THE UNIVERSITY OF RHODE ISLAND

REAL JOBS RHODE ISLAND CASE STUDY:

Biomedical Equipment Technician and Data Scientist Apprenticeship Program

Prepared for:

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Biomedical Equipment Technician and Data Scientist Apprenticeship Program

Real Jobs Rhode Island (RJRI)

In 2015, The Rhode Island Department of Labor and Training (DLT) awarded funding to workforce development collaborations throughout the state. Funding was provided through development grants to create sector-based partnerships and create a plan to provide workforce training aimed at sector needs. Implementation funding was then provided for these partnerships to develop training materials and train workers in Rhode Island in targeted industries, including healthcare, technology, marine trades, and the arts. Sector partnerships were developed through public private partnerships that included industry, workforce intermediaries, and educational institutions to address the economic needs of the state.

I. Sector Need

The Biomedical Equipment Technician and Data Scientist Apprenticeship Program (BET & DS), led by Claflin Medical Equipment, was designed to address a training gap and identify qualified people to fill equipment and information technology positions within the healthcare sector. Claflin Medical Equipment applied for and received an RJRI planning grant to develop the BET & DS Program. As part of the planning grant, Claflin conducted a survey, completed interviews, and held a roundtable discussion to aid in identifying issues and training needs within the industry. Based on the survey's findings, the BET & DS Program sought to address several realities within the healthcare industry, including:[1,2,3]

- The healthcare sector was the fastest growing industry in Rhode Island between 2000 and 2010 (growing 18.8 percent) and employed about 16 percent of the population. In 2013, hospitals accounted for nearly 6 percent of all jobs in the state.
    - As an example of growth in the biomedical field, the total sales of Claflin Medical Equipment are expected to increase from $37 million to $60 million annually.
- In Rhode Island, Biomedical Equipment Technician and Data Scientist positions are in high demand, and positions are often unfilled for long periods of time (49 months).
    - Over the next 10 years, there are expected to be 122 job openings labeled "Medical Equipment Repairers" in Rhode Island. Of these openings, 65 will be new job openings, and 57 will be due to incumbent worker turnover and retirements.

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[1] Greenwell, K. (2015, August). Labor Market Information Unit/ DLT. \A. Rome, Interviewer) Kate Greenwell provided data specific to the healthcare industry in RI, in biomedical and IT sectors, specific to job attributes and projected growth in the sector.

[2] Advancing Safety in Healthcare Technology. (n.d.). Retrieved from http://www.aami.org

[3] Industry Statistics Portal. (n.d.). Retrieved from Business Data from the US Census Bureau http://www.census.gov

        - Demand for Data Scientists is expected to grow by 10 percent over the next decade.
    - Medical equipment repairers earn between $45,000-$72,000 annually.
    - Most employers would strongly prefer to hire skilled workers rather than train them, but the pool of these workers in Rhode Island is extremely small.
    - The biomedical industry has faced difficulty finding available workers.
- Rhode Island lacks any form of institutional training for these programs, and many employers lack the means to train such workers.
    - Biomedical Equipment Technician and Data Scientist positions often go to job seekers from out of state with the needed specialized knowledge and skills. Massachusetts has training programs; therefore, many Rhode Island jobs go to residents of Massachusetts.
    - Companies that do conduct training often have difficulties conducting training in-house, and there is no training standardization within the industry.
    - Medical technology training takes at least two years, and this period is quite expensive because companies must pay trainees a living wage to ensure retention.
    - Turnover of trainees is an issue, and training costs are high. When an employer loses a trainee, it can cost the employer anywhere from $60,000-$70,000 in sunk training costs.
    - The majority of those who are hired into this industry lack certification and a college degree, so they still require one to three years of intensive on-the-job and academic training, and many young workers lack the maturity to be successful even with training.

