WAKE TECH
COMMUNITY COLLEGE

Building Capacity in Business Analytics Evaluation
Interim Report #6

November 8, 2016

Presented by

ETRServices
Using Knowledge to Make a Difference

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What are BAS students saying?

"The program shapes a professional in expectation and level of challenge; I chose this over NC State because I wanted a program that leads to better employment- WTCC leads to work!"

"Interesting, timely, and high demand – [the] trifecta of a good program!"

"This course is thorough and extremely detailed which gives you a very good job position in the market."
"The program has given me the confidence and skills to go back into the work force after staying home for 15 years. I'm currently interviewing and feel pretty confident that I will find a good job before the end of the year. This program is providing a great opportunity for students with all kinds of backgrounds to get the training they need to enter this growing field. There are lots of job openings in data analytics in our area and Wake Tech is providing the right kind of training to get people started in the field."

"Great curriculum that is broad-based and applicable to many fields."

I. INTRODUCTION

The Business Analytics (BAS) Program at Wake Technical Community College (WTCC) has been in operation for three years (Fall 2013 – Spring 2016). During the ensuing period, the program's administrators and faculty have worked diligently to ensure that the program not only meets, but exceeds, the associate degree program requirements of both WTCC and the North Carolina Community College System. BAS, which was initially developed with funding support from the U.S. Department of Labor (DOL) under a Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant, has blossomed into a full-blown associate degree program.

ETR Services, LLC (ETR), contracted with WTCC in Summer 2013 to conduct a three-year evaluation of the grant program. This interim evaluation report, the sixth in a series since the spring of 2014, chronicles the design, development, and implementation of the program as well as an update on program outcomes up to the current semester. Prior reports (referenced herein) document the program's progress over time in more detail.

Purpose of the Evaluation

The purpose of the evaluation is to document the process and the progress of the implementation of the Business Analytics Program. The evaluation seeks to answer the following five major questions:

1. How was the Business Analytics program designed, developed, implemented, expanded, and improved using DOL grant funds?
2. Which support services for students and best practices for online course offerings were instrumental in the implementation of the program?
3. How does the Business Analytics program compare to other recently-developed programs in the Business Technologies Division at Wake Tech such as the Global Logistics, Database Management, and Accounting in terms of the speed and progression of program implementation?
4. To what extent was the program effective in serving members of the target population?
5. To what extent was the program effective in producing the desired student outcomes (i.e., number enrolled, number gaining credentials, number attaining degree, number gaining employment in training-related field, number receiving wage increases post-enrollment)?
6. What differences, if any, were evident in the student outcomes based on instructional format (seated or online), duration of program involvement, or prior education?

For the Year 3 evaluation report, the evaluation questions regarding implementation (Question 1 & 2) and student outcomes (Question 5 & 6) remain salient. The evaluation activities reported here build upon previous findings.

Overview of Previous Evaluation Findings

Table 1 provides a summary of the previous key evaluation findings.

Table 1. Major Evaluation Findings to Date

Evaluation Year	Program Implementation	Program Outcomes
Year 1 Report (Spring 2014)	• All program personnel hired, except for one instructor; • Four of the eight courses in the BAS curriculum developed and offered; • Construction completed on the wing of the Western Wake Tech Campus to house the program; and • Computer laboratory/smart classroom established for student use.	142 students enrolled in program
Second Interim Report (Fall 2014)	• BAS program shifted from using mainly SAS software to using a variety of software packages to expose students to a broader array of tools of the industry; • Curriculum was revised to change the pacing and content of courses; • Course format was modified to run for eight weeks rather than 16 weeks; and • Program management shifted from a grant-funded approach to a WTCC department program approach.	161 students enrolled (a total of 178 students had been served)
Third Interim Report (Spring 2015)	• BAS program expanded from mainly SAS programming to include open source programs such as R, Python, and HADOOP; • Courses and curriculum were modified to address real-world analytics data sets; and • BAS students entered work in Data4Decisions Conference.	127 students enrolled (3 TAA-eligible); 36 certificate graduates (29 with certificates in Business Intelligence); and 1 graduate with an associate degree in Business Analytics
Fourth Interim Report (Fall 2015)	• BAS faculty and staff worked to better align curriculum and course descriptions with course content; • Hired an instructional design specialist and three adjunct faculty members; • Reconstituted the BAS Advisory Board in the interests of having more active involvement from its members; and • BAS Leadership presented at two professional conferences – High Tech Conference (Portland, OR) and Achieve the Dream Summit on Women in Analytics (SAS Institute)	289 students enrolled in program
Fifth Interim Report (Spring 2016)	• Greater integration of course content, software, and accessibility standards • Formalized partnership with Peace College and Central Piedmont Community College to offer associate degree • Presented at NCWorks and annual SAS conference; staff presented at Business Higher Education Forum in New York • Continued struggle to recruit high school students to maintain enrollment capacity; consistent mid-career students outnumber younger students • Growing focus on sustainability entering final grant year	420 students enrolled in BAS program

