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REPORT

Implementation of Competency-Based Education in Community Colleges: Findings from the Evaluation of a TAACCCT Grant

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I. INTRODUCTION

Between 2011 and 2014, the U.S. Department of Labor (DOL), Employment and Training Administration (ETA) awarded nearly $500 million per year in grants to individual community colleges and groups of institutions working together as consortia, through the Trade Adjustment Assistance Community College and Career Training (TAACCCT) grants program. The broad goals of the TAACCCT program were (1) to increase attainment of degrees, certificates, and other industry-recognized credentials that provide skills for employment in high-wage, high-growth fields; (2) to introduce or replicate innovative and effective curricula that improve learning that is relevant to employment; and (3) to improve employment outcomes for participants, especially those eligible for Trade Adjustment Assistance and other economically dislocated and low-skilled adult workers.

In October 2012, under Round 2 of the TAACCCT grants program, DOL awarded a $12 million grant to a consortium led by Sinclair Community College (SCC) in Dayton, Ohio, to fund a three-year project titled "Adapting and Adopting Competency-Based IT Instruction to Accelerate Learning for TAA-Eligible, Veterans, and Other Adult Learners." Under the grant, lead college SCC and co-grantees Broward College (BC) in Fort Lauderdale, Florida, and Austin Community College (ACC) in Austin, Texas, are implementing programs in which they are "adapting and adopting" the Western Governors University (WGU) model of competency-based education (CBE) in four information technology (IT) programs: programming at ACC, technical support at BC, and networking and software development at SCC.

A. Applying competency-based education models in community colleges

There is no single, authoritative definition of "competency-based education." However, a key feature of this approach is that it requires students to master clearly defined and measurable learning outcomes (the required "competencies") but allows variation in the time each student takes to demonstrate each competency. The approach contrasts with traditional models, in which each student may experience different learning outcomes, but all spend a fixed amount of time in each course.

Competency-based education is not new. In the early 20th Century, adherents of scientific management in industry and business developed training models that identified skills needed for particular work roles, specifying corresponding learning objectives for education and training programs for those roles (Fine 1968; U.S. Department of Labor 1965); in more recent decades, employer-driven and workforce training programs have often taken a competency-based approach (Ford 2014; Hodge 2007; Tuxworth 1989). Recognizing the importance of competency-based models in maintaining a skilled workforce, DOL launched the Industry Competency Model Initiative in 2009 "to develop and maintain dynamic models of the foundation and technical competencies that are necessary in economically vital industries... [and] that are essential to educate and train a globally competitive workforce" (Competency Model Clearinghouse 2015). Institutions of higher education began to apply a competency-based lens in the latter part of the last century, especially to teacher education and training in health fields, largely to ensure program quality and adequate mastery among those seeking to practice in the fields (Ford 2014; Koo and Miner 2012; Tuxworth 1989). More recently, interest in CBE models has expanded throughout higher education, where policymakers and postsecondary leaders are

struggling to find ways to ensure quality while containing costs, potentially by leveraging new technologies (Johnstone and Soares 2014; Porter and Reilly 2014; Steele et al. 2014).

Although there is variation in how institutions of higher education implement CBE models, the consortium colleges embraced a few basic attributes that most models share:

- **Definition of relevant and measureable competencies.** CBE models require that all learning outcomes (the essential competencies) be precisely defined, objectively measurable, and reflect skills that are necessary for a given position or field. Although the definition, measurement, and relevance of learning outcomes is a standard principle of sound instructional design (Gagné et al. 2004), and especially important for distance learning (Bourdeau and Bates 1996), CBE makes this explicit in a way that most traditional higher education models do not. Most CBE programs focus on preparation for specific jobs from which the competencies are derived, but this is not necessary in all cases (for example, general education courses or programs).

- **Demonstration of competency through valid assessment.** Students in CBE programs must demonstrate mastery of each competency before moving on to the next and advancing through a course or program. Assessments must, therefore, be clearly linked to required competencies and accurately measure mastery. Some CBE models allow students to skip program content if they can demonstrate mastery on an assessment.

- **Potential acceleration through the educational program.** Unlike traditional educational models, which hold "time (semesters or quarters) constant and [allow] the level of mastery (as reflected in grades) to vary" (Johnstone and Soares 2014, p. 16), CBE models allow time to vary but hold constant the minimum level of mastery. The result is that students can move through material at their own pace, allowing acceleration, especially for students who can draw on prior education or work experience.

- **Need for high-quality materials and timely support.** Because CBE models strongly emphasize student mastery and allow students to move through material independent of traditional academic term schedules, the quality and availability of learning resources is paramount and should be continuously monitored. At the same time, independent learning requires that students have adequate help at the moment they need it.

When consortium college leaders developed their TAACCCT grant proposal in early 2012, CBE models had not been widely applied in community colleges. Nevertheless, these leaders believed that CBE could address a few common concerns. First, experience had shown that community college students—especially adult learners, with life experience and responsibilities—want flexible programs and course schedules with the possibility of acceleration. Second, they had observed employer demand for qualified individuals with appropriate job skills, including in some cases, specific credentials, especially industry certifications. Finally, the colleges all wanted to improve course and program completion rates—especially in online and distance learning—ideally, while containing costs.

B. Managing change while building programs and capacity

In soliciting grant applications, DOL recognized that to meet the TAACCCT program goals, grantees would need to place significant emphasis on institutional capacity building. DOL

encouraged applicants to propose ways to "expand and improve their ability to deliver education and career training programs" (DOL 2012, p. 1), urging them to incorporate evidence-based design, stacked and latticed credentials, online and technology-enabled learning, transferability and articulation, and strategic alignment. Consortium applicants were pushed to think on an expansive scale, developing "programs that [would] impact individuals across a region, state, industry sector or cluster of related industries, and leverage their collective experience to expand and improve their ability to deliver education and career training programs" (Ibid., p. 12).

Consortium leaders knew they would have to engage in proactive change management to achieve all these goals during the grant period. They would have to define the innovation, change college processes and cultures to implement it, and achieve and track the results—all within three years. Toward that end, they created an implementation database and advanced an aggressive CBE program implementation plan that included 15 key grant deliverables in the main areas of curriculum development, student supports, and program administration (Table I.1).[1] Leaders identified 48 common milestones necessary for completing the corresponding deliverables within the three-year performance period. They also developed ambitious enrollment targets for each college and the consortium as a whole, setting a goal to enroll 2,325 unique participants across the three colleges (Chapter VIII and Appendix C detail progress toward these targets). Finally, they planned semiannual in-person meetings and monthly project-management calls to facilitate program development and implementation and to support shared learning.

Table I.1. Key grant deliverables for CBE curriculum, learner supports, and program administration

Curriculum	Learner supports	Administration
Curriculum definitions	Recruitment and application process	Memoranda of understanding
Course development foundation	Student screening and placement process	Staffing
		Budget*
Identification of latticed certificates	Enrollment process	Reporting*
New competency-based program courses	Learner support process	Fiscal agent / invoicing*
Competency maps	Career placement process	
Articulation among consortium colleges finalized	Transfer assistance process	
Virtual IT lab (BC only)		

Source: Consortium implementation planning database.

* Budget, reporting, and fiscal agent/invoicing were not included as deliverables in the implementation planning database, but were required of partner colleges.

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[1] All deliverables and corresponding milestones were tracked in an implementation planning database. In addition to the 15 deliverables outlined here, the database included additional deliverables and milestones related to performance reporting, evaluation, and WGU consultation.

The consortium's organizational structure (Figure I.1) supports the implementation plan. As noted above, SCC serves as the lead college and houses the consortium national office. In this role, SCC program leaders serve as administrators and fiscal managers for the grant. Recognizing that implementation of CBE models within their existing college structures would pose challenges, consortium leadership emphasized the need for change management efforts and shared with participating college leaders a change management monograph, which was developed by the SCC project co-director as part of an earlier National Science Foundation grant to the college (Siefert 2006). Each partner college has its own work group, comprising an academic dean and/or IT department chair and a project manager working to administer each CBE program; faculty and instructional designers working largely on curriculum; a data lead (usually an institutional research staff member) working to comply with DOL reporting requirements, the external evaluation, and internal data tracking and related program improvement efforts; and student services staff working on learner supports. The consortium also contracted with WGU, a CBE pioneer, to provide important consultation on program development and implementation. Finally, SCC contracted with Mathematica to conduct the required third-party evaluation of the grant.

Figure I.1. Consortium organizational chart
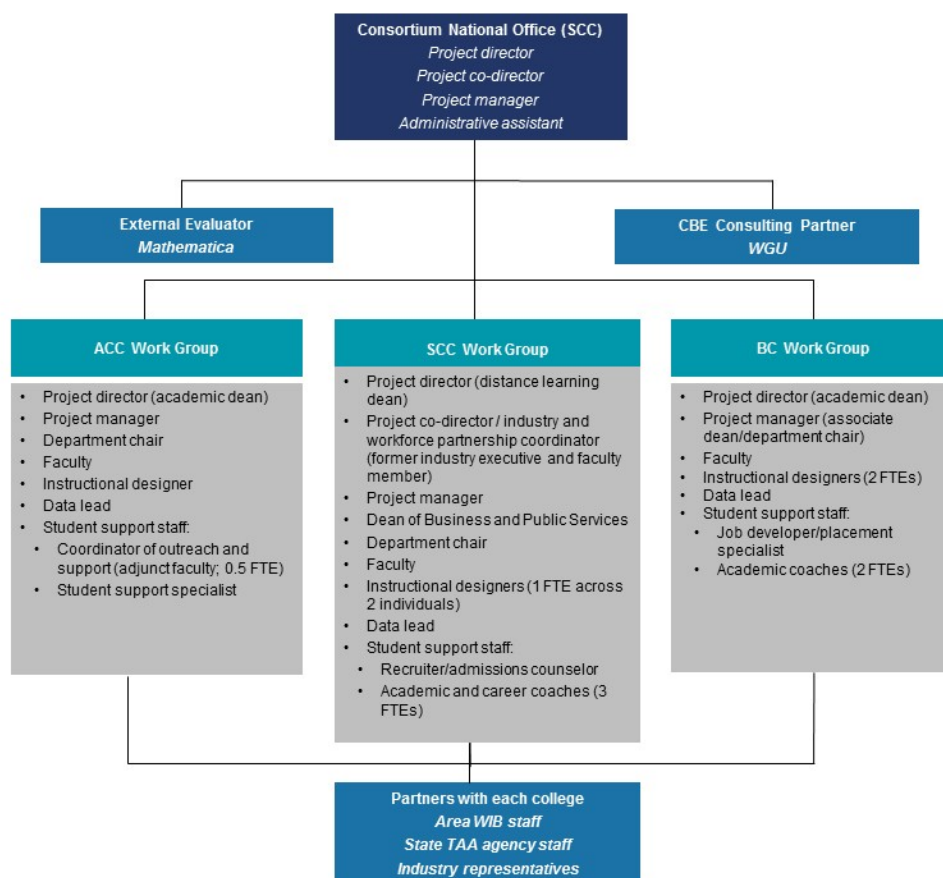
Source: Person et al. 2014; spring 2015 Mathematica site visits.

Note: Staffing of some positions fluctuated over the course of the grant period.

FTE = Full-time equivalent. WIB = Workforce Investment Board.

C. Evaluation approach and report overview

This report details how the consortium colleges developed and implemented CBE models in three community colleges located in three states. It examines program development, implementation, and participation within and across the three colleges and highlights cross-cutting challenges, successes, and lessons learned from program implementation. It is the second of three major evaluation deliverables. The previously published interim report (Person et al. 2014) described the colleges' CBE models at baseline, when program services were first offered under the grant. The final summative report (scheduled for publication in fall 2016) will provide a brief update on program implementation and a detailed analysis of participant outcomes, which are a critical measure of any program's success.

This report draws on three primary data sources. First, the evaluation team conducted site visits to each of the three partner colleges in spring 2015, two and a half years into the original three-year grant performance period.[2] Data collected on site included individual and group interviews with 62 respondents across the three partner colleges. Second, site visit data were supplemented by review of key program documents from across the colleges including, for example, program descriptions, curricular materials, and presentations on topics related to curriculum development, student support processes, and employer engagement activities. Finally, the study team analyzed administrative data from the consortium's implementation database and the colleges' student information systems.

Although these combined data sources provide rich information about the consortium colleges' implementation of their CBE programs, the data are limited in at least two important ways. First, the 62 respondents who provided information during site visits are a small and non-random sample of individuals, and their experiences may not be representative of others working in the same or different roles or who have engaged with the grant-funded programs at the partner colleges. Second, because most data come from a single visit to each site, they are essentially cross-sectional and do not capture the full evolution of programs or the full range of implementation experiences across the partner colleges. Appendix A describes in greater detail the data and analytic approach for the study.

The report is organized in eight chapters. Following this introduction, Chapter II presents a conceptual framework for the analysis of CBE program implementation at the consortium colleges and summarizes each college's current CBE program model in terms of the conceptual framework. The next four chapters provide cross-cutting analysis of program implementation at the partner colleges, with each chapter addressing one component of the conceptual framework: curriculum development and delivery (Chapter III), learner supports (Chapter IV), industry and workforce engagement (Chapter V), and internal and external contextual influences on program implementation (Chapter VI). Chapter VII describes the colleges' plans for sustaining, replicating, and scaling their CBE programs as they approach the end of the TAACCCT grant period. Chapter VIII concludes by summarizing the colleges' progress to date against their

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[2] The period of performance for Round 2 TAACCCT grantees was originally scheduled for three years, October 1, 2012, through September 30, 2015. In late 2014, DOL extended the period in which Round 2 grantees could offer grant-funded program services through March 31, 2016. The evaluation period for the grants continues as originally scheduled, through September 30, 2016.

implementation plan and performance targets; it also highlights key lessons learned from their CBE program implementation experience. As noted, Appendix A outlines data and analytic methods, and Appendix B provides summary profiles of each community college's CBE program model.

II. CONCEPTUAL FRAMEWORK AND OVERVIEW OF COLLEGE CBE MODELS

Analysis of CBE program development and implementation at the consortium colleges requires attention to several processes that unfolded simultaneously within the first three years of the TAACCCT grant period. The overarching conceptual framework for examining the colleges' CBE models (Figure II.1) calls attention to the individuals and processes involved in CBE curriculum development, delivery, and learner supports; it emphasizes the industry and workforce relationships that informed and strengthened the colleges' CBE programs; and it highlights the contextual influences that shaped each college's particular CBE approach. Using this conceptual model as an organizing principle, this chapter summarizes each college's CBE model as it was implemented during the third and final year of the grant period, in early 2015. Appendix B provides more detail on each college's model; the evaluation's interim report (Person et al. 2014) documents the colleges' models in detail, as they were implemented in the first year of the grant period.

Figure II.1. Conceptual framework for analysis of college CBE models
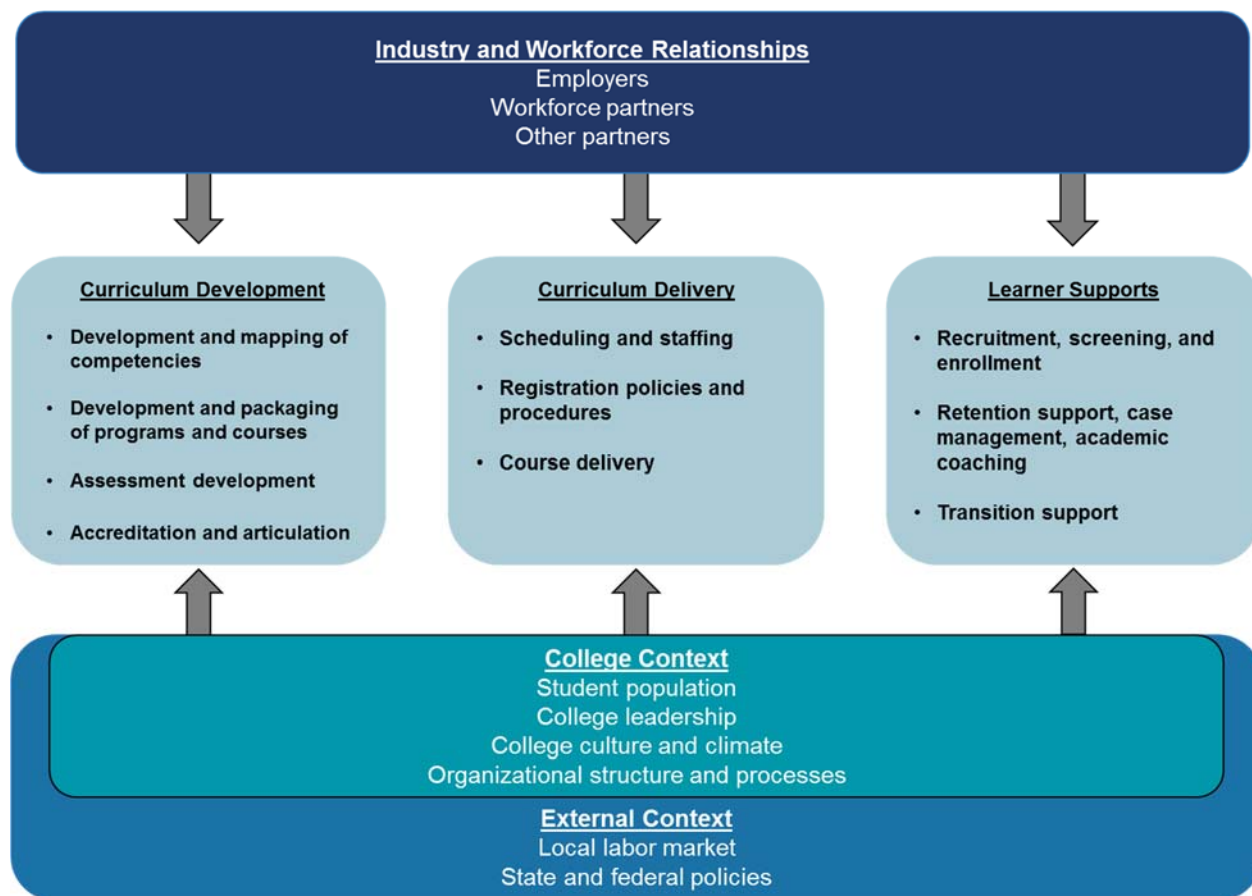
As the title for the consortium's grant indicates, the colleges planned to "adapt and adopt" the WGU model, which was described in an earlier report on the consortium's progress (Person et al. 2014) and is summarized in Table II.1. The WGU model can also be understood in terms of the conceptual framework above and includes some unique features, especially in curriculum development and delivery and learner supports. Notably, WGU employs a disaggregated staffing model, which "unbundles" the faculty role so that different positions are responsible for tasks such as course development, assessment development, academic support, grading, and advising. WGU's subscription-based tuition is another distinctive feature, which may incentivize students' progress, since they can complete as many courses as possible without paying more tuition for the term. Student mentors and course mentors monitor and support student progress using real-time data. With respect to context, it is important to note that WGU's institutional experience differed markedly from the community colleges, because WGU was established from the ground up with a CBE model; no retrofitting or modifications of existing institutional structures, organizational processes, or college culture were required. In their consultative role on the grant, WGU hosted a series of seminars on key features of CBE (for example, on student screening and orientation, advising and supports, and using data for continuous improvement); offered ad hoc consulting to various college stakeholders as needed (for example, on financial aid and student dashboards); and participated in regular consortium project management meetings.