To address these issues, the BET & DS Program specifically targeted companies that hire individuals for Biomedical Equipment Technician and Data Scientist positions, including healthcare organizations that employ staff directly and those that contract with third party providers. Biomedical Equipment Technicians install, inspect, maintain, repair, calibrate, modify, and design biomedical equipment and support systems to adhere to medical standard guidelines. They also educate and advise staff and other agencies on safe clinical application of biomedical equipment. Those who are qualified to be Data Scientists have certifications and experience in installing hardware, network equipment, and software applications and in managing the intersection of information technology and business operations. Overall, the training program worked to create a sustainable pipeline of well qualified local job seekers who would be available to fill jobs in the biomedical sector.

II. Grant History

In 2015, the DLT contacted Claflin Medical Equipment about the DLT grant program and encouraged Claflin to apply because DLT believed Claflin would be a good fit for this initiative. The CEO of Claflin was intrigued by the idea, and involved the Director of

Operations, who served as a liaison to the Community College of Rhode Island (CCRI). Claflin hired a grant writer who helped complete research and identify potential partners. The grant writer facilitated meetings among the partners of the grant and was instrumental in putting together the application for the RJRI planning and implementation grants. This group, including Claflin, CCRI, Year Up, and hospital partners, had never before worked together, and there had never been a formal relationship among them. However, in 2015, a Year Up student was employed as an apprentice at Claflin, and Claflin was impressed with the quality of this employee. This success gave Claflin the idea to partner with Year Up for the RJRI grants.

III. Goals and Objectives

The BET & DS Program was specifically developed to address Rhode Island's need for training for Biomedical Equipment Technicians and Data Scientists positions. The apprenticeship program included on-the-job training and community college courses to ensure that apprentices have the required skills to ultimately obtain industry certifications. The BET & DS Program sought to:

1. **Develop and implement an apprenticeship program for Biomedical Equipment Technician and Data Scientist positions.**

Specifically, BET & DS sought to meet the following recruitment and training objective:

- Recruit, train, and place four participants in apprenticeship programs (two in Biomedical Equipment Technician apprenticeships and two in Data Scientist Apprenticeships).

IV. Partnerships

Table 1: Partnership Members and Responsibilities

Claflin Medical Equipment (CME)	Lead Applicant: responsible for designing and executing the workforce training plan; acting as fiscal agent; enrolling Year Up graduates in custom CCRI classes; holding laboratory training and orientations.
Claflin Company	Responsible for managing the apprenticeship training for all Data Scientists; enrolling Year Up graduates in custom CCRI classes; holding laboratory trainings and orientations.
Year Up	Responsible for providing pre-apprenticeship training; developing workplace readiness skills in recruits; recruiting participants for the BET & DS Program.
CCRI	Responsible for developing curriculum; holding classes; supporting apprentices in their studies; creating two new degree concentrations for apprentices.
Rhode Island Free Clinic	Responsible for supervising and hosting year three apprentices in their second year of on-the-job training; inviting other apprentices and trainers to visit, tour, and hold discussions at the Clinic.
VA Medical Center	Responsible for providing supervision and guidance to year-three apprentices in their second year of on-the-job training.
South County Hospital	Training site host; responsible for providing supervision to year-three apprentices in their second year of on-the-job training.
Sturdy Hospital	Responsible for providing supervision and guidance to year-three apprentices in their second year of on-the-job training.

V. Implementation Activities/ Processes

Goal #1: Develop and implement an apprenticeship program for Biomedical Equipment Technician and Data Scientist positions.

Recruitment & Pre-Screening

Apprentices were recruited from the Year Up program. Year Up is a program that prepares young people who are unemployed to enter the workforce and train them in the skills they need. The Year Up program has a rigorous application process for recruiting young adults ages 18-24 with economically disadvantaged backgrounds who are currently not enrolled in a postsecondary education program. The program pays each participant to complete the program and requires participants to meet expectations while in the program. Each cohort of individuals in this program completed the Year Up program during year one (Module 1).