Focus of the Current Report

This sixth interim report, which captures program modifications and evaluation activities *since* Spring 2016 seeks to answer both process and outcome questions as it addresses:

- Continuing improvements/enhancements to the BAS Program (Question 1 & 6);
- Changes in staffing (Questions 1 and 2);
- Student enrollment and student support services (Questions 2, 4, and 5); and,
- Certificates and degrees awarded, student employment and career advancement (Question 5)

Note that program sustainability is guaranteed, as BAS is now an established associate degree program at WTCC. However, staff changes and program modifications are underway in response to the loss of DOL funding support. These will likely impact capacity and the range of programming offered to students in the near term.

Data Sources and Evaluation Methods

The specific data sources and evaluation methods that were used to gather information for the current report are outlined in Appendix A. Both qualitative and quantitative methods were used.

Among the qualitative methods were interviews with faculty, staff, and students as well as monthly program updates from the Program Director. Quantitative data – in the form of student demographics, enrollment, and completion totals – were collected through student surveys and from the Director of the Business Analytics Program and analyzed using descriptive statistics. Qualitative data were triangulated through interviews, program updates, and observations to identify key themes that cut across data sources. Key findings from both methods are presented in the following section.

II. KEY EVALUATION FINDINGS

Course Development and Evolution

Instructors continued to indicate the role of industry partners and student feedback in tool/software selection for course use. Instructors also indicated the need for them to continue their own training to keep up with a constantly evolving field in order to provide the most up to date instruction. In addition, the courses themselves are more aligned to ensure success begins by learning tools and techniques that will prove beneficial throughout the later course offerings. This also included learning how to teach in a formal academic environment, for the first time and altering course content/delivery depending on whether the course was online, seated, or hybrid.

> *"I think the key has been our liaison with industry and tied with what the industry needs. When students are learning Python and Tableau; that was based on something industry told us."*
>
> *- BAS Instructor*

Instructors had various goals for their students aside from mastering the material. One instructor indicated their desire for the students to become "solid business analysts", if that's their goal but also wanted to guide their development by their intended goals, whether that be personal interest or testing out the field. Another instructor wanted the students to develop a portfolio that would be useful for future employers. And another instructor wanted the students and staff to be provided with further instruction in professionalization, particularly when interacting with industry partners.

Currently, all course materials are being compiled, formatted, and uploaded to Creative Commons, a DOL repository where materials from the TAACCCT grant program will live. Some of this material was developed between instructors and the instructional designer by taking the static PowerPoints and turning them into visual animations. Once these materials are uploaded to the repository, they become freely accessible to anyone with an interest in analytics.

Program Outreach and Professional Networks

BAS staff expressed excitement about plans to move the program to a new Research Triangle Park (RTP) campus where they expect to be able to better cultivate connections with industries located in the area. Occasionally, out of state employers have contacted staff inquiring about the program but staff note that these exchanges do not often form substantive outcomes for BAS or its students.

BAS staff continue to receive feedback from students indicating that students tend to learn about the program through word of mouth. Program outreach is also targeting various groups on WTCC main campus including math groups, clubs, etc., though staff indicated that was not the most effective method.

Staff conduct a great deal of outreach through social media, like Twitter, Facebook posts and YouTube videos created of student projects, profiles, etc. that can easily go into the student's portfolio and serve as an outreach tool in recruitment of students and industry partners.

> *"I see us as really being a hub where - out here we are kind of on the fringe, but when we're in RTP and companies are 5 minutes down the road and they do this. There are a lot of analytical companies there that are going to need talent, and they are going to need to train their staff as well. I see us continuing our degree programs here, but also providing software training and employee development training for these companies on more of a corporate level than a student level. Instead of a student coming back to get a degree or skills, it will be the company sending them to Wake Tech and ramping up skills."*
>
> *- BAS Staff Member*

Student Support Services

BAS administrators began planning for transition long before the end of DOL grant funds were expected to end. At least three BAS staff members are leaving the program, two of which have secured other employment within WTCC. As these staff were charged with providing wrap-around services to BAS students, many of the current services will now be handled through Career Resources at WTCC or will have to be instructor-led. Instructors and staff are also connecting students to the Career Resources for other issue needs such as technology, basic math, or English support. BAS staff who will remain after the grant ends have started to merge services, like the Career Fair, with the Wake Tech Career Fair so that the contact would be directly through the college instead of a dedicated person within BAS. BAS administrators plan to continue the guest speaker series and network events despite the reduction in staff.

