLLABORATIVE SPACE

ABI members have full access to state-of-the-art instrumentation and equipment across various shared lab spaces. Training, support, and maintenance are all included in monthly leases. Coworking desk area, shared printer, private conference room, full kitchen, and medical privacy room are all available to support your business needs.



STARTUP BUSINESS SUPPORT

Entrepreneurs enjoy an IP-free zone with access to workshops, industry partners, extensive mentor network, and a robust interdisciplinary internship program. Your business growth will be supported by startup-friendly lease rates, equipment and instrumentation use and support, cold and dry storage space, community relationships, and a central location.



INDUSTRY PARTNERSHIPS

Forging partnerships with industry leaders to offer innovative technology on-site, along with local instrumentation training and flexible equipment use agreements for growing industry needs in the Central Texas region. ABI is continually working to support the growing life sciences and biotech industries in Central Texas.



WORKFORCE EDUCATION

ACC offers a multitude of educational and workforce training programming, and ABI strives to support hands-on learning opportunities for diverse disciplines, through real-world internship opportunities providing a vast array of expertise in support of our member company needs, from biotech lab technicians to marketing and beyond.



Advanced Technological Education

Provides Educational Solutions
For Training the Regenerative
Workforce

- ▶ Authorized by Congress in 1992 (Scientific and Advanced-Technology Act of 1992)
- ▶ Focuses on Creating the Technician Workforce for Advanced Technologies
- ▶ Creates Both Centers, Consortiums and Projects in Areas such as Biotechnology, Nanotechnology, Energy, IT, Cybersecurity, Advanced Manufacturing, Agriculture, Environmental Science, Marine Science, Autonomous Technology, Supply Chain



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Relevant ATE Awards

Developing the Skilled Technical Workforce for Regenerative Medicine Biomanufacturing in the Piedmont Triad Region of North Carolina

Award Number:2100268; Principal Investigator:Gary Green; Co-Principal Investigator:Russ Read, Cheryl Burrell; Organization:Wake Forest University School of Medicine; NSF Organization:DUE;

Scaling Implementation of Stem Cell Technical Education: A Collaborative Project

Award Number:1501553; Principal Investigator:Thomas Tubon; Co-Principal Investigator:Robert Del Vecchio, Edith Kaeuper, Carin Zimmerman, Jeanette Mowery; Organization:Madison Area Technical College

Development of a Technical Program in Stem Cell Technologies: Responding to an Emerging Need

Award Number:1104210; Principal Investigator:Thomas Tubon; Co-Principal Investigator:Thomas Tubon, Jeanette Mowery; Organization:Madison Area Technical College

Consortium for Advanced Manufacturing of Cell and Tissue-Based Products

Award Number:2223416; Principal Investigator:Thomas Tubon; Co-Principal Investigator:; Organization:BIOINDUSTRIAL MANUFACTURING AND DESIGN ECOSYSTEM

Discussion/Resources

- 1) **Recommendations for workforce development in regenerative medicine biomanufacturing** Gary M Green, Russ H Read, Senyong Lee, Thomas Tubon, Josha G Hunsberger, and Anthony Atala *Stem Cells Translational Medicine* 2021/10:1365-1371
- 2) **Voluntary Consensus Standard Recognition Program for Regenerative Medicine Therapies: Draft Guidance for Industry**
<https://www.fda.gov/regulatory-information/search-fda-guidance-documents/voluntary-consensus-standards-recognition-program-regenerative-medicine-therapies>
- 3) **Skill Standards and Curriculum for Cell and Gene Therapy Technicians** Dr. Margaret Bryans and John Carrese (Funding Award from NIIMBL and financial assistance from the U.S. Department of Commerce, National Institutes of Standards and Technology (70NANB17H002))
- 4) **NIST and Regenerative Medicine** <https://www.nist.gov/regenerative-medicine>