At the end of year one of the Year Up program, the BET & DS Program completed a presentation to the soon-to-be graduates of the information technology (IT) track. Program representatives explained the job to them, asked them to submit a job application, an essay, and a reference check, and then completed short interviews with every applicant from Year Up who was interested. The following characteristics were identified by partners as key to being successful in the positions: an interest in technology; motivated to improve their career and advancement of their education; good workplace habits; basic knowledge or interest in math and science; and desire for a career that allows for growth and advancement. Following the interview, about ten finalists were invited for a lengthy interview on-site, and four candidates were offered a position in the BET & DS Program, two for the Biomedical Technician program, and two for Data Scientist program. The students then graduated from the Year Up Program and moved to the BET & DS Program.

Training & Apprenticeship

A professor from CCRI worked with the BET & DS Program to create the curriculum for the Biomedical Technician and Data Scientist tracks. The professor helped to ensure credits could be granted through CCRI for on-the-job training so that the BET & DS program could streamline the process as much as possible and ensure the apprentices were not required to take extraneous courses.

The overall idea of the program was for apprentices to complete on-the-job training and mentoring over the course of two years, and to attend courses at CCRI with the goal of receiving an associate's degree. To implement the program, apprentices first participated in a six-month long orientation hosted by Claflin Medical Equipment and Claflin Company, based on whether individuals were doing the BET or DS programs (Modules 3 & 4). The orientations covered specifics of the industry and taught basic skills needed in field work. The orientation also allowed for further screening of the candidates to assess their job readiness. During this time, apprentices were paid $16 per hour for 40 hours per week, with the RJRI funding paying for 50 percent of the costs and Claflin Medical Equipment paying the other 50 percent.

In addition to their on-the-job training in year one, apprentices also began coursework at CCRI, ideally taking mostly weekend and night courses (Module 2). Apprentices' tuition, fees, and books were paid for through the RJRI grant. The Biomedical Equipment Technicians were enrolled in the Applied Science Technical Studies- Biomedical Technician program (Module 5). The Data Scientist apprentices were enrolled in the Engineering Systems Technology (ETST) program (Module 6). Classroom instruction was aimed at developing and improving skills in problem solving, critical thinking, communication, and mathematics.

After the completion of the orientations, the apprentices were then paired with an experienced and certified mentor to "shadow and assist" in both field and lab work. Senior employees provided mentoring and support to the individuals in the program, and the individuals gradually gained enough knowledge and skills that they were able to complete jobs on their own. Throughout years one and two, apprentices progressed towards their BMET and IT certifications at an individualized pace (Module 7). Biomedical Technicians were paired with a BMET certified senior technician for a minimum of one year, and they assisted and observed their mentors. After six months, the apprentices began supervised independent hospital work as well as continued workshop work. During this period they also honed their skills in preparation for the Certified Biomedical Equipment Technician (CBET) exam. A Biomedical Equipment Technician Apprentice must earn at least an Associate's degree and have worked full time for two years in order to take the CBET exam.

The Data Scientist apprentices also progressed towards obtaining various IT certifications in a similar manner (Module 8), and were paired with an experienced mentor to observe and assist. After six months, the apprentices began more supervised independent work at partner hospitals and the Rhode Island Free Clinic. They also continued work at Claflin Company's workshop during this time.

For the rest of Year One, the apprentices were paid $16 per hour for 40 hours per week when working with their mentors. By year two, the industry partners were expected to pay the salaries. By this point, the BET & DS Program expected that their investment in each apprentice would break even beginning in year two, meaning that their salary could be covered through contract work arranged through normal business operations.

Assessment & Trends

The BET & DS Program planned to conduct a semi-annual survey to assess progress towards goals and periodically update labor department statistics to keep current with labor trends.