Student Recruitment and Selection

Table 2 presents demographic information for currently enrolled students.

Table 2. BAS Student Demographics, Fall 2016*

	Frequency	Percentage
Sex		
Female	217	52.7
Male	193	46.8
Race/Ethnicity		
African American/Black	77	18.8
American Indian/Alaskan Native	1	0.2
Asian or Pacific Islander	48	11.7
White	233	57.0
Hispanic	21	5.1
More than one race	29	7.1
Age		
Recent high school graduates (20 yrs. and younger)	9	2.2
Early career professionals (21-32 yrs.)	145	35.2
Mid-career professionals (33-49 yrs.)	189	45.9
Late career professionals (50-59 yrs.)	55	13.0
Winding down (60 yrs. and older)	12	3.0
Work status		
Employed full-time at time of enrollment	242	58.7
Employed part-time at time of enrollment	26	6.3
Unemployed at time of enrollment, not looking	31	7.5
Unemployed at time of enrollment, seeking	108	26.2
Retired	3	0.7

*Source: WTCC case management data

The BAS program has been effective in recruiting mid-career professionals, many of which already have a bachelor's or an advanced degree. For these individuals, BAS training provides a unique opportunity to advance in their current careers or to transition into another field entirely.

There are slightly more female students in recent years, underscoring the program's overall diversity of students. Staff mentioned an increase in the enrollment of female Asian students, suggesting that "*they come in as dependents with their spouses. They already have a master's degree and they are looking to build some skills locally*." Aside from that particular trend, staff indicated there is no typical student and they expected to see students in age range from 18-65, of every ethnicity. One instructor has seen more women than men in his courses and sees that as a positive trend because the field of analytics is male-dominated.

Recruiting younger students remains a challenge for the program. Staff note their efforts to reach students through articulation agreements with the Wake County School System so they can learn about the program early in their postsecondary education before choosing a path of study. There are constraints in outreach across the region because recruiting in places like Durham is outside of WTCC's jurisdiction, but this may change once WTCC opens a campus in RTP.

Staff noted the potential advantages of intentional local outreach approaches including targeting early, middle college students and providing them with credit for an introductory course. One staff member also expressed a desire to see the program more active within the community—by putting material online for free and/or offering something beyond tuition paying opportunities.

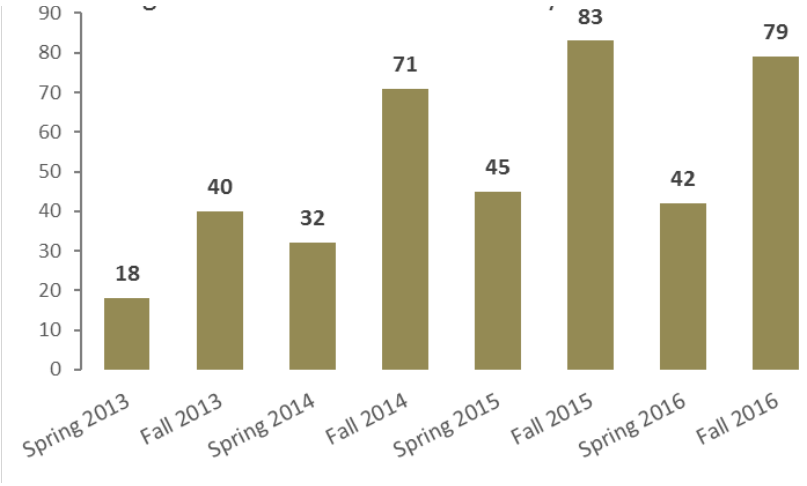

Figure 1. Enrollment by Semester (N=410)

As Figure 1 shows, enrollment has increased over time. About half of currently-enrolled students in BAS began in fall 2015 or later with students are at various stages of program completion. Students have the choice of hybrid or online only course formats.

Student Outcomes

Table 3 shows the distribution of fall 2016 course grades by BAS course. Similar to past years, grade distributions are positively skewed, with far more students (in both online and night hybrid classes) earning As and Bs, respectively, and with fewer students earning low or failing grades in the courses.