Table II.1. Key features of the Western Governors University CBE model

Industry and workforce relationships
• External industry experts meet with program development leaders two to four times per year to evaluate industry trends and make recommendations to develop and revise programs.

Curriculum development and delivery	Learner supports
• Relies on a disaggregated staffing model, separating into distinct roles curriculum development, assessment development, instruction, grading, and learner support. • Industry experts provide input on curriculum development through regular program council meetings. • Staff—including program leadership, instructors, and instructional designers—identify high-level competencies for programs and map them to topics, courses, learning objectives, and learning resources. • Course content is externally procured. Courses are offered wholly online and asynchronously (with the exception of some practicum courses), where students move through material at their own pace with support from mentors. • Enrollment is based on a subscription model; students pay a flat fee for a six-month term and can complete as many courses as they are able within the term for no additional charge.	• Supports include a detailed, mandatory student orientation process; flexible access to academic and non-academic supports from student mentors and course mentors; and continuous monitoring of student progress relying on detailed student and course data. • Career services emphasize assistance for incumbent workers as well as for job seekers, including professional development and networking resources as well as self-service tools for students to explore professional goals and career options.

Contextual factors
• WGU designed from the ground up as a CBE model; institutional culture and processes developed with CBE as their organizing principle. • Targets students who are mature and academically well prepared, most of whom are employed and have some prior postsecondary experience.

Source: Person et al. 2014.

Although the colleges all worked with WGU, had a mutual understanding of CBE, and shared a common implementation plan, they developed distinct CBE models to fit their respective institutional contexts. The remainder of this chapter describes each model in turn.

A. Austin Community College: Accelerated Programmer Training

Under the TAACCCT grant, ACC developed the Accelerated Programmer Training (APT) program model. Housed in the computer studies (CS) department, APT offers CBE programs leading to seven college certificates, as well as courses that prepare students for several additional industry certifications. With the addition of some general education courses, offered in traditional face-to-face and online formats, the certificate and certification prep courses can be stacked into five associate of applied science degrees (in computer programming and computer programming with software testing or web programming specializations, and information technology with user support or applications specializations). The program also offers two "Marketable Skills Awards" (in computer programming and networking) to students completing a core of set of introductory CS courses. More detail on the model is available in Appendix B (Figure B.1).

Contextual factors. When the grant proposal was developed in spring 2012, ACC and CS departmental leaders believed the CBE approach would align well with regional labor market needs. Because the city of Austin is home to a burgeoning IT industry with a relatively low unemployment rate (about 6 percent at the time of proposal development; Bureau of Labor Statistics 2015), ACC reportedly faced strong local demand for IT workers and pressure from the local chamber of commerce to produce more skilled workers, more quickly. These pressures heightened college stakeholders' interest in and receptivity to accelerated models that would pave the way to industry-recognized credentials.

ACC enrolled nearly 70,000 students in academic year 2012–13, across 11 campuses, with about 40 percent of students over the age of 25. Respondents consistently described Austin as a congested metropolitan area, and emphasized the importance of distance learning options for ACC students who cannot travel easily to a campus. Indeed, enrollments in distance learning were high, with about one-quarter of all students enrolling in some or all distance learning courses; however, program leaders reported concern about low online course success rates and were seeking a new approach. CBE's emphasis on clear, measurable, and relevant course outcomes appeared to be a promising way to improve distance learning.

ACC respondents described a CS department with strong central leadership balanced by a culture of academic freedom. The department chair and the academic dean played critical roles in the development and implementation of the model. The coordinator of outreach and student support was an adjunct faculty member. Other key roles were grant-funded, including the project manager, instructional designer, and data lead, and eventually, the learner support specialist.

Curriculum development and delivery. APT curriculum development involves a team of faculty working with an instructional designer, guided by the APT Course Development Guidelines, which were established for the CBE program. Faculty team members review and provide input on courses, and the department's industry advisory committee also reviews and approves the competencies as part of the development process. The instructional designer is also trained to conduct Quality Matters reviews, although the program has not implemented the full

Quality Matters review process.[3] Content adheres to Americans with Disabilities Act requirements.

APT curriculum delivery is fully online (except one hybrid course) and asynchronous; it uses the Blackboard Learning Management System (LMS), and students move at a flexible pace through materials. Students admitted to the program typically take only CBE courses, which they can begin at the start of the college's normal 8-, 12-, or 16-week terms. To date, courses have been taught mostly by full-time faculty, although ACC has used some long-term adjuncts.

Learner supports. The APT learner support model is still evolving. It originally focused on recruitment and did not include coaches, but during the first year of the grant, program leaders concluded that coaching would be necessary and so created a new position. A single full-time coach currently supports the CS department chair with intake and screening. The department chair individually interviews all students interested in the program, accepting those deemed a good fit and directing others to different opportunities within the department or college. This process allows program leaders to position APT as a sort of selective "honors" program. Once students enroll in the APT program, the coach emphasizes enrollment management, making sure students enroll in the proper sequence of courses for their particular pathway, and encouraging them to stay continuously enrolled. As students approach the end of their program, career supports are offered through the coordinator of outreach and student support, who relies on an extensive network of employer and workforce partners to help students obtain internships and jobs.

Industry and workforce engagement. APT leaders always placed heavy emphasis on employer partners, especially to support student recruiting and transition to jobs. Under the leadership of the TAACCCT grant project manager and the coordinator of outreach and student support, the program has recruited nearly 200 employer partners. Partner firms are featured on the program website, participate in virtual job fairs and mock interviews, and have early access to APT students' online portfolios.

B. Broward College: Accelerated IT Training Programs

Broward's Accelerated IT Training Programs (ATP) are housed in the computer science and engineering (CSE) department, where program leaders adapted the computer systems specialist program for the CBE model. ATP offerings include two stackable certificates, IT support specialist and IT analyst, as well as an associate of science degree in computer systems specialist; the certificates also articulate with several other associate of science degrees in computer science. The program also prepares students for ten industry certification exams. Offerings include seven general education courses in a flex-paced CBE format, which support the CSE associate degrees, but are also available to students in other programs. Under the TAACCCT grant, BC is also creating an open-source virtual lab to enhance online offerings. More detail on the model is available in Appendix B (Figure B.2).

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[3] The Quality Matters Program is an independent peer review process that assesses and certifies the quality of online courses for subscriber institutions. See [https://www.qualitymatters.org/] for more information.

Contextual factors. BC is located in Fort Lauderdale, Florida, which had an unemployment rate of 8.4 percent when college leaders decided to apply for the Round 2 TAACCCT grant in spring 2012 (Bureau of Labor Statistics 2015; rate includes Fort Lauderdale and Miami metropolitan area). The area is home to a large veteran population but relatively few trade-affected workers. Respondents described the area as having some good IT-related jobs across industry sectors, but they hoped that the grant could actually spur regional economic development by training highly skilled IT workers. The state was in the process of changing its developmental education policy, which affected the community colleges; the CBE program, which was originally designed with relatively high entrance requirements, was not necessarily affected by this change.

BC leaders viewed the TAACCCT grant as an opportunity to "experiment" with CBE. They reported recognizing CBE as having strong potential for community college programming, especially for serving returning adult students who want to leverage their experience to obtain relevant credentials; such students comprise a large segment of the BC student population (nearly 40 percent are age 25 or older). The college is large and spread out—approximately 60,000 unique students enrolled across BC's four campuses in 2012–13—and program leaders recognized that these logistics could make it difficult for innovations to have an institution-wide effect. However, distance learning is centralized through BC's online campus, which has become an important feature for sustaining ATP after the grant period. BC program leaders reported strong use of instructional technology across the college, and course syllabi were already structured around student learning outcomes. Both of these factors aligned well with a CBE approach. Finally, strong unionization delimited what could be asked of BC faculty. Although additional tasks required for CBE program development and delivery carried additional funding under the grant, continuation of the program after the grant period may require contractual amendments or other changes.

Two deans—one for academic affairs, the other an associate dean for CSE—played leadership roles in shaping the college's participation in the TAACCCT grant, but day-to-day CBE program administration was led by the project manager, a position originally filled by a former associate dean and adjunct faculty member.

Curriculum development and delivery. Curriculum development for ATP is collaborative, starting with teams of faculty working to identify, define, and map program-level competencies, which flow from state standards. Faculty teams then work with instructional designers to design courses, while another faculty member develops assessments. Once course content is finalized, an instructional technologist helps to build the technical components for offering the course through the LMS, Desire2Learn (D2L). Finally, the department uses the Quality Matters rubric for internal review of courses and content adheres to Americans with Disabilities Act requirements.

Curriculum delivery is mostly online (with some hybrid courses; ATP is the first IT program to be available fully online at BC); it is asynchronous, and students can move through materials at their own pace, though acceleration is encouraged. Students can enroll in a new course at any point during the first 12 weeks of the term. Early on, most courses were taught by full-time faculty, but BC program leaders are moving toward using more adjuncts.

Learner supports. The ATP learner support model has evolved significantly since the program was first offered in 2013. Whereas the original model relied on enhanced faculty advising to support student progress, the model currently uses academic coaches, hired explicitly for the CBE support role. Coaches initiate weekly contacts to check on students and can use D2L data to monitor their progress; some students also choose to meet with coaches in person. BC does not have a dedicated career coach, but academic coaches refer ATP students to BC career services.

Industry and workforce engagement. Industry and workforce relationships were not a major component of the original ATP model (beyond the existing advisory boards), but an industry partner coordinator began in late 2014 and is currently developing partnerships based largely on the ACC model.

C. Sinclair Community College: Accelerate IT

In developing its TAACCCT-funded model, SCC sought to build a full CBE system, with the Accelerate IT program as the centerpiece. The college positioned the grant simultaneously within the computer information systems (CIS) department and the distance learning division, SinclairOnline, which grounded the CBE model in the IT discipline but also gave it reach throughout the college. Accelerate IT offers four short-term certificates and courses that prepare students for several additional industry certifications. The program offers three associate of applied science degrees in network engineering, secure systems networking, and software development, which include five supporting general education courses. In addition to Accelerate IT, Sinclair offers CBE programming in instructor-led online, hybrid, and web-enhanced classroom modalities. More detail on the model is available in Appendix B (Figure B.3).

Contextual factors. SCC is located in Dayton, Ohio, an area with an unemployment rate of 8.2 percent in spring 2012 (Bureau of Labor Statistics 2014). (Program leaders report this rate had stabilized somewhat after the loss of nearly 13,000 jobs in 2008 following the closure of a major automotive factory.) The region is home to several large IT employers (for example, LexisNexis, Reynolds and Reynolds, and Teradata Corporation). Dayton is also home to Wright-Patterson Air Force Base and has a large military and veteran population. The Dayton Development Coalition has designated IT as a targeted growth industry for the region and program leaders report that there is a high demand for IT workers across industry sectors, at the Air Force base, and among its associated contractors. SCC program leaders believed that collaboration under the grant between the college and industry could help to support regional economic development.

SCC enrolled nearly 30,000 students in the 2012–13 academic year, nearly half of whom were age 25 or older. About 30 percent of SCC students took some or all of their classes online. College leaders believed that this older and online-oriented student body could benefit from the CBE model. Sinclair has a large main campus with centralized services, and four smaller satellite sites. SCC program leaders had a history of using grant funding to support broader institutional improvement and the TAACCCT grant built upon prior efforts funded by the National Science Foundation (NSF) and described by program leadership as an "intentional path" toward CBE. Although some of these past curriculum standardization efforts had been contentious early on, college stakeholders now accept them as normal, and prior innovations had resulted in tools that

could be leveraged for the TAACCCT-funded CBE model. Also facilitating CBE program development, the college had a strong history of working with industry and nearly all Accelerate IT program leaders and faculty had deep industry experience.

The grant leadership team at SCC included the dean of distance learning and a former business and industry leader who was also a faculty member as project co-directors. Other key roles on the grant were filled by individuals who had already been working at SCC, including the student support and data leads. The original and replacement project managers were hired through the grant.

Curriculum development and delivery. Program leaders report that SCC has a strong culture of assessment and instructional design practices. A centralized curriculum database houses all learning outcomes, programs, and courses. The learning outcomes are mapped to programs and courses, and assessed across programs and courses. State IT standards, which were developed in a collaborative effort between educators and industry leaders, form the basis for program and course competencies for the Accelerate IT program. Sound instructional design principles are enforced throughout the curriculum and course development processes. Prior to beginning course development, the state standards were mapped to program and course outcomes and reviewed by the Program Advisory committees, then the official college curriculum (25 courses) was updated to include the current competencies and outcomes. Faculty teams led by an instructional designer develop all course content and assessments. The faculty map the competencies and outcomes from the official curriculum to course materials and assessments in the LMS Learning Outcomes Repository. Following the SinclairOnline model, one online master course is developed using a standard template. The master course is replicated for use in every section in all modalities. The upfront mapping process ensures coverage of competencies and outcomes, validates objectives, and assures alignment of content and assessments to competencies and outcomes; content adheres to Quality Matters standards and Americans with Disabilities Act requirements.

Although the Accelerate IT program is delivered fully online with flexible pacing, CIS department faculty have adopted the CBE curriculum for other modalities, including traditional instructor-led online, hybrid, and web-enhanced face-to-face courses. Accelerate IT supports rolling starts, with students able to begin a new course any Monday during the first 12 weeks of the fall and winter terms, and any Monday during the first 8 weeks of the summer term. All SCC courses used the Angel LMS during the first years of the grant, but SCC started transitioning to D2L in the final year of the grant period. To date, courses have been taught primarily by full-time faculty, however, several adjuncts also teach the CBE courses.

Learner supports. Accelerate IT uses a five-phase learner support model (admit, enroll, retain, transition, complete) with career advising embedded throughout all phases. The model relies on academic coaches, who use Student Success Plan (software developed by SCC prior to the grant period), other tools, and regular student data reports to monitor and support student progress, targeting interventions as needed. Current staffing for the CBE program includes three full-time coaching positions, which cover both academic and career or transition coaching; the dedicated Accelerate IT career coach is embedded in the county workforce agency office. Coaches work proactively with students and the Business and Public Services division's internship coordinator to secure internships for program participants. Coaches provide support

for resume writing and interview preparation through the online internship course and through centralized college services. As part of sustainability planning, program leaders are trying to refine and automate as much of the coaching role as possible, scaling back on certain activities and solidifying those that appear to matter most for student success. Beyond Accelerate IT, the instructor-led online and hybrid CBE modalities also offer scaled back versions of CBE learner supports.

Industry and workforce engagement. Industry and workforce relationships are a key component of the Accelerate IT model. In particular, a Stakeholder Collaborative process structures regular engagement with employers and other industry and workforce partners, at both the executive and line manager levels, to address current and future job needs and broader economic development issues.

The next four chapters examine each facet of the conceptual framework—curriculum development and delivery, learner supports, industry and workforce engagement, and contextual factors—to draw overarching and comparative observations about TAACCCT grant-funded CBE program implementation at the three consortium colleges.

III. CURRICULUM DEVELOPMENT AND DELIVERY

A cornerstone of the consortium's TAACCCT grant is the development of new competency-based curricula; likewise, delivery of the new curricula to students is a key indicator of the grant's success. Although all three colleges offered IT courses and programs in traditional online and face-to-face formats prior to the grant, adapting these courses and programs to a CBE format and creating fully competency-based, flex-paced programs was a substantial undertaking. Program staff and faculty at the partner colleges adapted the foundation of their IT curricula to build the new programs and courses around competencies required for success in the IT industry. The numerous steps involved in identifying competencies and mapping them to programs, courses, and assessments are reflected in the six grant deliverables and 25 corresponding milestones related to curriculum development required of each college throughout the course of the grant. [4] Four of the six deliverables (curriculum definitions, course development foundations, identification of latticed certificates, and competency maps) were, for the most part, complete at the time of this writing; work on two others was still ongoing, with a few milestones not yet started (new competency-based program courses and articulation among consortium colleges). This chapter describes the ways in which the three colleges adapted their approaches to developing and delivering curricula for the new competency-based, flexibly paced programs, and it highlights some of the challenges and lessons learned through their efforts.

