Tracking Biotechnology Graduates of Forsyth Technical Community College

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Introduction: The focus of this project was to assess the commonality of characteristics among leading biotechnology graduates of Forsyth Technical Community College (Forsyth Tech). Forsyth Tech is a member of the North Carolina Community College System (NCCCS) which has invested heavily into workforce training for the assembly of a large pool of highly trained biotechnology workers. This is a follow-up study to the *Tracking Biotechnology Graduates in the Piedmont Triad, North Carolina* report completed in June 2009 and *Tracking Biotechnology Graduates of Forsyth Technical and Alamance Community Colleges* completed in April 2010; both can be accessed online at www.biotechworkforce.org. This project explores the characteristics demonstrated by prominent graduates of Forsyth Tech's Biotech Program. Graduates of this institution represent the Piedmont Triad region of North Carolina which is designated as an emerging cluster in biotechnology and the life sciences. The team worked with graduates who are achieving high levels of success in their careers or subsequent educational endeavors. Our purpose was to discover the characteristics or skills that they share that could be encouraged or enhanced in other students and graduates to raise the level of success obtained by other Biotechnology graduates.

Background: The North Carolina Community College System (NCCCS) BioNetwork trains Biotechnology workers for the state. In its short history, it has set up a system of workforce training that is internationally recognized. For the most part, the people who take NCCCS courses are either new to the biotechnology arena and are pursuing entry-level job training, or they are incumbent workers taking training upgrades, or they are pursuing an academic degree, such as an Associates. Forsyth Technical Community College, in the Piedmont Triad area, has strong ties to BioNetwork and is a leader in NC Biotechnology training. It is home to the National Center for the Biotechnology Workforce and it currently offers an Associate of Applied Science Degree in Biotechnology. The data from the Forsyth Tech Biotech program points to an average age of 35 with two-thirds of the students being female. We believe for economic reasons, pertaining to return on investment, following up with our graduates is a college and possibly a statewide priority. It had been assumed that Biotechnology students and graduates go into the biotechnology workforce after graduation, but data from our previous studies suggest that (at least for Forsyth Tech) employment into biotechnology positions is not always immediate.

Methodology: Four prominent graduates of Forsyth Technical Community College's Biotechnology Program agreed to be interviewed in a casual environment. They were videotaped and asked through a series of scripted questions, to self assess the attributes that have made them successful through the

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Forsyth Tech Associates Degree and onto the next level of education or employment. The videotaped responses were then transcribed into a spreadsheet for comparison. After the responses were transcribed it was noticed that in a few instances one or other of the participants had not provided input to a question; in that instance the participant was contacted via email and asked to respond. The chosen participants were:

- Jim Crawford, a 2007 graduate, earned an internship in Dr. Anthony Atala's lab at the Wake Forest Institute for Regenerative Medicine (WFIRM). The internship led to a full-time job in Dr. Atala's lab. Crawford worked there for nearly four years, managing the tissue and cell culture core. In 2009, he accepted a position with KeraNetics LLC as Director of their GLP Laboratory. This biomaterials company creates keratin-based products for areas of regenerative medicine and trauma care. Jim was also accepted into the Master's program at Wake Forest University and is pursuing an advanced degree in Bioethics.
- Robert Adams retired from the US Navy and attended Forsyth Technical Community College utilizing his Veterans Administration Educational benefits. Adams graduated from the Biotechnology Program in 2008. He started with NanoTech Labs (NTL) based in Yadkinville, NC and has climbed the ladder to the position of QA Manager/Engineer for the company. NTL is a nanotechnology materials company focusing on the development and production of military and commercial products that have performance benefits through the incorporation of nanotechnology.
- Margie Parker enrolled in Forsyth Technical Community College's two-year Biotechnology Program in 2006. As of the time of this interview, she is a senior student at the Biomanufacturing Research Institute and Technology Enterprise (BRITE) at North Carolina Central University in Durham on full scholarship. She'll graduate in May 2011 with a four-year degree in Biology and Chemistry with a concentration in Biopharmaceutical Science.
- Mica Welsh earned her Associate's Degree in Biotechnology in 2007 from Forsyth Technical Community College where she served as President of the Student Government. She then transferred to Salem College, where she served as President of Alpha Sigma Lambda, the National Adult Honor Society, and graduated with her Bachelor of Science Degree in Biology with a Chemistry minor in May 2010. Welsh is an Adjunct Instructor of developmental courses at Forsyth Tech and the Research Associate for the National Center of the Biotechnology Workforce.

Questions:

1) Why did you choose the BT program?

The responses demonstrated that all these graduates held an interest in science from an early age. Two of the four could name a certain person who influenced and encouraged that interest. All were adult students undergoing transition in their career field and had been seeking a lucrative and/or stable career change. Only one had utilized any type of science training. Interestingly, the one who had utilized science training during his first career stated that the choice to pursue this Biotech degree was based on the options he was allowed due to his financial aid and not based on his interest in science. The other three perceived that the termination of one career opened the door of opportunity to fulfill their long-held scientific passion.

2) What year did you graduate and what have you been doing professionally since then?