Table 3. Fall 2016 Course Grades by BAS Course

	BAS Course								
Grades	120 n=380	121 n=207	150 n=192	220 n=137	221 n=65	230 n=29	240 n=31	250 n=27	270 n=16
A	57.6%	69.1%	56.3%	72.3%	63.1%	65.5%	74.2%	81.5%	93.8%
B	20.8%	13.0%	22.9%	14.6%	18.5%	10.3%	12.9%	7.4%	0%
C	7.4%	4.3%	8.3%	5.1%	6.2%	3.4%	0%	11.1%	6.3%
D	2.6%	3.9%	2.1%	2.2%	3.1%	0%	0%	0%	0%
F	8.2%	3.9%	4.7%	3.6%	4.6%	13.8%	3.2%	0%	0%
W	1.8%	3.9%	5.7%	2.2%	4.6%	6.9%	9.7%	0%	0%
WF	0.3%	4.3%	0%	0%	0%	0%	0%	0%	0%
WP	1.3%	1.4%	0%	0%	0%	0%	0%	0%	0%

W = withdrawal (before 60% of course completion); WF = failing at time of withdrawal (after 60% completion); WP = passing at time of withdrawal (after 60% completion)

Student Career Survey Outcomes

In addition to semester course grades gathered from BAS staff, evaluators assisted staff with revising and implementing a student career survey. BAS students were asked to complete an online survey during Fall 2016 (n=52) to help evaluators and BAS leadership better understand the program's impacts and outcomes. The 37-item survey asked BAS students to reflect on their preparedness for career success, objective measures of career success, and how well their BAS training has helped them develop the core competencies that WTCC identified as essential for career success. Table 4 shows the demographics for survey participants.

Overall, the sample presented the diversity in BAS students quite well. Almost two-thirds of respondents were female, with significant numbers of African Americans, Asian Americans, and Caucasians (19.2%, 19.2%, and 46.2%, respectively). Respondents ranged in age from 20 to 61 years old, with an average age of 39.3 years. Just over half of respondents reported they were currently employed, with an average of 15.5 years of experience working in a professional environment. Note that females, Asian Americans, and unemployed students were slightly over-represented in sample data while Caucasians were slightly underrepresented.[1]

[1] Demographic characteristics of sample were compared to WTCC case management data (see Table X. for additional information).

Table 4. BAS Student Career Survey Respondent Demographics

	Sample Frequency	Sample Percent	All BAS students
Individual characteristics			
Sex			
Female	32	61.5	52.7
Male	20	38.5	46.8
Race and ethnicity			
African American or Black	10	19.2	18.8
American Indian or Indigenous Peoples	1	1.9	.2
Asian American	10	19.2	11.7
Caucasian or White	24	46.2	57.0
Hispanic or Latino	3	5.8	5.1
Biracial or multiracial	1	1.9	7.1
Other/unknown	3	5.7	-
Age (in years)			
Range	20-61	-	-
Mean	39.3	-	-
Student characteristics			
Currently enrolled in BAS program			
No	7	13.5	-
Yes	45	86.5	-
Certificate and/or degree seeking[2]			
Business Intelligence Certificate	29	55.8	-
Business Analyst Certificate	31	59.6	-
AAS in Business Analytics	29	55.8	-
Other	5	9.6	-
Class format			
Hybrid	22	42.3	-
Online	28	53.8	-
Seated	2	3.8	-
Employee characteristics			
Currently employed			
No	23	44.2	33.7
Yes	29	55.8	65.0
Currently seeking employment			
No	25	48.1	-
Yes	27	51.9	-
Years of professional experience (in years)			
Range	0-36	-	-
Mean	15.5	-	-

n=52

Subjective Career Success (SCS)

The Subjective Career Success portion of the survey consisted of 14 Likert-scaled items that focused on known correlates of career success (see Table 5 for survey items).

[2] Categories are not mutually exclusive.

Table 5. Subjective Career Success (SCS) Survey Items

Part I. Subjective Career Success

On a scale of 1 to 5, how much would you disagree or agree with the following statements?

1. My experience in the BAS program helped me to more fully realize my professional goals.
2. My experience in the BAS program helped me to more fully realize my personal goals.
3. Since taking courses offered through the BAS program, I feel that I have more control over my career trajectory.
4. Since taking courses offered through the BAS program, I have made numerous (new) professional contacts.
5. My social networking skills have improved since I began taking courses in the BAS program.
6. I feel invested in the analytics community.
7. Since taking courses in the BAS program, I have learned new ways to network with analytics professionals and communities.
8. Since taking courses in the BAS program, I have gained valuable work-based experience in analytics.
9. I see myself having a career in analytics after graduation.
10. After taking courses in the BAS program, I will be more competitive among professionals working in my field.
11. I believe it is important to continue to improve my professional skills throughout my career.
12. I received adequate support for success while taking courses offered through the BAS program.
13. The mentoring I received through the BAS program met my expectations.
14. Others in my life think I'll be more successful because of the analytics program.