A. Curriculum development

The consortium colleges built upon existing curriculum development processes, but they moved beyond them to develop new approaches for CBE in the first year of the grant (Person et al. 2014). Since then, the colleges have continued to refine their curriculum development approaches and formalize their processes and tools. Figure III.1 highlights the steps involved in developing grant-funded CBE programs and courses; more specific information about each college's model appears in Appendix B. Key adaptations made for developing CBE courses include collaboration with instructional designers, standardized tools for course development, explicit alignment of curriculum with competencies, augmentation of learning resources to guide students' independent movement through course material, and enhanced industry collaboration to inform content.

CBE course development is more collaborative than traditional models and relies heavily on instructional designers. Across the consortium colleges, the process of developing CBE courses is more team-oriented and collaborative than traditional course development models, which often rely on an individual faculty member. All three colleges have developed structures that support collaboration between dedicated instructional designers (most of whom have advanced degrees in instructional technology, instructional design, or a related field) and faculty (most of whom had taught similar IT courses in traditional formats but did not have experience with CBE course design). The instructional designers and faculty work together to map competencies to content, develop learning resources and assessments, and review course

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[4] Table I.1 lists grant deliverables; the virtual IT lab deliverable applies only to BC. Table VIII.1 presents specific milestones for each deliverable.

materials. Other team members with more circumscribed roles may include the department chair, additional department faculty, multimedia specialists, and other grant staff.

Figure III.1. Overview of CBE curriculum development

CBE course development is more collaborative than traditional models and relies heavily on instructional designers. Across the consortium colleges, the process of developing CBE courses is more team-oriented and collaborative than traditional course development models, which often rely on an individual faculty member. All three colleges have developed structures that support collaboration between dedicated instructional designers (most of whom have advanced degrees in instructional technology, instructional design, or a related field) and faculty (most of whom had taught similar IT courses in traditional formats but did not have experience with CBE course design). The instructional designers and faculty work together to map competencies to content, develop learning resources and assessments, and review course materials. Other team members with more circumscribed roles may include the department chair, additional department faculty, multimedia specialists, and other grant staff.

At ACC and SCC, the instructional designers are involved throughout the process of mapping competencies and developing course outlines and learning resources. Instructional designers at BC described their roles as more circumscribed, focusing on translating course outlines and learning resources into an online, interactive interface in the LMS, for example to "provide technical help to professors" and "enhance current courses with open educational resources." In contrast, instructional designers at ACC and SCC described their role more expansively, reporting that they served as part of the curriculum development team with involvement throughout—and at SCC even managing—the course development process. The more limited role at BC may derive from adherence to faculty contracts or from the fact that

BC's program leadership viewed their computer science course outlines as largely aligned with competencies prior to the grant. As a result, competency mapping seemed to be less of a focus at BC than at the other schools, and instructional designers played a more limited role.

CBE curriculum development relies on tools to support a more standardized process. The consortium colleges have all introduced tools and materials to make the CBE curriculum development process—and the end products—more standardized than in traditional programs. Such standardization is important for CBE because it facilitates regular maintenance and updating of program and course content to ensure relevance of competencies, and it supports curricular quality in courses where students are working independently through materials. An example of such a tool comes from ACC, where the instructional designer developed a comprehensive guidebook that outlines a standardized 14-step course development process.[5] The guidebook walks instructors through an iterative process of developing and revising course materials in conjunction with the course design team, an employer advisory board, and a quality control committee. SCC's online program was already grounded in a well-defined, sound instructional design process. Instructional designers worked with program leaders to modify the existing standardized SinclairOnline course development process to support CBE. The tools and development process include a project planning and scheduling tool that defines and tracks milestones, time frame, due dates, and responsibilities for the curriculum development process. SCC instructors also use a master course model and template for all CBE courses. The master course model was developed prior to the TAACCCT grant and has been refined over the past 10 years. Program leadership viewed this development as an important and intentional step toward a competency-based model. They reported that the master course model facilitates consistent course development and ensures that all competencies are covered. The instructional designers at BC also use a standardized course template but, perhaps because they are less involved in the early stages of developing course outlines and materials, have developed fewer tools to standardize the process. They noted that the lack of consistency across courses has been one of their greatest curriculum development challenges.

CBE course development is also standardized through the use of quality control processes that involve peer review. All three colleges use the Quality Matters framework for all or some of their internal course reviews, and some also use departmental peer review. BC and SCC both use the Quality Matters framework for all courses, with SCC incorporating it into the development process; one SCC instructional designer is a certified Quality Matters master reviewer and trainer. ACC has begun to implement it with some courses and hopes to expand its use. Both BC and SCC used Quality Matters prior to the grant and made no changes for the grant-funded courses. ACC did not use the tool for any courses in the CS department prior to the grant; as a result, training faculty members on the framework and setting up a review committee structure slowed its course review somewhat. The instructional designers at BC reported that outside of the Quality Matters review, they also solicit feedback on courses from students and instructors (informally and through surveys). Both the instructional designers and program leadership at BC noted that student feedback is valuable for quality control, because students are the ultimate

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[5] This tool and others developed under the grant are available on the OER Skills Commons website, https://www.skillscommons.org//handle/taaccct/2154.

users of these courses. SCC administers end-of-course surveys in every course, every term; program leaders also report that coaches routinely collect additional feedback from students.

Course content is explicitly aligned with competencies. The alignment between content, competencies, and assessments requires an explicit mapping process for CBE programs and courses. All three colleges used some form of industry standards—for example, those published by industry associations or large IT companies—as a starting point for identifying competencies directly linked to relevant jobs. In addition to industry standards, SCC and BC both used standards published by their respective state governing entities that specified IT competencies. ACC did not have state standards to draw from, but supplemented industry standards with local expertise from the Austin Chamber of Commerce, job descriptions, and labor market reports (Person et al. 2014). Building courses and assessments with direct reference to these kinds of industry standards and guidance supported clear alignment with the competencies students need to work in the IT field. Although such alignment is one of the basic tenets of sound instructional design, and is not unique to CBE, one respondent at ACC described this explicit alignment as the "biggest difference" between CBE and traditional online course development. Another ACC leader highlighted not only the alignment to standards, but the required updating of course content as an important benefit to students entering the workforce. At SCC, program leaders report that online course development has included explicit alignment processes for the past decade.

> **Promising practice: Using tools to ensure CBE course quality and consistency**
>
> - Step-by-step guidebook. Because CBE course development is new to many instructors and often involves more people and steps than traditional course development, a guidebook walks course development teams through the process. The guidebook also supports standardization, which is important for CBE courses, because they require both a consistent student experience and regular updating to ensure relevance of competencies.
>
> - Planning tools. Course development teams can use planning and scheduling tools to define and track milestones, time frame, due dates, and responsibilities.
>
> - Master template. A standardized course template helps ensure the same "look and feel" across courses, reducing the workload for the course development team and making it easier for students to independently navigate course materials.
>
> - Mapping tools. Competency maps ensure alignment of competencies to content and assessments.

After competencies are identified, they must be mapped to programs and courses in an effort that is reportedly more intense than traditional curriculum development processes. At SCC, course development teams begin with a three-step mapping process in which they (1) identify competencies at the program or curriculum level, (2) map curriculum competencies to courses, and (3) map course competencies to content and assessment items, which are tracked in the LMS. The instructional designer at SCC estimated that this additional mapping process requires about 25 percent more time from instructors than is required for mapping traditional online courses. The other colleges use similar mapping processes at the course level (steps 2 and 3 above), but ACC and BC appear to focus less on aligning competencies to programs (step 1 above) or to assessments (part of step 3).

Enhanced learning materials help students achieve mastery of competencies. Instructors at all three colleges include in CBE courses enhanced learning materials to ensure that all competencies are covered and students are able to work independently toward mastery of all

competencies. These resources may include "homegrown" videos and other media, as well as a variety of published content. Instructors across the colleges underlined the importance of such enhanced resources, noting that in a face-to-face classroom, an instructor can gauge whether students are keeping up with the lesson, answering questions and providing more explanation as needed. In contrast, with online courses, and in particular self-directed CBE courses, it is hard for instructors to know whether students understand the content. One instructor at ACC said that in response to this challenge, he includes at the start of each CBE lesson a video to introduce the topic and provide the additional explanation that some students might need. The project manager at BC also noted that one of the key differences between CBE and traditional courses is that more variations of learning resources are presented to students in CBE courses. She said that rather than providing "handholding" for students throughout a course, instructors present a range of learning resources to cover the topic from various angles, and students can choose which resources are most useful to them.

Success and expansion of program and course offerings

Given the early successes of their CBE programs, all three colleges have expanded the courses and credentials they offer beyond their original plans (documented in Person et al. 2014). They have developed additional offerings in response to employer demand, student demand, or skill needs identified by program leadership.

- ACC developed more programming courses than initially planned and added two new certificates: software testing in the CS department, and design coder in the visual communications department. ACC also developed the Marketable Skills Award, which includes four introductory courses related to programming and computer hardware and is designed to open doors to internships and jobs for students who have not completed a certificate or degree.

- BC expanded beyond its initial plans of offering only an associate degree to also offering 10 industry certification tracks and two technical certificates; program leadership believed this expansion would increase CBE program enrollment and allow students to obtain marketable credentials.

- SCC developed additional CBE offerings that were not initially planned. In response to local employers' recommendations, the college developed a software testing certificate. To better screen and serve students, it developed a computer literacy assessment and course, as well as some additional CBE general education courses. The foundation courses for the associate degrees were packaged into the IT Fundamentals certificate, which prepares students for an entry-level Help Desk position.

B. Curriculum delivery

Throughout the grant period, the partner colleges have not required large investments in new technology to implement their CBE models.[6] Rather they have relied on technology already in use to deliver their CBE courses, although some adaptations have been made for CBE (Person et al. 2014). Across the consortium colleges, all but two of the grant-funded courses are offered fully online through the colleges' online LMS, such as Blackboard and D2L.[7] Most interaction between students and faculty occurs electronically through email and, at ACC, online office hours via platforms such as Adobe Connect. Although online LMS delivery and electronic communication are standard practice for traditional online courses, the asynchronous progress of students through CBE

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[6] BC did budget for the development of a virtual IT lab, but it was not completed at the time of this writing (see Chapter VIII). ACC and SCC made some technology investments (for example, servers, NetLabs, and Cisco lab equipment) to support students' ability to connect and configure equipment remotely.

[7] ACC and BC each offer one hybrid course. Some students at ACC also choose to occasionally attend sessions of the face-to-face sections of their IT courses when they want extra help, according to both instructors and students.

course materials has necessitated adapted standards and structures to support students as they work independently and to encourage timely progress in courses. Some of the key issues related to the consortium colleges' CBE curriculum delivery are detailed below. The discussion shows that "curriculum delivery" for CBE courses is more about facilitating and supporting students as they work independently than providing traditional instruction.

Standardized course formats decrease students' learning curve. All three colleges have made an effort to ensure that the courses have a similar "look and feel" by developing a standard template for course sites. Instructional designers at ACC and SCC both emphasized the importance of this consistency across courses, particularly for online, flex-paced courses in which students work through material independently at their own pace. Standardization reduces the need for students to figure out how each new course is organized. SCC is unique insofar as it used a master course for all online courses prior to the TAACCCT grant that it has continued to refine and use for its CBE courses.

Standards for instructor response times help students progress. The independent, flexibly paced nature of CBE courses requires that instructors be particularly responsive to student questions and submissions. Because there are no regularly scheduled course meeting times for students to receive instruction and ask questions, emails and phone communication between students and instructors are a key part of curriculum delivery. A delayed response to a question about course materials or a request for access to new materials (that is, when the student has demonstrated adequate mastery of prior materials) could mean that the student cannot continue at the desired pace and may not complete the course in the planned amount of time. Instructors at all three colleges discussed the need to be especially responsive to students in CBE courses. Both ACC and SCC impose explicit turnaround time requirements for faculty to respond to students' questions (24 hours and 48 hours, respectively); SCC also requires all assignments to be graded within three days of submission.

De-emphasized student discussion forums align with flex-pacing. Another key adaptation that all three colleges have made for CBE is to de-emphasize the student discussion forums that are frequently used in traditional online courses. In traditional online courses, discussion forums are typically the only opportunity for students to engage with each other about course materials, and are often a key part of course delivery. According to various stakeholders at all three colleges, the discussion forums have not worked well for CBE courses, because students do not all work on the same course material at the same time. The instructional designer at ACC noted that the college has adapted the online forum model for CBE so that a tutor, rather than students, posts about a particular topic, and students can respond to engage the tutor in discussion.

Chunking course content has potential to improve student progress. To better accommodate the flexible pace of CBE courses and promote acceleration, there is a move at all three colleges to "chunk" course content into fewer units. Whereas traditional courses often have seven or more units, program leadership at BC and SCC said that they are trying to reduce the number of units for CBE courses to three or four. BC's ultimate goal is to have one unit per course. This approach will result in fewer assignments and quizzes for individual units; instead, students will complete larger projects that demonstrate mastery of more competencies. At ACC, program leaders are considering a somewhat different approach of compressing multiple courses that lead to a certificate into a single course with modules covering all required competencies.

Although the approaches differ, the goals are similar: simplified course structures will allow students in CBE courses to move more easily from one course to another with fewer intermediary assessments, administrative barriers, and opportunities for stopping. Instructors and administrators also benefit from this approach, because they have to spend less time grading and, at ACC and BC, manually releasing modules and assessments to students as they progress from one competency to the next (SCC releases these automatically). Because students must demonstrate mastery through assessments, program leaders said they are confident that chunking will not threaten course quality.

C. Assessment

The consortium colleges all recognize that security, quality, and objectivity of assessments are critical to the integrity of their CBE models (Person et al. 2014). However, they take somewhat different approaches to developing and delivering CBE assessments. In particular, their approaches differ (from each other and also from the WGU approach) in the extent to which they separate course development from assessment development and instruction from grading.

Staffing for curriculum development and delivery

The key college staff involved in program development and delivery at all three colleges are faculty and instructional designers:

- Faculty are responsible for course development, instruction, and grading. In some cases, altering the faculty role was limited by the faculty contract.

- ACC and SCC primarily use full-time, tenure-track faculty to develop and teach courses. Most CBE instructors also teach face-to-face or traditional online courses in the same subjects.

- BC also used full-time faculty when the program was first developed and implemented, but is now using more adjunct instructors. This move is, in part, because the faculty union contract at BC is restrictive, and the college has more flexibility to pay adjunct instructors by the hour or course. Program leadership also reported that one of the goals of using adjuncts is to have more instructors who have recent industry experience.

- Instructional designers support faculty in developing and revising courses and assessments. All three colleges employed instructional designers prior to the grant, but there was a small number of instructional designers spread across all college departments and, at ACC and BC, they did not specialize in a program or work with faculty on an ongoing, personalized basis.

CBE assessment development and grading are handled differently across the colleges. Although all three colleges seek to align their assessment items with the competencies covered in each course, their processes for developing the assessments, and the individuals involved, differ somewhat. Assessment development is perhaps most structured at SCC, where the instructional designers have designed a three-step mapping process that includes mapping competencies to assessments, even at the item level. In contrast, BC has tried to encourage alignment between competencies and assessments through a unique staffing model that separates course and assessment development. For each course, separate individuals develop the content and assessments, requiring that both pay explicit attention to the required competencies. The course and assessment development teams do not even have access to each other's content on the LMS (Person et al. 2014). An instructional designer at BC explained that they take this approach to encourage teaching to the competencies, rather than teaching to the test. Even so, BC's approach contrasts with the WGU model, where there is complete separation between course and assessment development, instruction, and grading.

None of the three colleges has separated the grading role from the instructor role, although such "unbundling" is a hallmark of the WGU model (Person et al. 2014). The challenge appears to stem, in part, from the colleges' conceptualization and operationalization of the faculty role, which is codified through contracts and official documents such as faculty handbooks. Because the colleges built their CBE models to fit within existing college structures, they were not always at liberty to carve up the existing faculty role or create a completely new grading role. College leadership at BC noted that unbundling of the faculty role is one of the biggest challenges they have faced in CBE program implementation. Program leadership at SCC noted that although course development and teaching were decoupled, further unbundling has been constrained by the limited volume of CBE courses; however, unbundling might be more feasible as the CBE programs expand.

Use of prior learning assessments varies. In their TAACCCT grant proposal, the colleges proposed to "integrate prior learning assessments (PLA) as an intake component of new programs," especially to support student acceleration. To date, the colleges have approached PLA somewhat differently from each other. Although most CBE courses at ACC include a pre-assessment to gauge students' baseline knowledge on the subject, there are few avenues for obtaining course credit without taking the full course. The college allows students who receive a relatively high minimum score on the pre-assessment to take the unit assessment without working through all of the course materials, but the students must still enroll in and pay for the complete course. ACC offers credit to students who hold several specific industry certifications prior to enrollment; students can also test out of an introductory computer course by passing a pre-assessment. Students who test out of this course pay only $40 (normal cost ranges from about $250 for in-district students to more than $1,000 for out-of-state students). College leadership at ACC reported that they would like to expand this financially incentivized test-out model to other courses.

BC has developed an explicit "test out" model for the CBE program. Before starting each course, all students in CBE courses at BC take a Course Challenge Evaluation, which measures baseline knowledge on the subject. Students who pass the baseline exam have the option of taking the unit assessments within the course; if they pass all unit assessments with a score of 81 percent or above without accessing course materials, they receive credit for the course. In addition to the benefit of accelerating through the program, the college also offers students a financial incentive for demonstrating prior knowledge: students who test out pay $7 per credit hour, compared with the normal cost of more than $100 per credit hour. Students interviewed for this report described positive experiences with the model. Some had tested out of most of the courses they enrolled in. Even students who had not achieved scores high enough to test out appreciated the model, because, they said, it provided them useful information about weak spots where they could focus extra effort in the course.

