Training the Regenerative Medicine Workforce for the Future: A Workshop

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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

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Snapshot: InnovATE*BIO*

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, …

Programs Benefit Economies

750 Employers have hired InnovATE*BIO* students

Foster Career Paths

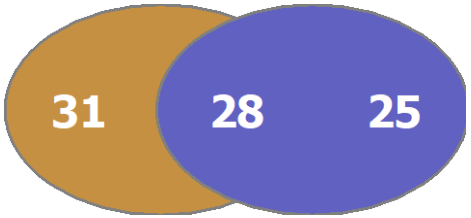
54 Articulation agreements with 4 yr colleges

17 High school partnerships

23 Dual credit high school partnerships

$$ Program Funding $$

NSF ATE Other



83 have received grant support

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

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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

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Gap Analysis for the Workforce

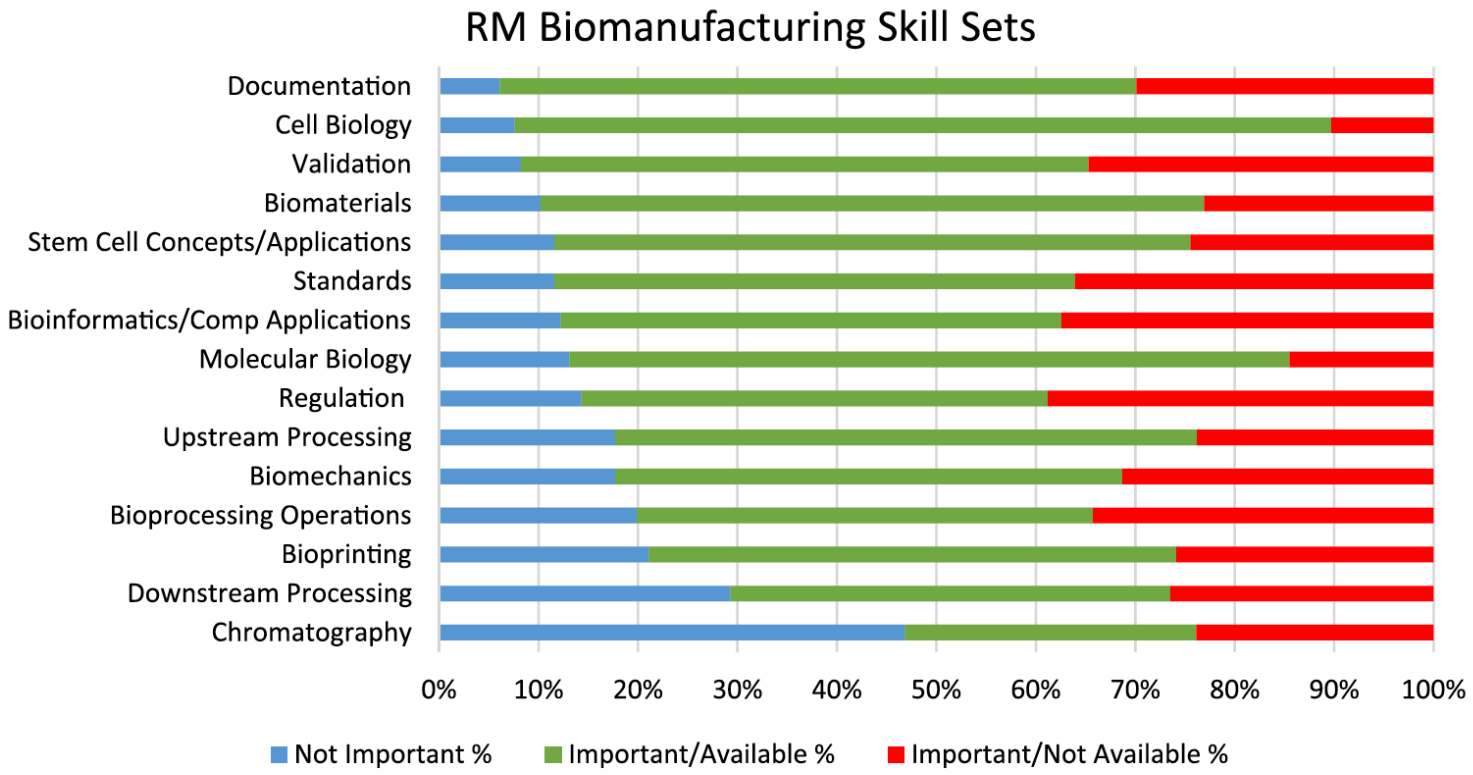
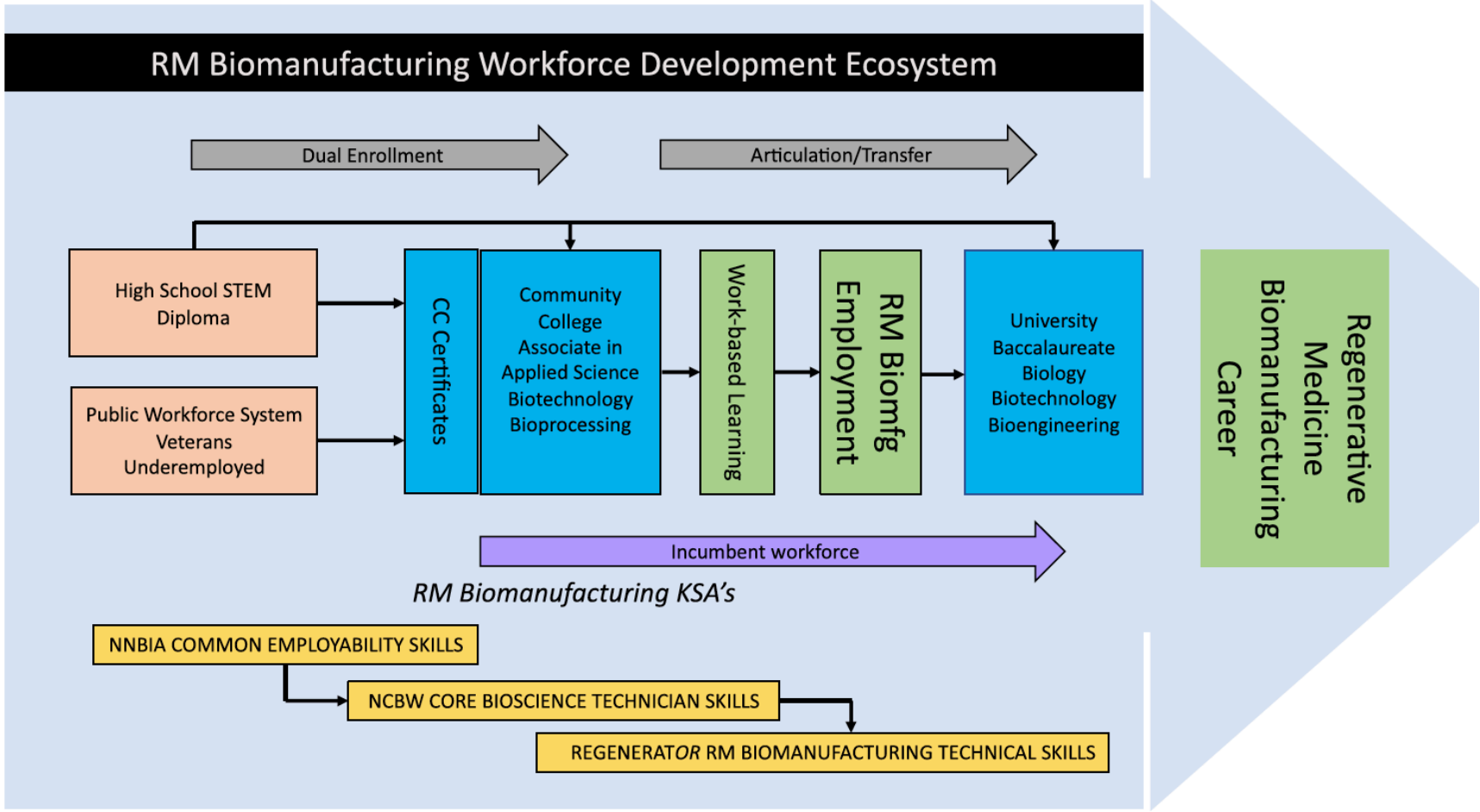