A) Directly into industry:

1. 2006- I was hired By Wake Forest Institute for Regenerative Medicine following my internship as a core technician. I am now the Director of the GLP lab for a spinoff company.

2. 2008- I went directly to Nanotechnologies in Yadkinville and have been promoted to QA Manager/Engineer.

B) Continued education:

3. 2007- I went directly to Salem College as a junior and completed my BS in May 2010. I continue to work with National Center for the Biotechnology Workforce.
4. 2008- I am now at North Carolina Central University in the Biomanufacturing Research Institute and Technology Enterprise (BRITE) program maintaining a full scholarship and expect to graduate May 2011.

3) What were the skills that made you successful in the program and that crossed-over into your career?

Participants unanimously agreed that the most valuable skills in their success were the soft skills of personal and professional interaction and an ownership of the learning process. These graduates expressed a drive to understand the material and the reasons for specific protocol as well as the determination to reach their goal. They recognized in themselves a stronger commitment to learn the subject matter at hand, instead of merely getting through the coursework. Sacrificing entertainment or convenience to attain the knowledge offered was a behavior that some other students didn't share. In addition, these four exhibited skill and motivation to ask questions, find solutions, and make themselves stand out among the other students or workers in their labs. Their ability to communicate to those around them provided greater opportunity for moving up the ladder of success.

4) Some graduates claim not to be interested, but still want to hear about networking events and other information. Can they be brought back to biotech?

Respondents were unanimous in their comments stating that some may be discouraged by the job market which magnified their lack of people skills and soft skills, resulting in an aversion to continue the job hunt thereby preventing them from working in the biotech field. They may still have the spark of interest. The appropriate networking opportunities, skills refreshing workshops, skill re-certification process or soft skill training may be the catalyst to help them get back into the game. Their desire to network indicates a reluctance to abandon their aspirations. It is also recognized that in some cases extenuating circumstances may temporarily or permanently prohibit their return (*i.e.* health issues involving themselves or family members), but the interest is still there.

5) ***Would it help if students were screened prior to entering the Biotech Program?***

Three of the four participants stated that screening was not as important as providing realistic information about the demands of the program and sacrifices that may be required for obtaining the greatest employment opportunities post graduation. Some graduates may have unrealistic expectations of their earning potential with this 2-year degree and many graduates are unaware that they may need to relocate for the best employment opportunities.

6) Any thoughts about resume/ interviewing skills? These things aren't taught, are they?

These graduates agreed that some may not be aware of the quality of communication skills expected of them by industry, which includes the ability to write effectively and to verbally convey their own worth as well as the value of the team in which they function. These are among the soft skills that graduates require to assist them in their post graduation success. They noted that it was important that individuals promoted the value of the teams instead of themselves. Many graduates tout their GPA or their personal accomplishments. Experience demonstrated to these four that lab work is done in teams and

not as an individual. This lapse on the part of prospective employees and teammates is often perceived as a negative in an interview or while working in a team environment, works against their success and can even prove irritating to coworkers.

7) Would the technical recertification process be a good time to teach soft skills?
Consensus was that yes, those "disinterested" or less successful graduates may be frustrated with their own failure and realize their need for additional training to enhance their people skills and job hunting skills. They may also be feeling that their laboratory skills are becoming "rusty" and the recertification process would not only aid them in regaining confidence and renewing their skills, but show prospective employers that they are committed to the field. Offering this type of training as continuing education or brief workshops would help them realize greater success.

8) How do you keep your skills current?
These graduates indicate that skills are maintained by daily practice. They also learn from others in the lab and rely on their ability to teach themselves. The lab is a continual learning environment and they are actively learning from others by asking questions and accepting instruction from co-workers. They also share their own skills in an effort to help improve the skill level of their co-workers.

9) Do you have any desire to take more class work?
Three of these graduates are indeed pursuing higher education; however, all indicate an interest in additional training. The dissenter agreed that the interest was there, but the opportunity was not. Due to the fact that this is an ever-progressing technology, the need for remaining current is important to their success. They all commented that the ongoing advances were fascinating and, therefore, fed into their passion for the subject.

10) If a local training facility had courses that led to certification, would graduates take them?
Again these four were in agreement that if graduates understood the value of the course, then graduates would take them. Workshops or short courses to teach specific skills would be of interest. An industry recognized certification would increase his/her value and marketability, so graduates and employers alike would be interested. One example provided was that employers currently have to rely on technicians from equipment manufacturers to perform certain maintenance or calibration tasks, but employees possessing industry certifications or validation for these skills would be of significant value to their labs. Not as much interest was displayed in coursework that failed to lead to certification.

11) If there were national certification modules to take on your own time, would that interest you?
Respondents were in agreement that a national certification would be beneficial to employees, job seekers and to employers. Having the opportunity to take on-demand courses at their convenience would give more people the option to complete the certification, especially those with busy schedules.

12) Should a fee be charged for the courses or should they be free?
Those with jobs felt that a fee was valid, whereas those still in transition felt that the cost could be prohibitive. The statement was made that "you get what you pay for" and an example was provided of the numerous schools that offer training that ultimately proved useless to companies. Many workers in the biotech field may be suspicious of additional training and believe free courses would not be worth their time and perhaps even serve as a "hook" to draw them into a long term training program that would eventually require significant financial expenditure. The suggestion was made that, perhaps, this fee could be waived for those without full time jobs in BT.