SCC offers numerous PLA avenues. These include portfolio review, proficiency tests, credit for industry certifications, and credit-by-examination (for example through programs such as the American Council on Education's College Credit Recommendation Service, the College-Level Examination Program, and Defense Activity for Non-Traditional Education Support). These PLA options are available college-wide, not just to CBE students; however, program coaches provide information about the PLA options to students enrolled in the grant-funded CBE programs. Moreover, CBE program leaders report that grant staff have worked with the college

PLA office to streamline and automate the PLA process for CBE students. For example, students are assessed for PLA eligibility during intake screening for Accelerate IT. In addition to the college-wide PLA options, SCC uses the CBE course assessments to develop proficiency tests that allow students to test out of a full course. These proficiency tests are similar to BC's challenge test, but students do not need to register for the course, and they pay $10 per credit hour, compared to about $120 per credit hour for traditional courses.

Assessment delivery is not entirely online. Despite the largely online format of course delivery, most students at all three colleges take high-stakes exams in person, where they can be proctored and security ensured. Among the three colleges, currently only BC offers assessments through Proctor U, an online proctored platform for administering computer-based assessments remotely. Despite this option, program leadership at BC reported that less than 25 percent of students choose to use Proctor U. At ACC and SCC, students must take assessments in person, either at a testing center on campus or at a remote testing site. Student interview respondents at the three colleges seemed satisfied with the in-person approach, though program leaders at ACC continue to explore online options for proctoring. Most courses at SCC require both objective online-testing and performance-based assessments in the form of labs and projects where students demonstrate that they have acquired the required competencies; these performance-based assessments are not proctored.

D. Challenges, successes, and lessons learned

Over the course of the grant, the partner colleges have faced challenges, developed successful solutions, built important institutional capacities, and helped to build knowledge for the field about implementing competency-based and flex-paced curricular models in community colleges serving TAA and other dislocated workers. Key challenges across the three colleges have related to engaging instructors in a collaborative model of curriculum development, refining the flexibly paced delivery model to mitigate procrastination and end-of-term grading bottlenecks, and adapting institutional policies related to instructor load and compensation. The colleges have begun to address these challenges in various ways and, in some cases, are still working toward sustainable solutions.

Faculty must adjust to the standardized, collaborative curriculum development model. One of the key challenges ACC and BC faced early in the grant was encouraging faculty to adapt to the more standardized, collaborative model for curriculum development. Many faculty members were reportedly used to having more independence and autonomy, and competency-mapping was not an explicit part of their existing processes. Despite some initial uncertainty about CBE, most who participated in the grant adapted to the CBE process, and the instructors reported positive experiences with the process. Program leadership at BC noted struggling the most with engaging general education faculty in the competency-mapping process. One respondent reported that some general education faculty wanted to "take their course, dump it into a shell, and call it CBE," rather than adapt it to align with explicit and concrete competencies. An indication that faculty have bought into the process comes from ACC and SCC, where instructors have actually adopted the materials developed for CBE courses in their traditional face-to-face or online courses. At SCC, program leaders report that faculty are accustomed to collaborative course development, and the CBE curriculum has been adopted

department wide, even among instructors who were not directly involved in the grant-funded curriculum development.

Instructional designers played a key role in building faculty trust and confidence in the curriculum development process. The experience of the instructional designer at ACC illustrates the importance of the role. She noted that the templates and tools she had developed were designed to help faculty initially understand the competency-based structure, which most had not been familiar with. As faculty worked with the instructional designer and applied the tools over time, they saw firsthand how the new process helped them improve their courses. The instructional designer said that at first she felt like a "salesman," but over time, faculty saw the value of the approach and now trust her judgment. Similarly, a BC program leader noted that, early on, the program had to engage in a certain amount of self-promotion to get faculty buy-in. In contrast, SCC implemented collaborative course design 10 years ago, and worked through the challenges of implementing the innovation at that time. Because the CBE curriculum development process typically requires additional time (especially for steps such as competency mapping), additional compensation—in the form of money or lower teaching loads—also helped secure faculty engagement at all three colleges.

Despite the challenges posed by the more standardized and collaborative curriculum development processes at the consortium colleges, stakeholders at all three colleges spoke positively of the differences. The instructors interviewed during site visits reported good working relationships with the instructional designers, and some acknowledged that the instructional designers have distinct skills that help improve the course materials. One instructor at SCC described the collaboration, saying the instructors have the "big ideas," and the instructional designers "make the magic happen." An instructor at ACC noted that working with the instructional designer has resulted in a big improvement in his assessments, which used to be composed of questions from test banks that did not necessarily map to competencies. The instructional designer at ACC agreed with instructors that the process developed for CBE courses works well, and expressed an opinion that it should be used for all online courses.

Staff workloads and compensation require attention. All three colleges have experienced administrative challenges associated with staffing CBE courses, because traditional formulas for calculating faculty credit load and compensation do not work well for CBE courses, where class sizes are not fixed at the beginning of an academic term. All three colleges have had to rely on manual workarounds to address this issue. The colleges are currently considering different ways to lessen the problem moving forward, including different approaches to load calculation and relying on adjuncts to teach CBE sections. For example, college leadership at ACC said that they currently have to combine as many as nine sections for CBE instructors to meet their required load, and they often have to open new sections throughout the term as enrollments build over the course of the academic term. ACC program leaders are looking into a new model that calculates load based on number of students rather than lecture equivalent hours, which will be better suited to shifting enrollments and small CBE course sections. A program leader at ACC said CBE has "broken the back end" systems that were designed for traditional courses. SCC uses their existing independent study payload rate to compensate CBE faculty; however, since enrollment is not fixed at the start of the term and additional students are added throughout the semester, the payload must be adjusted throughout the term. The challenges of workload and compensation do

not have easy answers, but addressing them is key for traditional colleges implementing innovative CBE models.

In addition to the administrative challenges of staffing CBE courses, the colleges also found that the flexible pace of the programs led to demanding workloads for instructors. Because students do not necessarily progress at a steady pace throughout the term, instructors at all three colleges reported grading bottlenecks, particularly toward the end of the term. Instructors at ACC and BC also reported some frustration with the need to manually release assessments to students as they completed course material, which can also pile up at the end of the term; at SCC the challenge is for faculty to complete grading so automatic releases are triggered. Efforts to keep students on track (discussed in greater detail in Chapter IV), may help to spread grading and manual releases more evenly throughout the term. A program leader at BC reported that the college has also tried to reduce the faculty burden by automating the release of all assessments except for the final unit evaluations. This approach has the additional benefit of reducing roadblocks for students, who reported sometimes having to wait for instructors to open courses or assessments. The streamlining or "chunking" of courses into fewer units is another potential solution to the additional burdens placed on instructors by the CBE models. With fewer assignments and assessments, less grading and manual release is required of instructors.

Flex-paced delivery does not always result in acceleration. Another challenge that all three colleges have struggled with is the flexible pacing of CBE program delivery. Originally, the colleges had used the term "self-paced" to describe their programs, but that label was problematic because as program leadership at all three colleges reported, it led to student procrastination rather than acceleration. The BC project director asserted, "Self-paced means slow. When [students] hear self-paced, they think it means they can take it at [their own] pace rather than accelerate." Program leaders at ACC and SCC expressed similar sentiments. In response to this challenge, all three colleges have adopted the terms "flex-paced" and "accelerated" instead of "self-paced." The colleges have also added pace charts that specify expected progress schedules (see Chapter IV), more milestones with soft and hard deadlines, and increased monitoring to encourage student progress through the programs.

Although the CBE models may help students who want to accelerate, it is important to note that students choose CBE models for different reasons. As noted above, student interview and focus group respondents emphasized that they were drawn to the flexibility that CBE offered more than the opportunity to advance quickly through material. At the same time, students liked the idea of acceleration, but some chose to take only a couple of courses per term. One student at BC explained that he had planned to take four courses in one term, but he took only two, because there were no strict schedules, and completion was not "urgent" for him. Two students reported being unable to accelerate as much as they would have liked. One faced enrollment constraints because her veteran's benefits required her to take at least one course per term on campus, and required all courses to have defined start and stop dates. Though this report came from a student at SCC, it highlights a problem common to any student seeking to use veteran's benefits for CBE courses. Accordingly, a program leader at BC also noted that veterans interested in or enrolled in their program have experienced similar barriers related to their benefits. Another student (at ACC) pointed to course content in prohibiting the acceleration she had expected. Specifically, she had experience working in the field and expected to be able to apply her skills to accelerate

in a project management course, but she found that it took longer than anticipated, because the course focused on "academic" topics that she did not have as much experience with.

Students appreciate flexibility of CBE programs. The nonrandom and limited sample of students interviewed for this report spoke in generally positive terms of their experience with CBE curricula. In particular, across the three colleges, students said they were attracted to the flexible pacing of the CBE programs that allowed many of them to balance schooling with work and family. Still, the students themselves sometimes noted the "double-edged sword" of flexibility and emphasized the need for self-discipline, motivation, and organization to stay on track and avoid procrastination. At ACC, students' concerns focused on the alignment of competencies with curricula. Specifically, some students there expressed concern that courses at the college do not cover some of the cutting-edge competencies required in the IT field. Students at ACC also cited concerns that some of the competencies that are taught in courses are not the focus of the accompanying assessments. It is unclear from our data whether this misalignment is merely the perception of a few students, or if the courses in question suffered from real misalignment between course materials and assessments. Students at BC and SCC did not comment on the alignment between competencies and curricula.

IV. LEARNER SUPPORTS

A core principle of competency-based educational approaches is that students who are moving independently through flex-paced CBE programs require additional supports beyond what traditional models typically provide (Johnstone and Soares 2014). The consortium colleges operationalized this principle by providing a system of enhanced supports from initial student intake and enrollment, through coursework and program completion, to career and transfer services. This model is reflected in the six grant deliverables and 18 corresponding milestones related to learner supports in the consortium's implementation plan. As with curricular deliverables, most learner support deliverables (recruitment and application processes, student screening and placement processes, enrollment processes, learner support processes, and transfer assistance processes) were also complete at the time of this writing, with work ongoing for only career placement processes. This chapter describes the partner colleges' experiences implementing the full spectrum of CBE learner supports.

A. Student recruitment, screening, and enrollment

Since the consortium colleges first offered CBE courses in fall 2013, they have targeted an academically prepared and mature student population (Person et al. 2014). CBE program leaders have felt that this focus is necessary, because flex-paced CBE programs require a great deal of independence, self-direction, and motivation from students. Respondents across the three colleges emphasized that CBE programs are not a good fit for all students. Creating a process that effectively screens for a good match and then supports students through the enrollment process is the first step in helping students succeed. Over the course of the grant period, the partner colleges have refined their intake processes, both to support their program enrollment goals and to ensure a good fit for students who do enroll.

Smarter recruiting and screening support a better fit with CBE. Over the course of the grant, the colleges have, in the words of one respondent, become "smarter" about the types of students they target and the tools they use to screen them. Seeking a student who is likely to be successful in flex-paced, online courses has resulted in the colleges recruiting older students, especially those with prior college credit and work experience. As of the end of the spring 2015 term, the average age of the colleges' CBE students was 28 years, compared with an average age of 26 years among students in traditional (that is, non-CBE) IT programs at the colleges; 83 percent of CBE students had prior college experience, compared with 74 percent of their peers in traditional IT programs.[8]

In their attempts to "get smarter" about recruiting and screening students for their CBE programs, two of the colleges have changed their intake assessment. Originally, all three colleges planned to use a commercial assessment of readiness for online or technology-rich coursework to screen CBE students. However, after the first year of implementation, BC and SCC program leaders both concluded that the particular assessment they had chosen was not an effective tool

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[8] All colleges provided Mathematica with administrative data on a comparison group of students in traditional IT programs similar to their CBE programs. Because SCC faculty have adopted the CBE curriculum across the CS department, the comparison group includes students taking face-to-face and traditional online courses with some elements of the grant-funded curriculum, but without access to grant-funded learner supports.

to assess student preparedness for their CBE programs. They felt that computer literacy was the critical requirement to being successful in CBE, and although the branded assessment purported to capture computer literacy, program leaders felt it was not meeting their needs; moreover, they believed that the assessment involved too much material not relevant to student success in CBE. As a result, BC and SCC both discontinued using the assessment and instead created stand-alone computer literacy courses and assessments that students can either test out of or take as a prerequisite for the colleges' CBE programs. In contrast, ACC continues to use the commercial assessment as part of its screening process, but enhances the process with a comprehensive personal interview with the CS department chair.

Other changes to recruitment were driven by student feedback or an exchange of ideas between the consortium colleges. At ACC, program leaders conducted an internal analysis of student survey data to ascertain how students had found out about the APT program and used the findings to inform their recruiting and marketing strategies. As a result, ACC shifted focus away from external marketing and instead began to leverage college advising staff more to recruit students (both BC and SCC were already using similar strategies, focused on internal recruitment). While ACC was paring back its external marketing efforts, BC was adapting some of ACC's early strategies and beginning to engage in more external marketing on the radio and at local professional sporting events. It is not clear what benefit this strategy has had for BC, but program leadership pointed to rising enrollments as possible evidence of student response.

Although the partner colleges have targeted mature, well-prepared students, at least one college found it needed to loosen its criteria for admission to its CBE program. Program staff at BC reported that they had originally targeted nontraditional adult students and used very strict criteria, including intermediate algebra, for admission to the CBE program. However, over time they began to feel that this criterion was unnecessarily limiting the applicant pool and excluding students who might actually succeed in the program. BC has relaxed the math prerequisite and now accepts a broader range of students; a program leader credits this change with helping to increase student enrollment in the program (second year enrollments were about double first year enrollments), a goal they have struggled with, especially in the first year of the grant. Whether students without an intermediate algebra background fare as well in the CBE program is a question that the evaluation's final summative report will need to address.

While they target mature, well-prepared students, CBE program leaders at all three colleges counsel students with remedial needs or not suited for the CBE model toward other programs. The colleges would all like to offer the CBE model to more students, but recognizing that CBE is not necessarily for all students, they have created a few pathways that allow a wider range of students to access CBE coursework. For instance, BC developed a number of general education classes to support the associate's degree; these courses let students try the format before entering a comprehensive CBE program. Both ACC and SCC offer an emporium model, which provides courses in the flexible online CBE format but supplements them with in-person support from faculty or tutors. While the colleges are focused on enrolling students who will succeed in their CBE programs, they are also developing CBE options outside the programs.

High-touch student intake and enrollment puts students on the right path. Compared with the intake processes of traditional community college programs, CBE program intake is a more "high-tech / high-touch" experience. CBE program staff and online orientations walk

students step-by-step through the intake process, rather than leaving students on their own (Person et al. 2014). In addition to the screening assessments noted above, key features of the colleges' current intake processes (summarized in Appendix B) include the use of personal admissions interviews and early academic coaching that seek to determine the best path for the student and help the student develop a plan for completing it. The depth and importance of each of these components varies by college, but the processes are present across all three. For example, while all colleges employ a personal admissions interview, ACC puts the greatest emphasis on this component, with the department chair interviewing all prospective students in person. Similarly, SCC developed the Student Success Plan tool, which helps students map a path from program entry to completion and informs coaching throughout a student's program. BC developed a similar tool that coaches use to guide students.

Staffing for learner supports

Academic coaches are the key staff involved in providing CBE learner supports across the three colleges. Although the colleges' respective CBE programs started with quite different coaching models, they have converged to look more similar as the grant period comes to an end:

- SCC's coaching model is most like the WGU "student mentor" model and has been the most stable model over the course of the grant. SCC initially hired a lead academic coach with a background in student services at SCC to lead the coaching team. There has been some turnover in the coaches over the course of the grant, but the college has maintained the same coaching model throughout.

- BC began the grant with four faculty advisors who served as CBE student mentors, however, the role was too burdensome when combined with full instructional loads. As a result, BC transitioned to a model similar to SCC's, hiring two academic coaches to focus solely on providing learner supports. Both coaches had worked in administrative roles at BC, but neither had prior CBE or IT experience.

- ACC did not initially include a coach position as part of its CBE learner support model. However, early in the grant period program, leaders determined that this position was necessary and hired one dedicated academic coach, a former ACC student with a diverse background in project management.

B. Academic coaching and transition support

Stakeholders agree that once a student enrolls in a CBE program, enhanced learner supports are crucial to students' timely progress and ultimate success in CBE programs. After program intake, the consortium colleges provide through their CBE models two kinds of enhanced supports, beyond those offered to all students at the college: academic support as students progress through courses in the program and services to help students transition to work or further education upon completion of the CBE program. Each college developed and implemented a "coach" position to provide both academic and transition support; however, the positions have evolved very differently at each of the partner colleges, in some cases, changing substantially from their original models (Person et al. 2014). ACC did not originally plan to include coaches in its CBE model but concluded early in the grant period that the position was necessary. Since then, ACC has been working to formally develop a role currently focused on intake and enrollment management. BC's model has changed significantly over time, evolving from the original faculty advisor role to a model somewhere between what is offered by ACC and SCC. BC's academic coaches guide

students through enrollment and monitor student progress through courses and programs (similar to the ACC coach), but the model continues to evolve, with movement toward higher-touch approaches (similar to the SCC coach). SCC designed its Accelerate IT coaching model to be

high-touch but also created lighter-touch approaches for its instructor-led online and hybrid CBE modalities.[9] We examine the similarities and differences between the coaching models here.

