



The National Institute for Innovation in Manufacturing Biopharmaceuticals

Supporting Capability in Workforce Resources

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Situation | As developing nations share many of the same workforce challenges, global collaboration is critical.

- A preliminary training assessment of 19 global companies within the DCVMN was conducted for BMGF by North Carolina State University.
- **There are lots of similarities with developed countries:**
 - The need for talent – and challenges with retaining talent
 - The reliance on foundational hands-on training for most technical staff
 - The need for training in emerging technologies such as automation, data science automation, virology, and design of experiments
- **However, we recognize that many unique challenges exist in developing countries**
 - Generalizing a solution is difficult due to differences between manufacturers in terms of their product portfolios, facilities, operations, and training programs
 - Regional language and learning technology differences
 - Availability of an in-country talent base
- There are a lot of organizations invested in global vaccine manufacturing workforce development



Trends | The need for skilled talent cannot be overstated.

- **Need for skilled talent will continue to increase** due to growth in cell therapy, gene therapy, and pandemic-related vaccine manufacturing
- **It's not just chemical engineers and molecular biologists.** Companies are growing increasingly multi-disciplinary and seek out a wide variety of backgrounds including data science, computer science, and business for a wide variety of roles including technicians, engineers, scientists, and corporate professionals
- **Adaptability is critical.** Technology and modality adoption requires that next-generation workforce must be adaptable, able to "pivot," and possess a strong LQ (learning quotient) in addition to a strong IQ (intelligence quotient) and EQ (emotional quotient).
- **Non-traditional pathways must be considered.** In order to meet the ever-increasing need for skilled talent, organizations must begin to embrace new approaches to demonstrating skill such as credentialing, certification, badging, and apprenticeship

WHAT ARE WE DOING TO HELP?

- Motivating new talent pools to explore careers in biopharma through our NIIMBL eXperience initiative
- Training military veterans and helping ensure they are placed in biopharma jobs
- Increasing the number of institutions industry recruits from each year
- Connecting companies directly to highly-skilled talent
- Piloting capstone badging experiences to augment 2-year degree graduates



Trends | Specialized hands-on training centers & regional partnership are driving success.

Success Factors

- Industry-led initiatives (lobbying power)
- Strong institutional support
- Collaboration & “Collective Impact”
- Industry-scale equipment
- Experienced staff / access to curriculum

Challenges

- Staffing / turnover (industry pays more)
- Equipment maintenance / upgrades
- Throughput limitations
- Competing priorities (training vs research vs services)

WHAT ARE WE DOING TO HELP?

- Facilitating train-the-trainer and curriculum transfer between centers
- Upgrading equipment and installing state-of-the-art education and training testbeds
- Catalyzing new partnerships between university training centers and community colleges



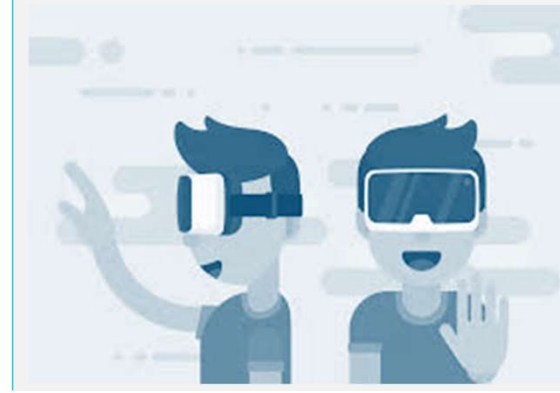
Trends | The pandemic jumpstarted use of new learning technologies.

- As university and community college biotechnology classrooms went online, instructors were forced to develop replacements for hands-on learning
- Institutions have created robust video libraries to augment online classes with laboratory demonstrations in addition to exploring the use of virtual reality (VR) and augmented reality (AR) solutions
- Others have developed kits for students to practice foundational skills such as pipetting at home
- While many schools have resumed face-to-face classes and laboratories, new learning technologies will remain an integral part of instruction



WHAT ARE WE DOING TO HELP?

- **Driving online curriculum development** in cell therapy, vector manufacturing, automation
- **Exploring mixed reality (AR/VR) and digital twin technologies** to teach unit operations and biopharma manufacturing concepts
- **Cataloguing education and training resources** for use by industry and educators



Opportunity | Global collaboration critical to workforce development success in developing nations.

- Again, there are a lot of organizations invested in and talking about global vaccine manufacturing workforce development
- Success in-country will require:
 - Better understanding of best practices and who's doing what?
 - Site-specific staffing plans and understanding training needs for technicians, scientists, engineers, quality, regulators, etc...
 - Mapping of region-specific talent supply, educational, and workforce development ecosystems and limitations
 - Formation of new partnerships between experienced training centers and in-country ecosystem partners
 - Infrastructure investment aligned with regional capabilities and partners
 - Curriculum development/sharing (hands-on and virtual) to 1) inspire new talent in-country, 2) upskill incumbent workforce, and 3) provide consistency across regions in understanding of new vaccine manufacturing science