13) Would certain courses be helpful and would your employer pay for them?
Again they unanimously believe that certain courses would be helpful, but none felt that their employer would finance the training, although they also believed that some employers would. Their companies were operating on tight budgets and would not, therefore, have an interest in committing resources to additional training for employees.

14) These suggestions for course topics were mentioned.
- Calibration of pipettes and analytical balances (certification)
- Lab math (to maintain and improve skills)
- Preparing solutions (to maintain skills)
- Preparing dilutions (to maintain skills)

15) Where do you see yourself in 5 years?
Three of the respondents were clearly optimistic in that they expected to attain their professional dreams or be well on the pathway to this realization. The dissenter wanted to be fishing during a financially stable retirement and was currently on track to achieve this dream.

Discussion: It was clear that these graduates exhibited an **assertive attitude toward their education** and felt that those experiencing less success should develop greater assertiveness. Several questions evoked similar responses. In questions 3, 4, 5, 6, and 7, participants explained the need for students to be aware of the program and its limitations as well as their own limitations and the requirements for success. One of those requirements was soft skills as it applies to their ability to interact with others in team environments or in interviewing type situations. They expressed their own ability to sell themselves without being irritating to co-workers. These participants described the discipline to own their own education which was demonstrated through the internal drive to know more, to seek out answers, and to explore various aspects on their own. They exhibited the willingness to "**go the extra mile**" on this journey.

The interviewees recognized the need for graduates to have the ability to excel, in writing and verbally, the minimally acceptable level of communication skills and mentioned that they noticed other students and those applying for jobs with their companies whose communication skills were not at that level. They noticed that in many instances their fellow students were unaware of their own soft skill competence, or lack thereof, as compared to the industry standard. In question #4 they indicated that the loss of interest may be due in part to a frustration caused by disappointments during the job search. This in turn may be attributed to their inability to communicate effectively and not in a perceived hard skill deficit overlooked by the Biotech degree program. In contrast these participants have observed that other workers in their labs don't share the same level of competence as themselves for the laboratory math or other hard skills specific to the community college's Biotech program.

In most other questions, there was unanimous agreement that additional training or certification would be helpful. Quantification of hard skills would be a significant benefit to a current or prospective employer. A graduate pointed out that "hiring a person with calibration certification, verified skill at preparing solution/dilutions, or strong skills in applying math in the lab may be the deciding factor in hiring one candidate over another." It would be helpful if soft skills were quantified and improved. The confidence that the additional training or certification would provide to the graduate could enable him

to obtain higher success and may lessen the "disinterest" claimed by some graduates in earlier studies. A caveat was suggested that although these courses should require a fee, it may be possible to waive the fee for the unemployed or under-employed.

Conclusion: Commonality among these successful graduates indicates some distinct qualities that enhance the efficacy of their passage from student to career-oriented employee. An intrinsic interest in the scientific field is needed because the success of a graduate is proportional to his/her diligence in "going the extra mile" to fulfill their potential. However, these graduates indicate that soft skills and communication skills may be the most significant factors that determine their success. One graduate explained that "You've got to be able to sell yourself to management; to let them know that [you] are an individual who can wear multiple hats in [their] organization…without overselling yourself or becoming a nuisance." Another explained that the resume has to be concise "When I receive a resume I quickly look at it to see if it's neat and concise or if it's 8 pages. If it's the latter case I pitch it back into the file. I'm looking for something in 15 seconds to indicate how I can use this person. That person will be brought in for an interview." One graduate added that "a lot of what comes out of an interview is not GPA or credentials, but are you someone we can work with, do you mesh with us well enough so that we can work together? That comes out in an interview, not on the resume." Without these skills, the prospective employee may not have the opportunity to display their hard skills in the work environment and those that do, fail to reach their highest potential.

Opportunities in continuing education (CE) may be the key to addressing these deficits and resurrect the graduate's journey to success. These CE courses may provide training to improve the written and oral communication skills required to effectively negotiate the job search arena through resumes and interviews. Other courses may assist the graduate in updating the hard skills used in the laboratory and should lead to certifications for specific hard skills common to the lab environment. One graduate stated that "I would pay for a concentrated class to learn a specific [skill] for certification." Another agreed stating that "I would like to see Forsyth Tech do what the Golden LEAF Biomanufacturing Training and Education Center (BTEC) at North Carolina State University does. They offer two or three one-day short courses of compressed instruction to earn certifications in SOP's, Validation, Documentation or another concentration." One graduate added that "these certifications would be an invaluable asset in your lab, instead of the lab paying an outside source to provide a service like the calibration of hand pipettes or analytical balances." From this study it appears that the biotechnology workforce, in addition to academic institutions and the biotechnology industry, would benefit from addressing the matters of **soft and hard skills certification**. The academic institution would improve the potential success of its graduates which is the workforce, and industry would have greater access to a qualified pool of promising new career-oriented candidates with the soft skills required to excel in the position for which they were hired.