Targeting supports to student needs is key to CBE coaching models. Coaches at the partner colleges noted that targeting supports—that is, providing the "right intervention at right time," as one SCC coach described it—is critical. Using data is a key to successfully implementing such timely interventions. At both BC and SCC, coaches receive regular reports developed from their LMS data that indicate whether a student is falling behind and trigger contact with students. The ACC coach currently relies on faculty to provide this kind of information. Targeting interventions will be especially critical as enrollments expand and coaching loads increase. The colleges are all seeking to leverage technology to facilitate or automate some aspects of coaching through branded software tools (such as Civitas[10]) or through working with their college IT staff to implement changes that could facilitate admissions, orientation, and registration. For example, at SCC, program staff worked with college IT to begin "smart lifting" of restrictions that would allow students already enrolled in the CBE program to register themselves for new CBE courses, without the help of a coach. SCC will roll out this automated process in the spring 2016 term.

In the most highly developed coaching model (SCC's Accelerate IT model), coaches are heavily involved from intake through transfer or employment and rely on a variety of tools to support students' progress through the program. Coaches meet with students (in person or virtually) and use the My Academic Plan component of the Student Success Plan tool to develop the student's individualized vision statement and program goals. They shepherd students through course selection and registration, and use weekly coaching reports derived from the LMS to monitor progress toward completion. The reports track student log-ins, assignment submissions, assessment grades, and course grades, and they prioritize for intervention any student who exhibits high-risk behaviors. Depending on student needs and risk assessment, coaches check in with students weekly or biweekly to discuss progress, challenges, and successes. Coaches also work with faculty to troubleshoot student performance issues and to support students consistently. This model aligns most closely with the WGU student mentor role, which is a critical feature of WGU's learner support model (Person et al. 2014).

Currently, SCC program leaders are trying to streamline the Accelerate IT coaching model, both to support sustainability and to focus on what seems to help students most. Compared with SCC's centerpiece Accelerate IT coaching model, the ACC and BC models and SCC's instructor-led online and hybrid models employ a lighter touch, where the coach acts largely as an enrollment manager and progress monitor. In addition to guiding the intake process described in the prior section, the coach periodically checks in with students via email and/or phone, to ensure they are completing course work and progressing at an appropriate pace; they also help students to stay on track by enrolling in new courses as needed.

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[9] See the Interim Report (Person et al. 2014) for further description of the SCC coaching models and corresponding CBE modalities.

[10] Civitas is a data analytics platform that colleges can tailor to analyze a range of institutional data, including LMS data.

Pace charts support CBE students' timely progress. One goal of CBE is to enable students to move through courses more quickly than they would in traditional online or face-to-face environments. Nevertheless, although acceleration is possible, it is not guaranteed. Because students are working independently, they can progress at the same pace they would in a traditional course, or perhaps fall behind the pace required to complete the course in a timely manner. All three consortium colleges have implemented pace charts to encourage students to stay on track and, ultimately, accelerate.

Pace charts specify milestones that students must meet to progress through a given course. For example, a pace chart might indicate that a student should complete at least one assignment within one week of beginning a course and specify the maximum amount of time it should take to complete 25, 50, and 75 percent of the course material. Coaches at BC work with students to tailor pace charts at the beginning of a course, while at SCC students independently develop their pace charts as part of orientation. Pace charts push for acceleration and foster student ownership of and accountability for their own progress. Coaches use the pace charts to monitor students' movement through course material. A student who is not meeting the milestones set by the pace chart triggers a targeted intervention, which is usually direct contact from the coach to troubleshoot and help the student move forward. Using the pace chart to prompt the intervention helps coaches provide outreach more effectively and improves the chances that students will respond. One coach asserted, "The right service has to be delivered at the right time, otherwise… [students] don't hear it."

Career supports can link students to jobs that require their competencies. The key goals of the TAACCCT grants relate to individuals' preparation for careers and their ability to find jobs upon completion of a credential. Therefore, all three colleges have developed enhanced career supports for their CBE programs. However, the colleges are in large part still developing their respective CBE career services models. At a minimum, all three colleges offer referrals to existing career services at their college. Beyond that, each college offers its CBE students varying levels of career and transition support services.

The SCC Accelerate IT model is again the most developed program, with one support staff member who is designated as both a career coach and an academic coach. As previously noted, SCC career support is integrated into the five-phase coaching model and not left until the end of the student's program. Coaches pro-actively work with students and the Business and Public Services division's internship coordinator to secure internships (many of which are paid) for program participants. SCC program leaders report that 87% of internship students are hired by the employer into a permanent position. Coaches provide support for resume writing and interview preparation through the online internship course and through SCC centralized career services; reverse job fairs provide students the opportunity to be interviewed by prospective employers. ACC offers some career development and job placement services similar to SCC, such as resume and interview workshops. They also offer online portfolio development (including sharing portfolios with employers), and job fairs. BC recently hired an industry partner coordinator who is working to create employer partnerships; this includes linking employers to the college's career center, which could also benefit students.

Promising practice: Using tools to monitor and support student progress from intake through completion

- Intake assessments. Because CBE requires students to work independently, it is important to assess students' preparedness for the program before they enroll. Two of the consortium colleges use a computer literacy assessment and course as a prerequisite for their CBE programs; one uses a commercial product, a branded assessment of readiness for online or technology-rich coursework. All colleges interview incoming students to get them on the right path.

- Student Success Plan. SCC support staff use this tool developed by the college to help students identify the courses needed for their CBE program, to create a time line for completion, and to keep students on track as they move through the program.

- Student progress data reports. Support staff and instructors receive automated data reports generated through the LMS to monitor students' enrollment and performance in courses. They can use this information to provide targeted interventions when students fall behind or are struggling.

- Pace charts. Milestones and suggested time lines for each course are mapped out in pace charts. Students can use pace charts to monitor their own progress, and support staff can use them to identify students in need of targeted intervention.

C. Challenges, successes, and lessons learned

Implementing the various CBE learner supports has posed a number of challenges for the consortium colleges, but they have also realized some important successes with these offerings.

Identifying and recruiting TAA-eligible workers is difficult. While the colleges have succeeded in meeting the overarching program enrollment goals articulated in their DOL grant agreement, across the board, the colleges have struggled to recruit TAA-eligible workers, who are of primary interest to the TAACCCT program. A principle reason for this challenge is that the TAA population is relatively small in all three consortium college sites, and most of that program funding expired during the grant period. Moreover, college information systems typically do not track TAA eligibility. BC reportedly has very few TAA-eligible students in its county from which the program can draw. As a result, the program has put more resources into attracting other populations of interest, such as veterans. SCC has a larger TAA population to draw from than BC; however, the college found it needed to more actively pursue that population for the CBE program—unlike veterans, TAA-eligible and other displaced workers were not proactively inquiring about the program. ACC program staff said they are struggling with how to identify and recruit more TAA-eligible students.

Finding students who are a good fit for CBE requires careful strategies. A key challenge to the intake and enrollment process is ensuring that the colleges are enrolling students who are a good fit for the requirements of their CBE programs (that is, self-motivated students with relatively strong academic preparation). All three colleges have struggled with screening strategies. As described above, BC and SCC have supplanted one of their original screening tools (a branded assessment of readiness for online coursework) with other assessments focusing on computer literacy. ACC has a single departmental leader in a "gatekeeper" role, which has ensured student fit with the program but may result in bottlenecks, especially as the program grows. ACC has tried to streamline recruitment and intake by holding "one-stop recruiting" events, where students can complete both the intake assessment and interview in the same sitting. The only piece they cannot complete is the actual enrollment, which is handled with the help of a coach. All three colleges have come to rely on internal college advisors for referrals to their CBE

programs. However, this approach may be drawing students away from other programs within the department or college.

Coaches and faculty must work together to fully support students. Staff across all partner colleges, and at all levels, expressed a belief that coaches are key to student success in CBE programs. Ultimately, all three colleges have implemented a model that is more comprehensive and what they describe as "intrusive" than services available to students in traditional programs. At BC and SCC, coaches are in touch with most students on a weekly or biweekly basis. These coaches use data to monitor student progress and guide targeted interventions to ensure student success. Nevertheless, optimizing the coaching role posed a similar challenge at all three colleges. In particular, faculty were reportedly used to having full control over student performance monitoring, and it was not always clear to them how coaches were supposed to support their work with CBE students. Program leaders worked to get coaches and faculty on the same page by clarifying the coach role and determining how coaches and faculty might best work together. At SCC, the provost established a task force to help resolve this issue and other challenges related to coaching, resulting in defined interventions and faculty and coach responsibilities. Across the colleges, a common understanding has been defined between coaches and faculty, and more positive collaborations are now the norm. Ensuring that both faculty and coaches understand their roles in a CBE learning environment is a key lesson the colleges learned during program implementation.

Supporting student access to financial aid and other benefits sometimes requires flexible solutions. The colleges experienced some challenges with student financial aid when students enrolled in CBE courses one or two at a time, but they have found solutions to these problems. At SCC, program leaders implemented rolling starts that allow students to begin a CBE course on any Monday during the first 12 weeks of the fall and winter terms, and any Monday during the first 8 weeks of the summer term; however, students must register for a full course load at the beginning of the term to receive full financial aid, and they may have to return aid if planned courses are not completed. BC created an "out of sync" session that allows for disbursement of funds within each CBE session, appropriate to the student's course load and progress. In general, financial aid has not posed a problem at ACC, because most students have a bachelor's degree and are, therefore, ineligible for financial aid.

Although all of the colleges reported that they have been successful in recruiting veterans into their CBE programs, they have all encountered challenges ensuring these students' access to their full benefits. These challenges are related to at least two issues. First, veterans are required to be full-time students if they want to use their benefits, but they may wish to take CBE courses one at a time, making them appear to be enrolled in a less than full-time course load. Second, the CBE programs are offered almost completely online across the three colleges, but veterans must be enrolled in at least one in-person course to receive their housing stipend. To date, program staff across the colleges have had to work individually with veteran students, liaising as necessary between their benefits office, the financial aid office, and the CBE program.

Student experience with learner supports varies within and across colleges. Students reported mixed reactions to the various intake and support processes. At all three colleges, at least one student expressed appreciation for being walked step-by-step through intake. One BC student noted that although college enrollment processes were usually stressful, CBE "has been

the easiest ever." An SCC student described the orientation courses as "pretty quick and essential," and helpful for students acclimating to the LMS interface for the CBE program. A few students were less satisfied with CBE program intake processes, particularly the assessments. A BC student described the computer literacy assessment as "unnecessary nonsense," while an ACC student was unimpressed with the intake assessment, saying it seemed like a "personality analysis."

With respect to coaching, students who had had frequent contact with the coach and understood the coach's role tended to be most effusive about it. One SCC student praised his coach: "Amazing. If it wasn't for her, I probably already would've failed out." Similarly, BC students reported that coaches "bend over backwards to help," including taking calls outside of regular business hours. At ACC, where the academic coaching model was not part of original program plans and is still developing, the role appears to be less understood by students. From the few students we spoke to, it appears that ACC students have less frequent contact with their coaches, maybe only a few times each term, and the interactions are cursory. In contrast, at the other two colleges, students reported frequent contact with their coaches and occasional in-person meetings with them, despite the online format of the program.

Our understanding of student perceptions of career and transition supports is limited because, at the time of our site visits, most student respondents had yet to use the services or were already employed and therefore not planning to use them. Moreover, our sample of students was small and non-random, and data were collected by different means across the three colleges (in-person focus group at ACC, in-person and phone interviews at BC, and phone interviews at SCC). Among those who had experience with career services, a student interviewed at SCC expressed enthusiasm about the help received with an internship. Students participating in a focus group at ACC expressed a desire for more information about employer needs and more frequent communications from the program about career development opportunities.

V. INDUSTRY AND WORKFORCE RELATIONSHIPS

Creating effective career pathways for students entering or advancing in the IT field is a key objective of the consortium's TAACCCT grant. Although the grant deliverables related to industry and workforce engagement are framed in terms of the role these relationships have in students' career advancement, the colleges view them more broadly. In particular, they see such relationships as supporting curriculum development, student recruitment, and in some cases regional economic development. The partner colleges have done more to develop industry ties than relationships with public workforce systems, but both are key to the success of the CBE programs and the colleges' ability to achieve their grant objectives.

A. Employer engagement

The colleges all viewed industry partner involvement as important for CBE program development and implementation. All three colleges employ staff explicitly dedicated to engaging employers, and all have developed formal relationships with industry partners; but the level of involvement varies across colleges and partner organizations. Partner involvement may be more passive (for example, with partner firms listed on the CBE program website or in marketing materials) or more active (for example, with partners contributing to curriculum development, participating in job fairs, and hiring students for internships). Partnership activities tend to focus on program development and supporting students, but in some cases, the colleges viewed their employer engagement as a response to local economic conditions. We highlight here some of the similarities and differences in the colleges' approaches to employer engagement.

Industry partners inform curriculum development, current and future competencies. Competencies are the heart of any CBE program, and they must align with academic and industry standards. Yet standards change, especially in rapidly evolving areas such as IT. Although most college and program accreditation processes require some regular review of program content, that is not enough to ensure that competencies keep pace with industry needs. Moreover, informed program planning and curriculum development require that college leaders think ahead to future needs.

All three colleges engaged industry partners to varying extents in curriculum development. All used employer advisory committees at the department level prior to the grant, and their opportunities for input on curricula were expanded under the grant. SCC drew upon state technical content standards for IT programs that had been developed through a statewide, collaborative effort between educators, employers, and other industry groups, leveraging these resources for its CBE program and course competencies. SCC program leaders also established the Stakeholder Collaborative, which includes executives and line managers from industry partners, representatives from the workforce system, and academics, to provide guidance related to aligning competencies with existing and future regional workforce needs. Such input from industry partners influenced the development of new certificate programs at both ACC and SCC. At ACC, interactions with employers lead to the development of software testing and visual communications certificates. Similarly, SCC created a software testing certificate in direct response to a need highlighted by an employer partner for entry-level software testing job

candidates. Employer partners have had more limited involvement in developing individual courses at the colleges, but all three colleges provide their partners with the opportunity to review courses.

Employers and students can benefit from supportive interactions facilitated by the college. Both ACC and SCC tap their industry networks to support students directly by participating in internship programs, resume workshops, mock interviews, and job fairs. Each college has developed its own model for job fairs. At ACC, the coordinator of outreach and student support chose to use virtual job fairs, organized around the seven academic fields within the CS department, to connect employers and students. He reported that these online opportunities received better turnout among employers and students than in-person job fairs. SCC has taken a different approach, using reverse job fairs, in which students set up booths to demonstrate their experience and skills for employers. During their core monitoring visit, DOL highlighted SCC's reverse job fairs as a positive practice. The two colleges have also taken slightly different approaches to prepare students applying for jobs: ACC offers workshops, and SCC offers a weeklong boot camp, but both include mock interviews conducted by local IT employers. The ACC coordinator noted that although the interviews are described as "mock," they can sometimes lead to actual jobs for students. BC has not engaged employers in job fairs or job preparation activities geared toward the grant-funded CBE programs; instead, students can participate in college-wide activities coordinated centrally by the college's career services office. For example, program leaders said that they refer interested students to the college's formal internship program, which works through industry partners.

Partnerships address local and regional economic conditions. Beyond program development, the colleges also design employer partnerships to respond to local and regional economic conditions. SCC program leaders developed the Stakeholder Collaborative, which bridges the supply and demand for an educated workforce by bringing employers and industry representatives together with college and program representatives. The collaborative includes industry partners at the executive and line manager levels. This partnership is critical, because executives can address broad industry evolution and regional economic development, and line managers can address alignment of curricula with current job requirements. SCC has developed a transparent and replicable process for gathering input from members of the collaborative that is being adopted and applied to other content areas beyond information technology. Ongoing input from the group helps ensure that SCC programs and courses have clear, job-relevant competencies that can be continually updated as academic and industry standards evolve. ACC also aims to meet local labor market demand through its CBE program, but program leadership and staff did not cite economic development as an explicit goal of their employer partnerships. Rather, they focused more on how the employer partnerships mutually benefit employers and students, specifically in attracting students to the program and linking them to jobs after they complete the necessary credentials required by employers.

The colleges often built upon existing employer relationships. The colleges each came at employer engagement from a different angle, building upon relationships and resources that had been in place prior to the grant, and using the grant to enhance their respective approaches. Prior to the grant, ACC's CS department had relied on a former IT industry executive who was an adjunct faculty member that built personal relationships over many years with local IT employers. With strong support from the CBE project director, he continued to grow and

formalize this network in his role as the CBE program's coordinator of outreach and student support. Before the grant, SCC's IT programs had already benefited from employer-influenced IT content standards and active employer advisory groups. Developing industry partnerships was a continuing priority for SCC going into the grant, and program leadership devoted significant efforts to establishing a range of employer engagement approaches at different levels. BC has placed less emphasis on employer engagement and did not originally include an employer-engagement position as part of its grant. However, looking to ACC as an example, BC eventually created a position and hired an industry partner coordinator in November 2014. At the time of the site visit, the coordinator had begun to reach out to employers through local industry events and to develop relationships aimed primarily at coaching and mentoring students. Using existing connections from the BC career center's network as a starting point, the coordinator has recruited about 20 industry partners, which are featured on the program website, similarly to ACC's approach.

B. Engagement with public workforce systems

The colleges have engaged with public workforce agencies somewhat less than with employers but for largely similar purposes of recruitment and student support. In particular, all three colleges tapped workforce partners for help identifying TAA-eligible and other displaced workers. In what is probably the deepest of the colleges' relationships with their respective workforce partners, one of the academic coaches at SCC is embedded in the local American Job Center and works in that office three days a week; she reported that her position has facilitated relationships and interactions between the workforce office, their clients, and the CBE program. SCC collaborates extensively with the Job Center, partnering on reverse job fairs, and including high-ranking county workforce staff on the business and industry teams. Additionally, SCC established a Strategic Partners' Forum consisting of executives from industry, community, and workforce agencies, and high-level industry executives and state workforce officials (representing over 40 counties) participate in the grant's oversight committee meetings. Both ACC and SCC use their relationships with local workforce offices to enhance career supports for students. Workforce partners at these colleges offer workshops to students on topics such as interview preparation and resume building; they also participate in job fairs and other partnership activities. Only at SCC did respondents report workforce partner involvement in curriculum development, specifically, through workforce representatives' participation in the Stakeholder Collaborative. BC has had difficulty executing a formal agreement with its workforce agency, in part because of limited staffing resources at the agency. As a result, the program has had limited engagement with its local workforce agency.