Exploratory factor analysis was used to identify groups of variables that hang together (and presumably measure the same latent construct) to form sub-scales. Based on these analyses, four sub-scales that tap into various correlates of career success were identified: career preparedness; professional networking; professional support; and efficacy. Table 6 reports the results from reliability analyses, all of which indicate high internal consistency reliability.

Table 6. Reliability Analyses yield high internal consistency among four sub-scales

	Cronbach's alpha
Career preparedness sub-scale	.833
Professional networking sub-scale	.895
Professional support sub-scale	.859
Efficacy sub-scale	.838
Overall SCS scale	*.928*

Career preparedness sub-scale. The career preparedness sub-scale consists of five items that focus on the realization of professional and personal goals, the importance of improving skills throughout one's career, and assessments of competitiveness in the field. Respondents strongly agreed in the importance of improving one's skill set throughout one's career, an expected finding that reflects the mindset of mid-career working professionals who choose to return to school. Most students agreed that their BAS training is enhancing their competitiveness and they foresee having a career in analytics after graduation. Figure 2 reports additional information.

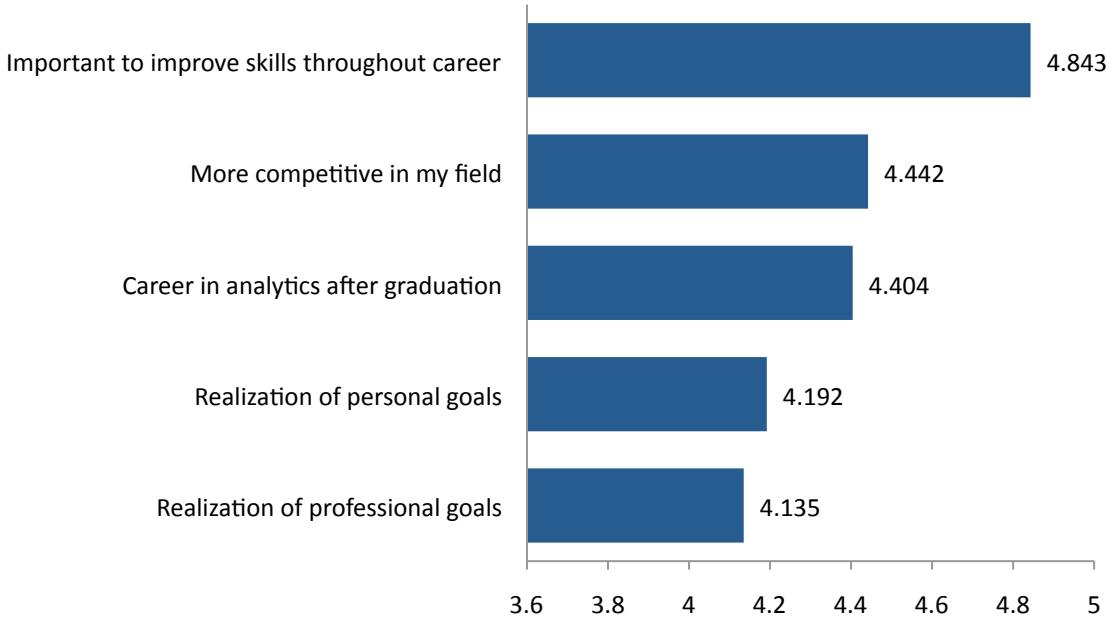

Figure 2. BAS students report high levels of career preparedness.

Professional networking sub-scale. Most BAS students provided ratings consistent with moderate investment in the analytics field. Many believed they gained valuable experience throughout their BAS training and had learned new ways to network with other professionals in the analytics community. Rated lower were the items that deal with improvements in networking skills and the number of professional contacts made throughout participation in BAS training. Figure 3 provides additional information about this sub-scale.