Table 2: Training Module Overview

Modules	Skills Addressed
Module 1: Year Up Workforce Training Provider: Year Up	Job Readiness, familiarity with basic technology (hardware & software).
Module 2: CCRI Associate's Degree Part I Provider: Year Up/CCRI	Theoretical knowledge analytic & problem-solving skills.
Module 3: Biomedical Equipment Technician (BMET) Orientation Provider: Claflin Medical Equipment	Understanding of and competency in basic job functions of BMET.
Module 4: Biomedical IT Technician (BMITT) Orientation Provider: Claflin Company	Understanding of and competency in basic job functions of IT Tech.
Module 5: CCRI Associate's Degree Part II (for BMETs) Provider: CCRI	Theoretical knowledge; analytic & problem-solving skills.
Module 6:CRI Associate's Degree Part II (for BMITTs) Provider: CCRI	Theoretical knowledge; analytic & problem-solving skills.
Module 7: BMET Apprenticeship Provider: Claflin Medical Equipment	BMET 1; BMET 2; BMET 3; CBET Certification.
Module 8: Data Scientist Apprenticeship Provider: CCRI	6-7 IT Certifications.

VI. Achievements

Partnerships

New and effective partner organizations

The BET & DS Program found the Rhode Island Free Clinic, an initial business partner, to be an excellent placement for apprentices to gain experience. Claflin had never partnered with anyone before this program, but Claflin now has a close relationship with the Rhode Island Free Clinic. Claflin provides some free or reduced rate services for the Rhode Island Free Clinic, so in turn, the Rhode Island Free Clinic is more than willing to provide an environment for apprentices to gain knowledge and skills. Furthermore, the partnership with CCRI worked very well and produced positive results in terms of curriculum development, courses, and degree completion for the apprentices. Finally, the partnership with Year Up has proved invaluable as well. Year Up is very flexible with meeting the BET & DS Program's needs, and this partnership has also benefited Year Up as it allowed them create a new curriculum and attract new students to the program.

Recruitment

Ability to meet recruitment and completion goals

The BET & DS Program highly valued the partnership with Year Up for finding high quality, dedicated program participants. During the second class, there were no drop-outs, and Claflin believed it found good matches for the positions.

Trainee Barriers

Helping active students complete their degrees

When apprentices were not able to take a full load of classes at CCRI, the BET & DS Program worked with the individual to ensure they could at least take one course each semester. This extended the amount of time in school, but the trainees were able to continue making progress in obtaining their degree.

Training

Incentives program helped motivate participation

Claflin implemented a department incentive program that is performance-based for mentors in the program, and participating in mentorship for the BET & DS Program is included as part of that incentive program. Overall, mentors liked participating in mentorship as they felt they were getting assistance or help on their job by having a mentee. Mentees gradually worked towards full independence as they gained more experience. When the apprentices became fully independent Claflin could begin billing for the work they provided, increasing the value of the apprentices to the company.

Transition from Training to Employment

Program apprentices transitioned to employees quickly

The BET & DS Program found that the Biomedical Technicians became “employees” of the company rather quickly. For example, the first group of Biomedical Technicians were viewed by year two of the program as assets to the company, meaning Claflin was already able to bill for services provided by these apprentices.

Table 3: Performance Metrics

IG-02 Biomedical Equipment and Data Scientist Apprenticeship (BET & DS)	Start Date of First Cohort	Proposed End Date for All Cohorts	Target Enrollment	Enrolled	Target Completed	Completed
Recruitment, Training, and Employment						
Apprenticeship - Cohort 1	4/1/2016	12/31/18	4	5	4	4
Employed after Apprenticeship					4	3

VII. Challenges

Partnerships

Convincing industry employers to join the partnership

The BET & DS Program had difficulty convincing hospital partners to support the program. Claflin wanted the apprentices in the BET & DS Program to have outside experience beyond Claflin, but finding partners willing to allow this proved challenging. Partners that stated they would participate sometimes ended up participating less than expected. In one case, this was due to a point of contact person retiring.

Difficulties working with the VA Medical Center

Claflin had intended to work with the VA Medical Center, but due to administrative hurdles in the VA system, implementing apprenticeships for any length of time at the VA proved difficult.