C. Challenges, successes, and lessons learned

The colleges addressed a few key challenges related to establishing robust relationships with both employers and local workforce agencies.

Engaging employers at the right level is challenging. A common challenge to developing employer partnerships cited across the colleges was finding the right individual within a company to engage with, and structuring the engagement so it is worthwhile to all parties involved. Depending on the objective, program staff must choose whether to target higher-level executives or line managers. For example, a program leader at SCC noted that higher-level executives were more appropriate for strategic planning conversations or developing formal

internship program agreements; on the other hand, line managers could be more suitable for interviewing students.

After identifying the right contact within a firm, program staff also had to determine how to initiate and foster long-term relationships with those individuals and their companies. The industry coordinator at BC reported that she found that asking relatively little of employers can make it easier for them to become involved in the grant. However, it can also leave employers feeling disengaged. Some employers have been quite involved with the CBE programs, but employer respondents at all three colleges expressed interest in pursuing more opportunities with the programs, though they did not always express concrete ways they hoped to achieve this goal. Program staff had to balance effective approaches for making initial inroads into companies with approaches that would lead to sustainable partnerships in the long term. Staff working on employer engagement emphasized that individual relationships and personalized communication were key to building relationships with employers. However, program leaders also emphasized the need to establish replicable processes to promote sustainable engagement with employers over time. For example, program leadership at ACC said that they plan to move away from having a single point person connect employers and students individually; instead, they want to start using an automated Internet application to identify relevant jobs and flag those offered by program partners with a "badge" that students could view. At SCC, the Stakeholder Collaborative takes a systematic and replicable approach to examining current and future needs in a given field, although the approach does require strong involvement from a college program leader.

Proximity to workforce agencies may support coordination. The colleges have been able to coordinate with their respective workforce agencies to different degrees, and proximity seems to be a factor in fostering stronger relationships with workforce partners. SCC has had success engaging with the workforce agency, and according to the coaches, having a program staff member embedded in the workforce office has helped them build this relationship. The lead coach said that the relationship has been most beneficial in terms of student recruitment: when displaced workers approach the workforce agency for assistance, they learn about the credentials offered through the CBE program, and some eventually enroll in the program. In the report from their core monitoring visit, DOL cited this approach as a positive practice. ACC has also developed a partnership with the local workforce board, which may in part be related to the CBE program's project office being located on the campus across the street from the workforce office. ACC's partnership with the workforce agency has been more focused on career services than on recruitment. Staff from the workforce office come to campus to teach resume preparation and conduct interviewing workshops for students, and program leadership said that they plan to employ staff from the workforce office to help maintain industry partnerships after the grant period.

VI. CONTEXTUAL INFLUENCES ON CBE PROGRAM IMPLEMENTATION

A central task for the CBE consortium's TAACCCT grant was to demonstrate how CBE programs could be implemented in a community college context. It is important to recognize, however, that the consortium colleges vary greatly from one another, both in their internal college characteristics and their external environments. Such factors merit careful consideration in the assessment of the colleges' CBE program implementation. Among the various factors highlighted in the conceptual framework (Figure II.1), respondents pointed to college and program leadership and institutional culture and structures as important contextual influences within the college; outside the colleges, they described local economic conditions as a key influence on CBE program implementation. Given the variation in their internal and external contexts, the partner colleges ultimately implemented their CBE programs in distinct ways, despite sharing a common implementation plan and similar understanding of CBE.

A. Internal contextual influences

High-level and consistent project leadership facilitates implementation. The consortium colleges all benefited from strong presidential leadership and a history of innovation in developing their proposal for the Round 2 TAACCCT grant. Respondents across the colleges noted that the genesis of their participation in TAACCCT was a conversation between the three colleges' presidents and a WGU executive about the potential for CBE models in community colleges. At the same time, all three colleges had leveraged past grant funding—from federal agencies, such as NSF, as well as private foundations, such as the Bill & Melinda Gates Foundation and the Lumina Foundation—to develop and implement innovative programs to improve institutional performance and increase student success. As noted above, SCC in particular had used such grants to support intentional movement toward CBE.

Despite this shared history of executive leadership, leadership of the grant-funded CBE program at each college was distinct and may have had implications for CBE program implementation and institutionalization. The ACC leadership team included a dean (formerly CS department chair) and the current CS chair, both of whom had significant responsibilities in CBE program implementation. The dean of academic affairs at BC was involved in TAACCCT proposal preparation but had less day-to-day responsibility for the grant than an associate dean who was also a CSE faculty member. Finally, SCC tapped the dean of distance learning (who was also a CIS faculty member and former department chair) as the consortium project director. She also co-directs the CBE program at the college, together with a former business and industry leader and faculty member. All three colleges hired new staff members as project managers for their respective CBE programs. Both BC and SCC saw turnover in this role, but SCC appeared to struggle less than BC with the departure of the original project manager (who left later in the grant period and was quickly replaced by an individual who had been on the grant since the first year). The relatively higher level of the project leadership at ACC and SCC, and less impactful management staff turnover, appear to have facilitated CBE program implementation at these colleges and may also support institutionalization of the CBE programs over time (we discuss sustainability in detail in Chapter VII).

Institutional culture, climate, and processes pose both supports and barriers. The influence of college culture on CBE program implementation is difficult to assess directly,

because culture is often more implicit than explicit; but respondents did discuss these issues during site visits, suggesting that culture mattered for CBE program implementation. At both ACC and BC, CBE program leaders noted that it was important to respect institutional culture, even as they were trying to change it through their work with CBE. In contrast, multiple respondents at SCC cited a college-wide openness to experimentation, with one respondent asserting that college stakeholders know it can be "OK to fail" on the path to innovation. These contrasting views on institutional culture appear to have resulted in a somewhat more conservative approach to implementing CBE, at least initially, at ACC and BC. Both of these colleges' programs started in a single department, and BC leaders actually described their program as an "experiment" with CBE. In contrast, SCC based its CBE program in the distance learning division, with the intention of propagating the CBE model across the whole online curriculum. SCC program leaders also describe the college as a very centralized, organized, and systematic institution with a strong culture of assessment and sound instructional design, which appears to have supported adoption of innovations like the CBE model.

With respect to general receptivity to CBE implementation, respondents at all three colleges cited negative attitudes toward change as a potential obstacle, though not an insurmountable one. They described attitudes ranging from indifference ("this is the way we've always done it") to skepticism ("they were suspicious of CBE"). Respondents described how such attitudes could be an issue at the individual level, for example, inhibiting some faculty from engaging with the new CBE approach; or they could have a more institutional impact, where inertia can set in and stifle innovation. According to program leaders across the colleges, however, these attitudes were not entirely unexpected, and they felt that the range of reactions to the CBE models was in line with the normal range of attitudes whenever an innovation is introduced. Moreover, CBE program leaders suggested that resistance to change could be managed, primarily by gaining executive support (described above) and involving a "coalition of the willing" early on, allowing the CBE model to take root.

Organizational structures and processes were another, perhaps more concrete influence on CBE program implementation. On one hand, as described in Chapter III, existing curriculum processes and tools were readily leveraged for CBE curriculum development and delivery at all three colleges, which program leaders cited as helping them to meet the aggressive program development goals set out in the consortium's implementation plan. On the other hand, respondents identified as potential stumbling blocks college procedures that were aligned to traditional academic terms (for example, calculation of financial aid at the beginning of a term) and traditional students' needs (for example, instructors holding office hours when nontraditional students are often working). Additionally, they reported that slow and rigid program approval processes could impede CBE program development, though they were generally able to overcome such obstacles. In a typical example, an academic dean at SCC noted that under normal college processes, it would take about a year to get a new course through the college's curriculum approval process. However, CBE program leaders were able to compress the process with the help of strong executive sponsorship and industry support.

Continuous program improvement requires the right data, strong research capacity, and structured inquiry processes. CBE requires colleges to do things differently than in traditional programs; to be successful in using CBE, colleges must learn from their own experiences as they implement program, policy, and procedural changes. At all three colleges,

CBE program leaders worked closely with data leads to track key DOL performance measures and consortium performance targets. These indicators included, for example, participation, credit accumulation, and program completion. However, program leaders agreed that they were not always the most valuable measures to inform program improvement, so they looked to the LMS, student information systems, and their own intake data for more immediately useful indicators. Moreover, using data for program improvement required research capacity that not all the programs had. In particular, BC had originally conceived the data lead more as a data entry role. In the first year of the grant, however, it became clear that the college needed to obtain additional support from its institutional research (IR) office. Both ACC and SCC were able in the first year of the grant to hire full-time data leads, both with significant IR experience.

At SCC, where the data lead was a full-time IR staff member, CBE program leaders supported a process in which stakeholders (1) developed and piloted changes based on existing best practices; (2) collected and analyzed quantitative and qualitative data from participants and other relevant stakeholders; and (3) continually refined the process, documenting changes and their corresponding outcomes. This process of piloting, assessing, and refining was applicable to all areas of the CBE effort, including strategy and planning, workforce engagement, curriculum development, course delivery, and student support; DOL recognized the process as a positive practice in their core monitoring report. A concrete result of the continuous improvement process has been documentation of the key policies and procedures that support SCC's CBE program. Informed by the continuous improvement process described above, this CBE policy document describes the college's approach to many of the issues that must be addressed for CBE programs to be successful (for example, intellectual property, faculty payload, and assessment policies). The document serves as a guide for SCC's ongoing program improvement and can provide a blueprint for other programs and colleges considering CBE.

B. External contextual influences

A few external factors also appear to have influenced program implementation across the consortium colleges, but some were less salient than program leaders originally expected. Local economic conditions had varying influence on the three colleges' CBE program decisions. At ACC, local employers' unmet demands for skilled IT workers, coupled with corresponding pressure from the chamber of commerce, was reported to be a key factor in ACC's choice to become involved in the consortium's grant application and influenced its specific program and credential offerings. SCC leaders reported seeking to use the grant to proactively promote regional economic development in the IT sector, which they described as having both existing jobs and good growth potential, for example through major employers like LexisNexis, Teradata Corporation, and Wright-Patterson Air Force Base; the approach would also dovetail with the Dayton Development Coalition's targeting of IT as a growth industry. Finally, although the BC local economy has reportedly become relatively strong, BC program leaders noted that IT firms are not as prominent in the area. Therefore, like SCC, it is trying to help the industry develop in the area. Although unemployment and college enrollments might be expected to move in tandem, no respondents at any of the three colleges saw unemployment or student demand for IT training as a major enrollment drivers.

State and federal laws or regulations did not appear to be major influences on the consortium colleges' CBE program implementation. In particular, accreditation and articulation—which can

be problematic for CBE programs, given regulations around direct assessment and credit hours—were straightforward for all three colleges. Accreditation was not a problem, because the colleges have implemented course-based programs that did not qualify as the kind of "substantive change" that would require a higher level of accreditor scrutiny. Both of the relevant regional accrediting bodies (the Southern Association of Colleges and Schools [SACS] for ACC and BC and the Higher Learning Commission [HLC] for SCC) had developed straightforward application processes for such programs, so none of the consortium colleges were hindered by accreditation processes. However, with the June 2015 release of the Council of Regional Accrediting Commissions' (C-RAC) Framework for Competency-Based Education, the process has changed and, going forward, new CBE programs will require initial approval as a substantive change. Articulation has not been problematic for the colleges' CBE programs, either, as they mirror traditional offerings on students' transcripts—that is, students are awarded credit hours, even though the CBE courses are not technically based on seat-time. Finally, as noted in Chapter IV, financial aid and veterans' benefits have posed a few hurdles for individual students, but the federal Title IV rules that govern aid have not posed many issues for the consortium's programs, again, because their programs are course-based.

Although state and federal policies have not been a major influence on CBE program implementation, program leaders are keenly aware of policy makers' interest in CBE and are using their experience to inform the policy agenda and shaping their programs to respond to policy interests. ACC respondents reported that policy makers in Texas are very interested in dual enrollment and high school-postsecondary transitions. In response, ACC program leadership developed and is now implementing the Capital Academy, an extension of its CBE offerings that allows high school students to earn college credit, using an emporium model. BC is participating in the federal government's Experimental Sites Initiative, which is testing flexibility in federal financial aid requirements, and is a founding member of the Competency-Based Education Network (C-BEN), a group of institutions working together to address shared challenges to implementing CBE programs. SCC leaders reported that Ohio's governor is pushing to reduce tuition costs to students and is very interested in the potential of CBE models as a means to this end. Moreover, the state assembly has approved a plan to encourage institutions of higher education to develop and implement CBE models. In response, SCC is collaborating with the state association of community colleges to promote understanding of CBE models among policy makers and other education stakeholders.

C. Challenges, successes, and lessons learned

Much can be learned from the examination of contextual influences on CBE program implementation at the consortium colleges.

Consortium colleges addressed cultural and structural challenges explicitly. At all three colleges, CBE program leaders reported that they were mindful of cultural and structural issues from the outset and that they emphasized a step-by-step approach to change management. One respondent aptly described this strategy as a deliberate "crawl, walk, run" approach. At the same time, program leaders were careful to balance between consistency and change—as one respondent put it, to "break it without breaking it." Another leader described the strategy as balancing "top-down" and "bottom-up" approaches. Program leaders across the colleges recognized that changing institutional cultures and structures takes time, but they were able to

start with "coalition[s] of the willing" and to involve naysayers in ways that helped them eventually to feel ownership of the program.

Programs can be launched without all appropriate organizational structures in place. Across the three colleges, respondents emphasized that CBE is an evolutionary process and that interested colleges should not worry about getting every piece of the process in place before attempting to implement it. According to program leaders and staff, manual workarounds of some institutional procedures were common (for example, enrollment and financial aid), especially in the early stages of implementation. However, they have found ways to bypass some bureaucratic procedures, even as they are working to put more permanent solutions in place. It appears, however, that several institutional conditions were necessary for adoption of the colleges' CBE models.

- **Executive engagement** was important throughout the implementation process, and each college's program benefited from high-level executive support: presidents were involved in early conversations shaping the grant, and they played a role in sustainability planning; vice presidents and deans had hands-on roles in different aspects of program development.

- **A strong champion** was necessary to spearhead each college's CBE efforts. At ACC and SCC, the department chairs and deans who were also the colleges' respective grant leads played this critical role. Although BC struggled with some changes in leadership, the project manager (who is also an associate dean) became a champion for the work.

- **Faculty buy-in** was critical across the three colleges, not only for development and delivery of curricula, but also for institutionalization of the CBE models.

- **Infrastructure for data collection and analysis** should be in place to support program development and continuous improvement. ACC and SCC had dedicated IR staff in the original project plan; BC brought IR on later. All shared program data with college leadership, program faculty, and learner support staff to inform their work.

- **The ability to experiment**—and sometimes to fail—allowed college stakeholders to identify the components that are appropriate for their institutional context and their target student population. SCC stakeholders described the college's culture as supporting such experimentation, and ACC and BC leaders appear to have had similar leeway, even if they did not describe their respective cultures in the same terms.

The colleges avoided challenges related to state and federal laws or regulations by structuring their CBE programs to be course-based. Although there are many ways to operationalize CBE, the consortium colleges chose a route with less regulatory resistance than if they had placed more emphasis on direct assessment or abandoned the credit hour.

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VII. SUSTAINING, REPLICATING, AND SCALING THE PROGRAMS

The TAACCCT grants program encouraged "project strategies that will have a lasting impact" and urged colleges and consortia to develop a "plan to sustain effective innovations developed under this program after the grant period ends" (DOL 2012, p. 8). As the partner colleges work toward the end of the grant period, all have taken steps to sustain their CBE program models. At the same time, some programs are working to replicate or scale their CBE models to other disciplines or divisions within their respective institutions.

All three partner colleges will continue their CBE programs in some capacity after the grant period ends. In general, there will be continuity in the program leadership at each college, though some key leaders are retiring. Continuity of learner supports and industry engagement is less clear, and some of these grant-funded positions will end. This chapter documents the colleges' current plans for sustaining, replicating, and scaling their CBE programs and describes the related challenges, successes, and lessons learned.

A. Austin Community College

ACC's CS department will continue to administer the college's CBE program, but the program will be physically housed in the college's new "Accelerator." The Accelerator is a high-tech learning lab that provides student access to computers, individualized learning, and small group tutoring. It is based on an emporium model that has been used by other colleges, especially for developmental education courses. Starting in fall of 2015, four APT courses will be offered through the Accelerator. Additionally, the program will offer the recently launched Capital Academy, a program that allows high school students to earn college credit by taking the same CBE courses that were developed for the APT program. The hope is that this approach will help the college broaden the demographics of students who succeed in CBE coursework to include more traditional college students. It will also address Texas state objectives for improving the transition from high school to college.

ACC program leadership will continue to be funded through a new line item in the college budget, as ACC academic leaders want to maintain the core group that has been working together on CBE. As part of its transition from grant funding, the program is also developing a new role, instructional associate (IA). This individual will be a full-time adjunct professor and will serve as a facilitator, responsible for a group of 30–40 students moving through a course or program in the Accelerator. In addition to providing instructional support, the IA will take on some of the responsibilities of the current student support specialist, monitoring progress and following up with students who fall behind. Program leadership hopes that because these new faculty members will be hired specifically for this hybrid role, they will not have preconceived notions of traditional college instruction—"standing in front of a blackboard and teaching," as one respondent put it—and will be a good fit for the CBE format. They will still offer small group sessions but will do so on demand and will cater to student needs rather than follow a prescribed course schedule.