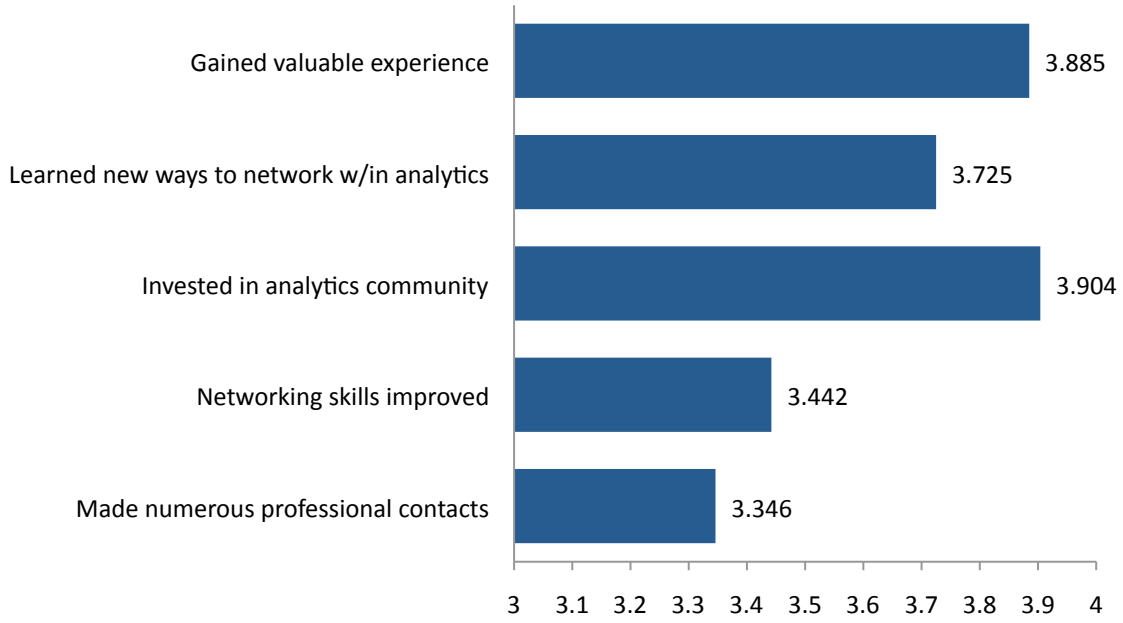

Figure 3. Students report high ratings regarding their investment in the analytics community and valuable experience gained.

<u>Professional support sub-scale</u>. The professional support sub-scale includes two items that probe respondent's level of agree with statements regarding mentoring and adequate support. Most students agree that the level of support they receive is adequate, fewer students indicate that the mentorship they receive during their BAS training meets their expectations. Figure 4 provides additional information.

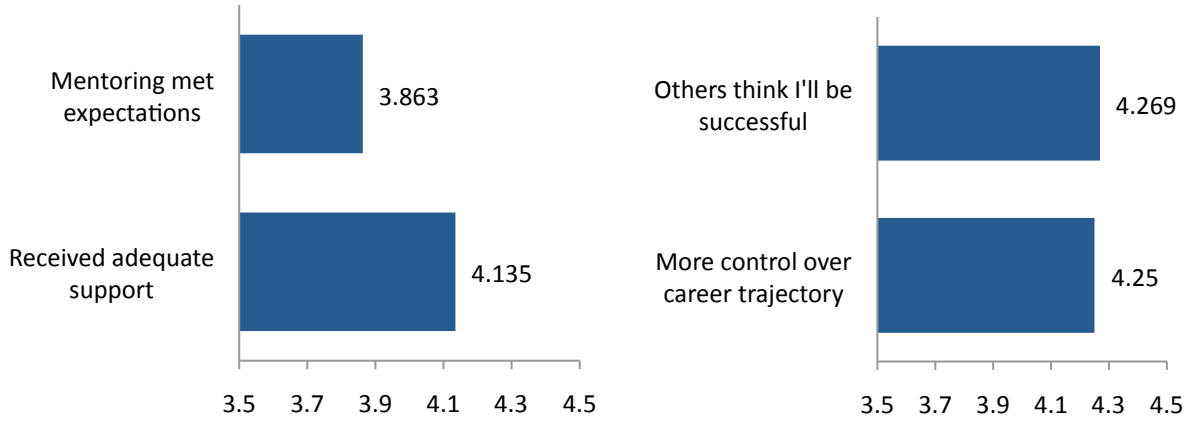

Figure 4. Students received adequate support and reported high levels of professional efficacy.

Efficacy subscale. Lastly, respondents' sense of professional efficacy was assessed. This two-item sub-scale asks respondents to assess their sense of control over their career trajectory and whether they agree that others think BAS students will be successful as a result of their BAS training. Most respondents agreed that they felt more control over their career trajectory as a result of their BAS training and that other people in their life believed BAS students would be successful as a result of their BAS training. (See Figure 4.)

Comparison of sub-scales. A side-by-side comparison (Figure 5) of the four subscales reveals that students are most confident in their career preparedness followed by the two-item scale that assess professional efficacy. Although students, on average, feel they received adequate support while in the BAS program, professional networking appears to be the weakest area for many BAS students. BAS instructors and leadership might consider additional ways in which they can prepare and empower BAS students to enhance their social networking skills and contacts.