FIGURE 1 Illustrates the ReMDO survey results that address skills needs (green and red) and skill gaps (red only) for the 15 identified skill sets for the regenerative medicine skilled technical workforce

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

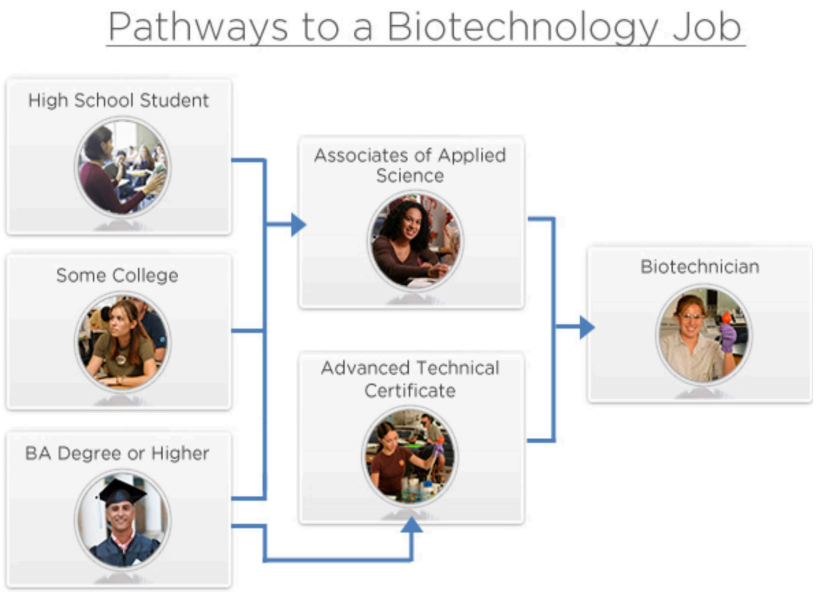


E 2 Depicts a model of the educational ecosystem for the skilled technical workforce for regenerative medicine bio
g the educational continuum from K-12 to university, the connectors that close the seams in the educational pathway
culation), and the defined KSAs that guide curricula

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



Combining Economic Development with Education

- Director, Nancy Lyon

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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

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Discussion/Resources

1) **Recommendations for workforce development in regenerative medicine biomanufacturing** Gary M Green, Russ H Read, Sengyong 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

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