In addition to adapting some aspects of CBE program delivery, ACC program leaders are working to expand their CBE certification offerings. To date, they have already expanded to offer a design coder certificate program through the visual communications department.

B. Broward College

BC's CBE program transitioned to the college's online campus starting in fall 2015. The CBE program will also physically move from its current location on the central campus to new offices in downtown Fort Lauderdale. The project director and some administrative staff will continue in positions funded through the online campus. Instruction will shift to include more adjunct faculty, in addition to the full-time faculty who participated in program development.

BC plans to continue with similar course offerings and services under this new arrangement, however, it is not yet clear how this process will be operationalized. Most program staff served in multiple roles when housed in the CSE department—for example, the project manager was responsible for course scheduling, curriculum development, and recruiting, among other tasks. It is unclear how these positions and roles will look once the CBE program becomes part of the larger online college structure. Further, the project director is exploring how BC will continue to implement enhanced learner supports, similar to those currently offered through the CBE program, as part of the online college. Program leadership hopes to refine its coaching model and implement more automated processes to complement potentially lower levels of in-person coaching, for example, with help from technology and data tools such as Civitas software.

According to BC program leadership, in addition to continuing the CBE programs in IT, there are plans to expand CBE offerings to include an associate of science degree in business administration. Ultimately, BC plans to branch out to other programs, as well, although the specific programs are as yet unknown. One program leader reported that part of the motivation for this scaling was a response to joining the Complete Florida initiative, a statewide effort to recruit adults with some college credits to complete their degrees online.

C. Sinclair Community College

SCC's Accelerate IT program is already fully integrated within both the distance learning division and the CIS department, where it will continue to be offered following the grant period. CIS faculty have already adopted the CBE curriculum department-wide, including for face-to-face and traditional online courses. The fact that the CBE project director is also the dean of distance learning appears to have facilitated the CBE program's implementation and could support sustainability after the grant period.

When the grant period ends, all soft money positions in the CBE program will be lost, which is likely to have the biggest impact on sustaining learner supports. Program leaders report that they will transition from an admissions counselor and three full-time coaches devoted solely to the CBE program to two full-time and two part-time coaches for both the CBE program and SinclairOnline students. Program leadership and the current coaches are working on automating as much of the coaching role as possible before the grant ends. They believe that enrollments can be sustained, but not all students will not get the same level of "personal touch" they currently do with Accelerate IT. As with the other colleges, SCC program leaders believe that adopting Civitas as a data tool can help to identify students who need more aggressive interventions and focus support on those students.

SCC will have the opportunity to leverage processes and lessons learned in developing the CBE program for the benefit of other programs. Specifically, the college is implementing a

manufacturing certificate in the CBE format under a Round 4 consortium TAACCCT grant, which is adopting the processes and model developed under the current grant. The college is also considering additional CBE programs for data analytics and geographic information systems. As noted, SCC is also collaborating with the Ohio Association of Community Colleges to help promote CBE as an educational model throughout the state. Although program leaders advised caution about touting CBE as a panacea for higher education, they said they believe there is no longer a debate about the validity of CBE, and its use will spread to other institutions.

D. Challenges, successes, and lessons learned

As the TAACCCT grant period comes to an end, the consortium colleges are encountering a new set of challenges to sustain their programs. In a number of cases, intentional planning has made this transition relatively seamless; however, in others, the colleges are still determining how the program will look after the grant.

Finding the right program leadership is key to creating and sustaining an effective CBE program. One program leader summarized the need as a "team of three," with leadership roles focused, respectively, on program strategy, management, and content. Although each college doesn't necessarily have a team of three, they all have individuals who focus on these specific leadership roles.

Nevertheless, leadership turnover may be a threat going forward. Staff turnover in leadership positions was an issue, to varying extent, at all the colleges throughout the grant period, and turnover may continue as they work toward sustainability. BC experienced the most turnover in leadership positions, losing its first project director early in the grant period, as well as its associate dean for CSE a few years into the grant. The second project director has since been promoted to the associate dean position; she continues to oversee the CBE program but is less involved in day-to-day management, which has been turned over to a new project director—the third in three years. SCC's staffing has remained relatively stable with the exception of the project manager and administrative support positions, both of which have turned over (once and twice, respectively). Moving forward, SCC is losing key departmental leadership to retirement, however, other staff will be stepping into the role to maintain institutional memory and sustain the program. ACC's leadership has remained stable over the course of the grant. The college will lose its coordinator of outreach and student support as the grant period ends, but it is developing a plan to shift some of the coordinator's responsibilities to the college's workforce partners.

Learner supports may not be sustained without increased resources. Continuing learner supports—especially academic and career coaching—after the grant period is one of the greatest challenges to sustainability across the consortium colleges. Unlike CBE curriculum development—for which upfront costs have tapered off, and sustainable, budget-neutral processes are reportedly in place—CBE learner supports still have important cost implications. As described above, all three colleges are trying to leverage technology to automate some coaching tasks as a way to maintain adequate services at lower staffing and funding levels. SCC program leadership is working with its IT group to automate some processes internally. SCC program staff are also relying on Civitas to inform coaching functions, especially to focus coaching resources where most needed, rather than providing similar supports to all students. Both BC and ACC are considering adopting Civitas for their CBE programs, and the project

director at BC also mentioned that the college is hoping to exploit features of the LMS to help automate some of the coaching functions. As noted above, ACC has developed the new instructional associate position, but there is uncertainty about the role of the coordinator of outreach and support, and the college may not continue to employ a full-time student support specialist.

The future is similarly uncertain for career supports and employer and workforce engagement at the colleges. Staffing is the primary challenge at ACC, as the staff member with primary responsibility for career support and employer outreach is retiring; however this change may provide an opportunity for the program to shift from an individual-driven model to a more systematic model. BC career support and employer engagement were limited, in any case, with these components not yet fully developed. The risk is that there will not be enough time to develop services before the grant period expires, let alone sustain them. At SCC, concerns are primarily related to decreased staffing after the grant period, compounded by the college's reorganization of its career services. However, program advisory boards will continue, and several departments at the college are adopting the employer engagement framework developed under the grant. Moreover, the approach will be further expanded as part of the college's Title III career communities project and development of the virtual career center.

VIII. INTEGRATIVE SUMMARY AND CONCLUSIONS

The prior chapters of this report have provided an integrative analysis of the consortium colleges' experiences implementing innovative CBE programs, in different contexts, over the course of the TAACCCT grant period. This chapter summarizes their progress through an analysis of key grant deliverables and milestones that were articulated in the consortium implementation plan during the first year of the grant, assessing the extent to which the colleges implemented their grant-funded CBE models as planned. Additionally, it examines student participation against the consortium's enrollment targets, a key indicator of successful program implementation at the colleges. The chapter concludes by highlighting overarching lessons drawn from the colleges' implementation of flex-paced, CBE programs and summarizing next steps for the evaluation.

A. Summary of progress

Implementation progress has been steady and is reflected in the accomplishment of key grant milestones across the three colleges, as well as their growing student enrollments.

Figure VIII.1. Summary of CBE program implementation milestones by college
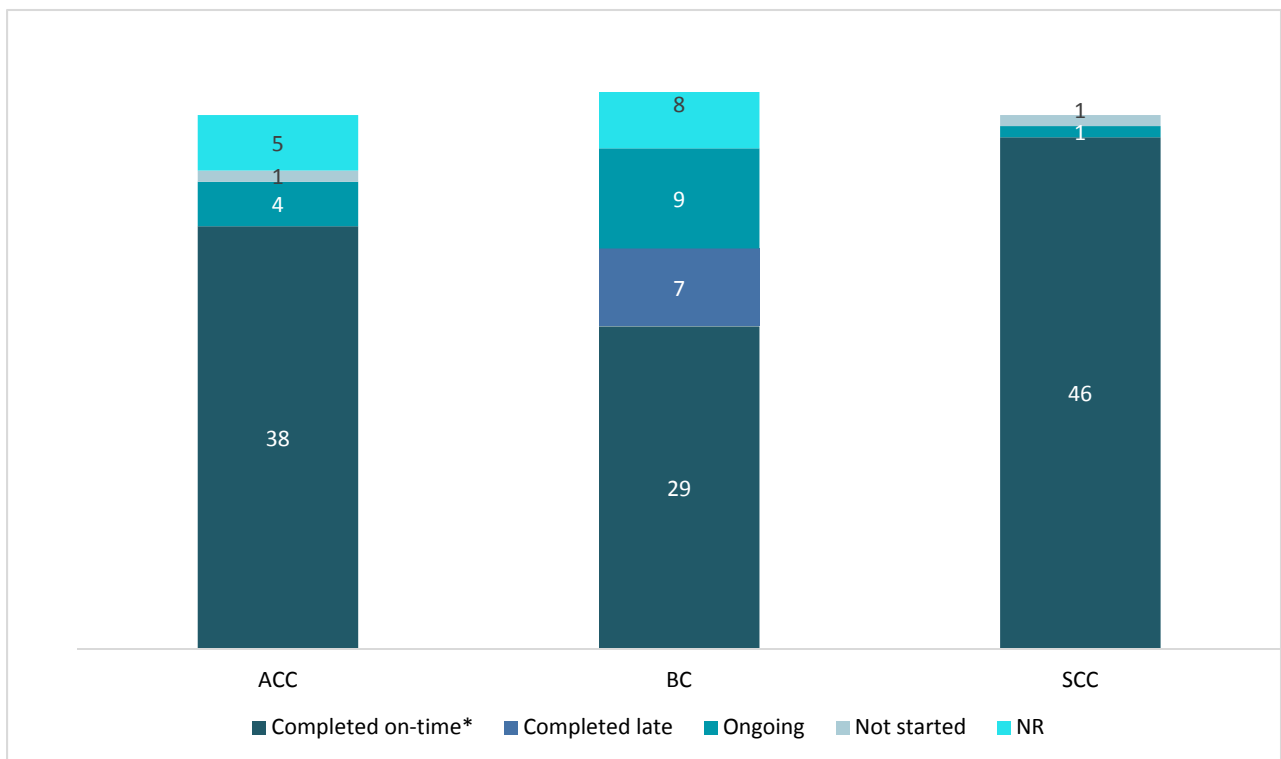
Source: Consortium implementation planning database; status as of November 15, 2015.

* Items completed within 30 days of the specified due date are considered on time.

NR = Status not reported.

The colleges implemented their CBE models as planned, with a few exceptions. Teams at all three colleges completed a majority of their project milestones on time, as planned (Figure VIII.1). The BC team completed seven milestones late (more than 60 days after the specified due date) and none of their five milestones related to the virtual IT lab—a key deliverable for that college alone—were reported as complete at the time of this study. As noted in prior chapters, BC struggled with leadership turnover that may have influenced some of its implementation delays. Indeed, BC program leaders cited staffing and infrastructure obstacles as impeding progress on the virtual lab. Articulation, accreditation, and career placement processes comprised over half of the 14 ongoing items across the colleges (Table VIII.1). As noted in Chapter VI, program leaders did not view articulation as problematic, so it is unclear whether ACC and BC plan to complete their remaining articulation milestones in the remainder of the grant period or have determined them to be unnecessary. Although ACC and BC program leaders were unaware of specific implications for their programs, C-RAC's June 2015 CBE framework may pose some hurdles for the colleges finalizing their accreditation milestones. Finally, with respect to career placement, few students completed their CBE programs in the first two years of the grant; however, as more students complete the programs, BC and SCC will need to finalize related ongoing items.

Table VIII.1. Status of partner college progress on grant deliverables and implementation milestones

Deliverable and milestones	Due date	Milestone status*		
		ACC	BC	SCC
CURRICULUM DEVELOPMENT				
Curriculum definitions				
Revised competency-based master syllabi	11/15/13	✓	✓	✓
Degree and certificate descriptions for programs of study	11/15/13	✓	✓	✓
Stacked certificates (completed within a degree)	11/15/13	✓	✓	✓
Curriculum definition process documented	11/15/13	✓	✓	✓
Course development foundation				
Student assessment policy developed and documented	10/30/13	Ongoing	✓	✓
Program rollout plan developed and documented	10/30/13	✓	✓	✓
Course development schedule for new grant courses	10/30/13	✓	✓	✓
Course templates for new grant courses	10/30/13	✓	✓	✓
Course development foundation process documented	10/30/13	✓	✓	✓
Identification of latticed certificates				
Latticed certificates developed and documented	12/15/14	✓	✓	✓
Latticed certificates development process documented	12/15/14	✓	✓	✓
New competency-based program courses				
All competency-based courses in Phase 1 ready for delivery	12/31/14	✓	✓	✓
All competency-based courses in Phase 2 ready for delivery	12/31/14	✓	✓	✓
All competency-based courses in Phase 3 ready for delivery	12/31/14	✓	Ongoing	✓
All competency-based courses in Phase 4 ready for delivery	12/31/14	✓	Ongoing	✓
Course development process documented	12/31/14	✓	Ongoing	Not started
Competency maps				
Competency map template complete	7/1/15	✓	✓	✓
Competency map process documented	7/1/15	✓	✓	✓
Advisory board approved mappings to jobs	7/1/15	✓	✓	✓
Articulation among consortium colleges finalized				
WGU Bachelor of Science in IT modified for articulation	10/30/15	Ongoing	NR	✓

Deliverable and milestones	Due date	Milestone status*		
		ACC	BC	SCC
Articulation agreements with WGU signed†	10/30/15	✓	✓	✓
Articulation agreements with WGU updated	10/30/15	Not started	✓	✓
Articulation agreements process documented	10/30/15	Ongoing	✓	✓
State accreditation approval	10/30/15	Ongoing	NR	✓
Regional accreditation approval	10/30/15	✓	NR	✓
VIRTUAL IT LAB**				
IT infrastructure installed	8/1/13		Ongoing	
Classroom for hybrid-delivered IT courses assigned	8/1/13		NR	
Virtual IT labs tested	8/1/13		NR	
Workstations for programmers installed	8/1/13		NR	
Virtual IT labs ready	8/1/13		NR	
STUDENT SUPPORT SERVICES				
Recruitment and application process				
Recruiting and application process documented	8/1/13	✓	✓	✓
Student recruitment tracking process documented	8/1/13	✓	✓	✓
Marketing plans and materials	8/1/13	✓	✓	✓
Student screening and placement process				
Orientation template created	1/30/14	✓	✓	✓
Screening/placement process documented	1/30/14	✓	Ongoing	✓
Screening tool selected and license(s) purchased	1/30/14	✓	✓	✓
Remediation pathways documented	1/30/14	✓	✓	✓
Enrollment process				
Enrollment process documented	1/30/14	✓	✓	✓
Rolling registration process documented	1/30/14	✓	✓	✓
Financial aid process documented	1/30/14	✓	✓	✓
Learner support process				
Learner checkpoints documented	1/30/14	✓	✓	✓
Framework for student support documented	1/30/14	✓	✓	✓
Learning support process documented	1/30/14	✓	✓	✓
Career placement process				
Internship process documented	8/30/14	✓	Ongoing	✓
Career counseling/job search and placement tools documented	8/30/14	✓	Ongoing	✓
Tools in place for tracking job placement	8/30/14	✓	Ongoing	Ongoing
Engagement with employers documented	8/30/14	✓	Ongoing	✓
Transfer assistance process				
Articulation/partnerships approved and documented	8/30/14	✓	NR	✓
ADMINISTRATION				
MOUs				
MOUs with all necessary program partners in place	5/30/13	NR	✓	✓
MOUs with all necessary measurement and evaluation partners in place	5/30/13	NR	✓	✓
Staffing				
Project manager hired	8/30/14	NR	✓	✓
Support staff hired	8/30/14	NR	✓	✓
Data lead hired	8/30/14	NR	✓	✓

Source: Consortium implementation planning database.

✓   = Completed. NR = Status not reported. MOU = Memorandum of understanding.

* Status reported in database by responsible staff at each college, as of November 15, 2015.

† ACC and BC articulation agreements with WGU were not recorded in database but documentation was available.

** Virtual IT lab is a deliverable for BC only.

To the extent that the colleges deviated from their planned approaches, they often did so to enhance or expand CBE offerings. This motivation was especially prevalent in curricular development. As noted in Chapter III, the colleges have all added courses and/or programs beyond their original implementation plan. ACC expanded its CBE model to include software testing and visual communications programs. Outside of the TAACCCT grant, the college also recently launched the Capital Academy, which combines the CBE approach with an emporium model for high school students. BC added two industry certification tracks beyond their original plans. SCC expanded use of the CBE curriculum across the CIS department, including instructor-led online and web-enhanced face-to-face approaches; it also developed an IT fundamentals certificate, a software testing program, and a computer literacy assessment and course. Across the three colleges, these additional efforts responded to perceived needs and opportunities; at ACC and SCC, these efforts were spearheaded with strong college executive sponsorship and industry input.

The colleges drew from the WGU model, but diverged from it in important ways. WGU's role on the consortium's TAACCCT grant was to provide consultation on the various aspects of CBE to inform program development and implementation at the colleges. Over the course of the grant, the colleges have taken on different facets of the WGU model, as appropriate for their respective institutional contexts. Of note, all three colleges adopted a similarly collaborative curriculum development process and a learner support model with academic coaching as its central feature. Also like WGU, they are targeting mature, academically prepared students for their CBE programs. In contrast to the WGU model, the colleges only partially unbundled the faculty role, in part due to the constraints of using existing full-time, sometimes unionized faculty. Similarly, none of the colleges adopted the WGU subscription model for tuition. Consortium leaders reported that such structural changes were probably not feasible within the community college context, at least not within the short period of time covered by the grant; moreover, they emphasized that community college tuition is already low, so the WGU approach may not make sense for them.