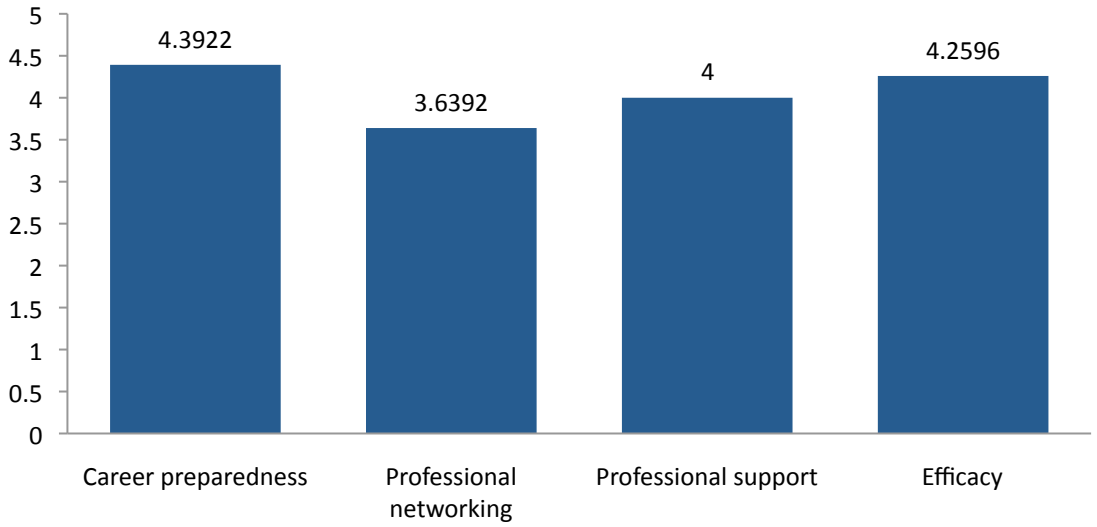

Figure 5. Side-by-side comparison of four sub-scales reveals professional networking is weakest area for many BAS students.

Objective Career Success

BAS students were asked about the typical objective measures of success, including: whether they received a raise or a promotion as a result of their BAS training; whether they obtained new employment as a result of their BAS training; and whether they felt they have improved their labor market position as a result of their BAS training (Figure 6). Although few students reported a raise or promotion (3, or 5.8%) or new employment (4, or 7.7%) as a result of their BAS training, **more than half of respondents felt they have improved their labor market position as a result of the BAS training (29, or 55.8%).**

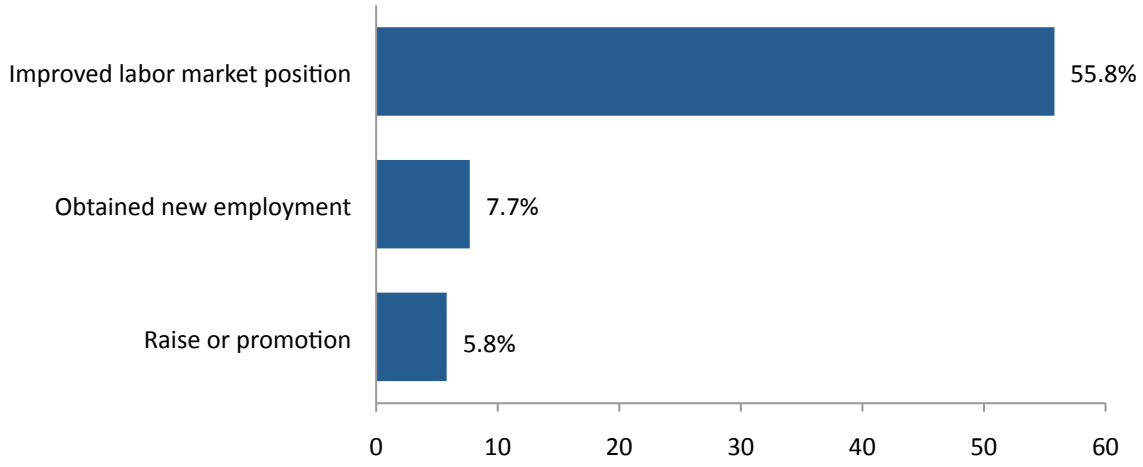

Figure 6. Objective measures of career success obscure the positive impact of BAS training on students.