Recruitment

Difficulty establishing an effective recruitment process

One of the biggest challenges noted by the BET & DS Program had to do with figuring out the recruitment process. The process was quite involved and was critical to the success of this training program. As described, the BET & DS Program identified program participants through the Year Up program. When recruiting the first cohort of participants, the timing was an issue, and the BET & DS program did not start recruiting participants until after many of the Year Up soon-to-be graduates had already found job placements. During this first cohort, two of the four people recruited dropped out of the program because it was not an ideal match between employee and employer. While the BET & DS program was able to find other recruits in this situation, it learned that there appears to be an optimal time to start recruiting participants so that all Year Up students can consider working at Claflin. This would allow Claflin to recruit from the best candidates rather than getting in too late and potentially losing out. Therefore, when recruiting for the second cohort, the BET & DS program conducted its recruitment presentation earlier and was able to identify four excellent matches for the program.

Trainee Barriers

Transportation

Several students had transportation difficulties, but these challenges were overcome as the students started earning paychecks to assist them in repairing or purchasing vehicles.

Training

Underestimating training length and effectiveness

The amount of one-on-one training and mentorship required for each apprentice was one challenge identified by Claflin. Claflin did not anticipate the amount of time needed for training.

Overall, Claflin found that having one-on-one mentor support was the most effective for ensuring that each apprentice gained the necessary knowledge and skills. Therefore, adjustments had to be made to the program to ensure that each apprentice got as much one-on-one support as needed.

Lack of mentors

Making sure each apprentice was paired with an experienced mentor was challenging as the number of apprentices increased. Claflin worked to identify more senior-level technicians able to provide support. The program is now set up where each apprentice rotates through different senior-level people depending on which skills they are building.

Transition from Training to Employment

No means for billing for Data Scientists program

While the BET & DS program found those who were training as Data Scientists to provide helpful support to their mentors, the program was not able to bill for services for the Data Scientist position. The data scientist program does not have direct, revenue-generating jobs like the biomedical technicians do, so it is less clear if the program is working well.

VIII. Sustainability

Claflin views the Biomedical Technician program as highly sustainable and sees a strong future for the Biomedical Technician program. The sustainability of the data scientist program has yet to be determined because it is more challenging to identify whether or not the company is benefiting from it. Claflin has identified projects where Data Scientists are able to help make projects more efficient, but also has identified projects where things are done less efficiently because extra time is spent on training. Claflin has stated an interest in expanding the apprenticeship program to benefit other industry employers.

IX. Lessons Learned

The following lessons were learned by the BET & DS Program in executing this training program:

- Partnering with the Rhode Island Free Clinic proved to be a mutually beneficial partnership that was highly effective.
- Recruitment for the for the BET & DS Program needs to align with Year Up graduation timelines in order to ensure all Year Up graduates know about this program when learning about other opportunities.
- Apprentices may have difficulties with taking a full course load at CCRI while also working full-time through the BET & DS Program.
- The success of the training program for Biomedical Technicians is more easily recognized than the program for Data Scientists.

X. Best Practices

These best practices were utilized by the BET & DS Program:

- Provide funding for the apprentices while in the training and apprenticeship program.
- Ensure one-on-one mentorship is provided.
- Provide workplace incentives for mentors who take part in the program.
- Enable apprentices to adjust timelines for completion of their degrees at CCRI when they are unable to take a full course load.
- Identify partners that can provide mutually beneficial services to one another. For example, the Rhode Island Free Clinic served as a training site, and Claflin provided free or reduced services to the Rhode Island Free Clinic in exchange.

XI. Recommendations

Based on the implementation successes and challenges of the BET & DS Program, the following recommendations are suggested:

- Identify additional partners that might also value free or reduced services in exchange for apprenticeship placements (mutually beneficial partnerships).
- Encourage this partnership to work with CCRI and former/current apprentices to identify the most effective modes (online vs. in-person) and days/times (day, night, or weekend courses) for providing and completing coursework.