WTCC Employability Competencies

WTCC identifies four competencies that are critical to success in the workplace:

1. **Communication** – the ability to effectively exchange ideas and information with others through oral, written, or visual means.
2. **Interpersonal Skills and Teamwork** – the ability to work effectively with others, especially to analyze situations, establish priorities, and apply resources for solving problems or accomplishing tasks.
3. **Problem-solving** – the ability to identify problems and potential causes while developing and implementing practical action plans for solutions.
4. **Information Processing** – the ability to acquire, evaluate, organize, manage, and interpret information.

To better understand how the BAS program is developing these competencies among its students, BAS students were asked to respond to eight additional items derived from the core competencies outlined above (Cronbach's alpha for the full scale is .950, suggesting very high internal reliability of the scale as well as some redundancy among items).[3] Table 7 displays the items in full detail. Competencies emphasize the salience of communication, interpersonal skills and team work, problem-solving, and information processing skills.

[3] Exploratory factor analysis was used to identify subscales within the eight-item Employability Competencies scale. Results suggested high collinearity, thus no subscales were created.

Part III. Employability Competencies

Using a scale where 1 means not at all and 5 means a lot:

19. On a scale of 1 to 5, how has your experience in the BAS program shaped your ability to effectively exchange ideas with others through **written means**?
20. On a scale of 1 to 5, how has your experience in the BAS program shaped your ability to effectively exchange ideas with others through **oral means**?
21. On a scale of 1 to 5, how has your experience in the BAS program shaped your ability to effectively exchange ideas with others through **visual means**?
22. On a scale of 1 to 5, how has your experience in the BAS program shaped your ability to work effectively with others **to analyze situations**?
23. On a scale of 1 to 5, how has your experience in the BAS program shaped your ability to work effectively with others **to establish priorities**?
24. On a scale of 1 to 5, how has your experience in the BAS program shaped your ability to work effectively with others **to apply resources** for solving problems or accomplishing tasks?
25. On a scale of 1 to 5, how has your experience in the BAS program shaped your ability **to identify problems and potential causes** while developing and implementing practical solutions?
26. On a scale of 1 to 5, how has your experience in the BAS program shaped your ability **to acquire, evaluate, organize, manage, and interpret information**?

Table 7. Employability Competencies

As expected, students reported the highest ratings for the employability competencies that most closely align to the characteristics of a good data analyst: the ability to acquire, evaluate, organize, manage, and interpret information; ability to work with others to analyze situations, and the ability to identify problems and potential causes while developing and implementing practical solutions. Results suggest that students feel less confident in their abilities to work well with others to establish priorities, as well as their ability to communicate orally.

Figure 7. Students report highest ratings among employability competencies most pertinent to working as a research analyst.

III. PROGRAM CHALLENGES

BAS faculty and staff noted several areas of concern for the program going forward. As the DOL grant nears completion, staff responsibilities will continue to be reorganized and delegated to faculty and instructors who remain with the BAS program. With the loss of grant-funded positions – such as the Student Recruitment Coordinator and Industry Liaison and the Instructional Media Specialist – remaining BAS staff have started to work more closely with the College to plan and publicize events like career fairs and speakers. Similarly, with the loss of the Instructional Designer, faculty will now be responsible for making revisions to course materials.

Of particular interest to BAS staff are programmatic challenges, such as retaining the interest of businesses, developing stronger recruitment strategies, and the formulation and maintenance of a shared vision for the BAS program. Developing fruitful connections with industry partners remains an ongoing challenge, even as the BAS advisory board has become more engaged.

Recruiting strategies that mirror for-profit businesses were suggested as a way to ensure longevity of the program. This recruiting would be for students and industry partners.

Faculty also noted the importance of a shared vision of the program. One instructor indicated a need to more clearly define the program as business analytics rather than as a data science program; to do so, faculty should place more emphasis on the practical business components of BAS training.

BAS staff also noted institutional challenges to the continued progress of the program. Having the financial and human capital resources in place will prove challenging given repeated cuts to the college's budget and the challenges of hiring and retaining talented instructors at a pay grade that is lower than salaries garnered in the private marketplace. As the need to rely more heavily on adjunct instructors grows, this dynamic is likely to be exacerbated.

BAS also faces a continued challenge in recruiting younger, particularly high school, students. WTCC has an open-door policy regarding student enrollment, but BAS has been relatively unsuccessful in garnering the interest of younger students. The program has been very successful in obtaining mid-career professionals, many of which already have a bachelor's or an advanced degree. For these individuals, BAS training provides a unique opportunity to advance in their current careers or to transition into another field entirely.

As the DOL grant comes to an end, evaluators will take a comprehensive look back over the findings to distill promising practices for offering analytics in a community college setting.

APPENDIX A. – STUDENT PROFILES

[INSERT PROFILES HERE]