The consortium exceeded its participation goals. The colleges enrolled their first students in their respective CBE programs within less than a year of launching the TAACCCT grant. Over time, enrollments climbed steadily to total 3,797 unique participants at the end of the summer 2015 academic term, meaning the colleges met and exceeded the overarching consortium enrollment goal of 2,325 unique participants by 61 percent (Figure VIII.2 and Appendix C). SCC has been the major contributor to enrollments (contributing about 77 percent of the participants), and it is the only college that had met its individual participation target by the end of the summer 2015 academic term. ACC and BC have enrolled about 87 and 52 percent of their respective targets, and program leaders at both colleges said they expect to meet their goals before the end of the grant period. One reason SCC was able to exceed its targets so quickly was because, as noted, it was able to offer several CBE modalities, including online, hybrid, and web-enhanced classroom models, in addition to the centerpiece Accelerate IT model.

Figure VIII.2. Colleges' progress toward enrollment targets
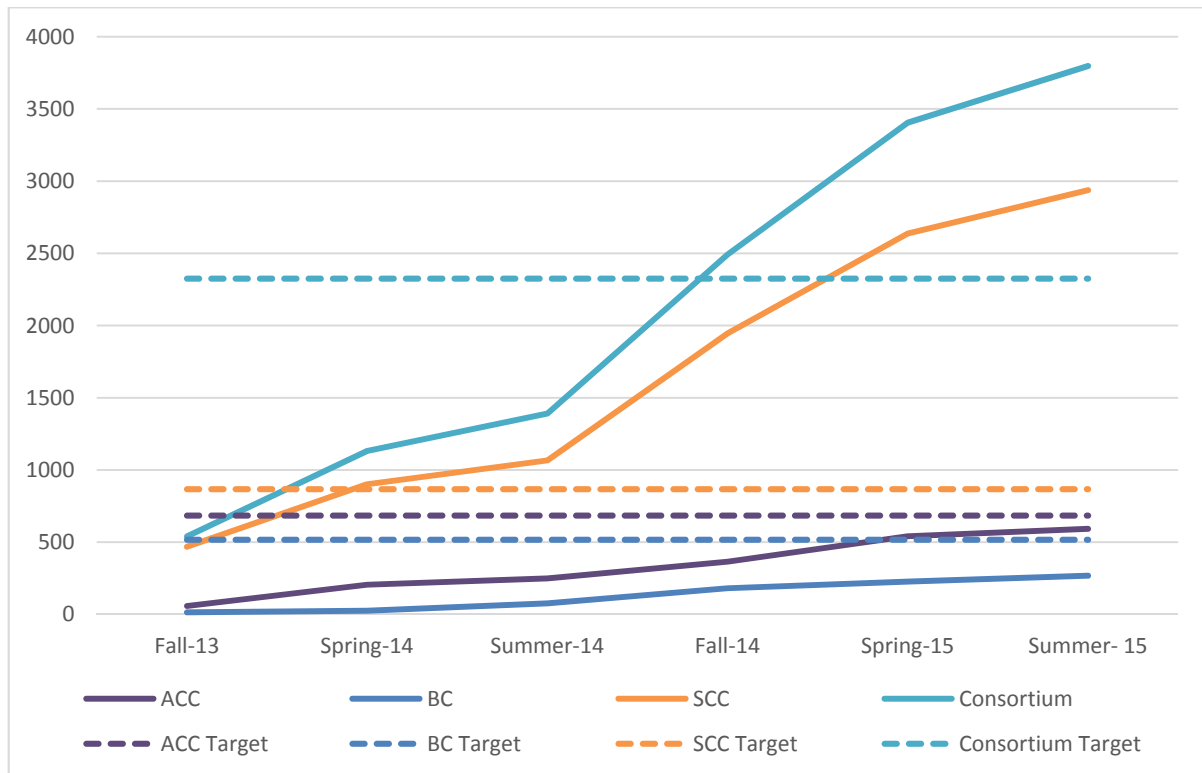
Source: College administrative data; targets from consortium implementation planning documents.

B. Key lessons learned

A few overarching lessons emerged from the consortium colleges' implementation of flex-paced, CBE programs under the TAACCCT grant. These lessons may inform the ongoing public conversation around CBE, especially its application in community college contexts.

There is no single "right" way to design or implement a CBE program. The consortium colleges served as a proving ground for CBE, and their experiences show that different contexts can give rise to diverse CBE models. During their collaboration on the grant, the partner colleges' teams learned a great deal from each other and from WGU's expert advice. Nevertheless, program leaders from each college had to apply the shared learning within the bounds of their own institutional and state contexts and resources. Contextual factors that appeared to be especially important for shaping each college's model included college and program leadership, institutional culture and structures, maturity of curriculum design, and local economic conditions. It is also important to note that the partner colleges are all large institutions with enrollments ranging from about 30,000 at SCC to about 70,000 at ACC. Smaller colleges may have different experiences implementing CBE—for example, they could be more nimble and responsive to innovation, or they could struggle with fewer institutional resources such as instructional designers or well developed distance learning platforms.

CBE curriculum development requires a high degree of collaboration and standardization. Although CBE may take many forms, the consortium colleges' experience suggests that curriculum development requires at least two features that are perhaps distinct from traditional curriculum development processes. First, because CBE programs and courses need to be informed by the perspectives of industry representatives (who can help identify and articulate competencies), academics (who have both technical expertise and instructional experience), and instructional designers (who know how to design courses for flex-paced delivery), it is inherently highly collaborative. Second, standardized, replicable processes are necessary, especially for aligning competencies and avoiding redundancy across courses within a program. Standardization also appears to help facilitate students' progress as they work independently through the CBE curriculum by keeping the look and feel of courses consistent. Standardization should also support curriculum maintenance over time, especially in fields (such as IT) where competencies may change rapidly. Having a robust culture of assessment and strong instructional design appear to greatly benefit CBE.

Enhanced learner supports may help students move independently through CBE courses and programs. Learner supports were one of the areas of greatest distinction across the three partner colleges. Yet all three colleges followed the WGU lead and sought to implement some form of enhanced learner supports, with all three eventually landing on a coaching model. Similarly, all three colleges have tried with varying success to leverage technology and student-level data to facilitate their learner supports. It is beyond the scope of this study to assess the impact of these enhanced supports on students' educational progress, but the colleges' experiences show that there may be an important role for enhanced supports in CBE programs where students are working through their academic programs independently and often remotely. Still, more research is needed to understand which supports are most critical to student success and how they might best be operationalized and delivered. As the grant period ends and some of these supports are at risk of not being sustained, evidence of the contribution of supports to student success could provide justification for additional support resources. In any case, SCC's centralized academic advising division has moved to mandatory advising and case management for all students.

CBE programs can be launched without first resolving all cultural and structural issues. Given policy makers' interest in CBE, higher education stakeholders are justifiably concerned about different colleges' readiness for CBE models. Program leaders across the consortium colleges found that it was important to educate their colleagues about CBE, but they did not necessarily need to win everyone over to the cause at the outset of the grant period. Rather, they engaged in proactive change management with an eye toward eventual institutional transformation. Each college took a different approach—from working with volunteers to encouraging ownership by involving people in decision making—that allowed them to implement CBE with some success, which in turn brought others on board and allowed the innovation to spread. Similarly, college systems and procedures—for example, financial aid and enrollment processes—did not always work well for CBE programs that did not align with traditional academic terms. The consortium colleges tended to start with manual approaches, resolving problems as they arose; but over time, they were able to create tools and change some college processes to make them more amenable to the CBE model. They cited WGU support as useful to this process, including not only their direct consultation on the grant, but also materials WGU has helped disseminate through other venues (for example, the CBEInfo.org website and

the CBE4CC conference and webinar series). Program leaders at all three colleges agreed that cultural and structural obstacles should be expected, but CBE programs can be launched without resolving all such issues ahead of time, and explicit attention to change management can support successful adoption of the innovation.

CBE models should be one of multiple options for college students. Given the targeting of more mature and academically prepared students by the colleges' CBE programs, there was broad agreement among college stakeholders (including students) that CBE models should be one option a college might offer, rather than the only option. Students and program staff both emphasized that to be successful in a CBE program, students need to be mature, organized, and motivated. At the same time, however, program leaders tended to agree that "CBE is the future." Therefore, they suggested that community colleges need to consider it as an option for their students, especially "nontraditional" adult students, who want to leverage their experience and who may need to balance college with work and family obligations. Finally, by diversifying their CBE options beyond their planned IT programs (for example, to include general education and dual enrollment options), the colleges are laying the groundwork for testing CBE models among broader student populations.

C. Next steps in the evaluation of the grant-funded CBE programs

The final summative report, to be published in fall 2016, will examine the education and employment outcomes of students enrolling in the grant-funded CBE programs. It will compare participating students' outcomes with other, similar students at the consortium colleges and seek to determine the factors that influenced student success. The final report will also include a brief update on program implementation in the last months of the grant period; it will seek to contextualize the quantitative analysis of student outcomes with reference to the qualitative findings on program implementation, to help address variation in student outcomes and how to ensure student success in CBE programs going forward.

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APPENDIX A.
STUDY METHODS

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Data sources

This report draws on data from three primary sources:

- **Site visits** were completed at all three colleges during late March and early April 2015. During these two-day visits, Mathematica staff conducted semi-structured interviews with 62 individuals in key roles across the colleges, including program leadership and support staff, college leadership, faculty, employers, and students. At BC and ACC, the student interviews were conducted as focus groups. Table A.1 summarizes the number of staff interviewed in each position. Follow-up phone calls and emails with program leaders at each college served to verify and fill in gaps in information that arose in the course of data analysis. During the drafting of the report, Mathematica communicated with program leaders at each college, as needed.

Table A.1. Site visit respondent sample by college

	SCC	BC	ACC	Total
Program leaders	3	1	1	5
Coaches	3	2	1	6
Instructional designers	2	2	1	5
Career services/industry engagement staff	2	1	1	4
Data leads	1	1	1	3
College leaders	2	3	2	7
Departmental leaders	2	2	1	5
Faculty	3	1	2	6
Employers	4	2	1	7
Workforce partners	2	--	1	3
Students	3	4	4	11
Total	**27**	**19**	**16**	**62**

Source: Spring 2015 Mathematica site visits.

- **Extant documents** related to the colleges' program implementation activities were collected in association with consortium meetings and calls throughout the first three years of project implementation. CBE program staff at each college uploaded documents associated with project deliverables in the implementation database; other documents were shared with the evaluation team in an ad hoc manner. Documents included, for example, program descriptions, meeting minutes, and presentations on topics of curriculum development and student support.

- **Administrative data** from two sources, the consortium's implementation database and the colleges' student information systems, were collected and analyzed as part of the report. The implementation database was designed to track the colleges' progress on key inputs, activities, milestones, and outcomes for all project deliverables. Mathematica worked closely with consortium leadership to define the database fields, which were based on a series of Mathematica-led calls in which the group refined its CBE project logic model. Mathematica extracted status data on milestones and outcomes of all project deliverables in November 2015. To assess consortium progress toward student enrollment targets, the

evaluation team collected and analyzed data from the colleges' student information systems. The data included enrollments as of the end of the 2015 summer term at each college.

Analytic approach

The analytic approach was shaped by DOL requirements for third-party evaluations of the TAACCCT grants, which were put forth in the Round 2 Solicitation for Grant Applications. DOL articulated high-level research themes and questions, which the evaluation team refined through communication with consortium leadership. Site visit protocols were designed to reflect these key themes and questions. Site visitors took detailed notes during interviews and focus groups; notes were then organized by theme to facilitate systematic analysis across respondents and colleges. When necessary, the research team used extant documents to fill gaps or enhance understanding of the research themes or to provide illustrative examples for the report. Finally, the research team triangulated qualitative implementation data from the site visits and documents with quantitative administrative data from the implementation database and the colleges' student information systems.

APPENDIX B.
COLLEGE CBE MODELS

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Figure B.1. Austin Community College: Accelerated Programmer Training competency-based model

- APT is housed in the computer studies (CS) department.
- Offers CBE programs leading to seven certificates (design coder, web developer, Java, C++, database, user support, and software testing) and two Marketable Skills Awards (networking and programming). Additional courses prepare students to sit for industry certification exams (A+, Net+, and Security). With general education courses, CBE courses can be stacked into five associate of applied science degrees (computer programming, programming with web specialization, programming with user support specialization, IT with user support specialization, and IT with applications specialization).
- Additional CBE programming includes visual communications certificate program; Capital Academy, a program combining CBE and emporium approaches and aimed at high school students, is offered in ACC's Accelerator computer lab.

INDUSTRY AND WORKFORCE RELATIONSHIPS

- **Employers.** Extensive network of local industry partners expanded under grant; provide input on curriculum development, recruitment, and transition support.
- **Other partners.** Partnership with state workforce agency to offer career development workshops. Collaboration with Austin Chamber of Commerce to host recruiting events.

CURRICULUM DEVELOPMENT	CURRICULUM DELIVERY	LEARNER SUPPORT
Development and mapping of competencies - Industry experts and chamber of commerce provide input on skill needs. - Instructional designer (ID) and instructors translate learning objectives from traditional courses into competencies and map these to course materials and assessments. **Development and packaging of programs and courses** - ID and instructors develop learning resources and online course materials based on competencies; process guided by CBE course design guidelines developed by ID. - Courses reviewed with rubric by small group of faculty, department chair, and program director; industry partners have opportunity to review courses. - As of spring 2015, 31 CS courses were revamped for CBE. Four CS certificates and one visual communications certificate offered in entirely CBE formats. **Assessment development** - Instructors develop assessments for the courses they teach. - Adapt existing assessments and questions from certification exams, create new items aligned with competencies. **Accreditation and articulation** - CBE programs accredited through the college's accreditation; did not require additional approval because they are course-based and not substantially different from existing programs. - Articulation does not differ from traditional CS courses or programs; developing articulation agreement with WGU.	**Scheduling and staffing** - Staffing determined by CS department chair. - Most instructors are full-time faculty; some long-term adjuncts. - CBE instructors also teach traditional CS courses. - Combine multiple CBE sections to meet faculty load requirements using existing load formula. **Registration policies and procedures** - CBE courses offered in 16-, 12-, and 8-week sessions. - Students enroll at only those time points. - Course catalog includes traditional and CBE sections for the same courses. CBE sections are restricted to accepted program participants. **Course delivery** - Courses offered through CS department. - All courses are fully online except one hybrid course. - Assessments delivered in-person at college or testing centers. - Assessments graded by instructors.	**Recruitment, screening, and enrollment** - Recruitment primarily through ACC advising staff. - Student support specialist and CS department chair interview every student and advise on program fit. - Assessment of readiness for online course work informs screening. - Offer one-stop intake events for interviews, intake assessments, and financial aid. **Retention support** - Student support specialist provides enrollment management support, tracking enrollment, and reaching out when students withdraw or fail to re-enroll. - Students can contact student support specialist for support with courses, but specialist does not have access to grades or course progress. **Transition support** - Trainer from state workforce partner teaches workshops on applying and interviewing for jobs; industry partners conduct mock interviews. - Virtual job fairs connect students with industry partners. - Students create online portfolios that industry partners have first access to before the public.
Key staff - Instructional designer - CS faculty and adjuncts who teach CBE courses - CS department chair	**Key staff** - CS faculty and adjuncts who teach CBE courses - CS department chair	**Key staff** - Student support specialist - Coordinator of outreach and student support - CS department chair

COLLEGE CONTEXT	EXTERNAL CONTEXT
- **Student population.** Approximately 69,500 unique enrollments in 2012-13; 23 percent enroll full-time; 39 percent are age 25 or older; 23 percent take all or some courses via distance learning. - **Leadership**. Strong presidential support for CBE; active dean spearheaded program development. - **College culture and climate.** CBE new to ACC, but leadership interested in flexible emporium models for developmental subjects. Distance learning programs had high demand but poor completion rates; CBE viewed as potential solution. - **Organizational structure and processes.** Prior to grant, CS department offered most of the same courses in traditional and distance learning 16-, 12-, and 8-week sessions. CS faculty load for traditional courses was based on credit hours.	- **Local labor market.** Strong local demand for IT workers and pressure from chamber of commerce to produce more skilled workers, more quickly.

Figure B.2. Broward College: Accelerated IT Training Programs competency-based model

- Accelerated IT Training Programs (ATP) housed in the computer science and engineering (CSE) department.
- Offers CBE programs leading to two stackable certificates (IT support specialist and IT analyst) and one associate of science degree (computer systems specialist). CBE courses prepare students to sit for 10 industry certification exams (A+; Linux+; Certified Internet Webmaster; Microsoft Office Specialist; MTA Windows Networking Fundamentals, Security Fundamentals, and Server Fundamentals; Net+; Security+; and Server+). Certificates and certification prep courses can be stacked into several other associate of science degrees.
- Additional CBE programming includes seven flex-paced general education courses that students can take as part of the associate of science degree programs.

INDUSTRY AND WORKFORCE RELATIONSHIPS

- **Employers.** In early stages of developing partnerships with employers focused on recruiting and mentoring students.
- **Other partners.** No collaboration with state workforce agency or other partners to date.

CURRICULUM DEVELOPMENT	CURRICULUM DELIVERY	LEARNER SUPPORT
Development and mapping of competencies - Program-level competencies are drawn from the Florida Department of Education state standards. - Most courses had outlines with learning outcomes already aligned with competencies prior to grant. **Development and packaging of programs and courses** - A team of two instructors develops learning resources for each course based on existing course outlines. - Instructional designers work with instructors to build the course shells in the learning management system, D2L. - Courses reviewed with Quality Matters rubric. - As of spring 2015, developed courses for an associate degree, two certificates, and 10 industry certifications. - CBE courses include CS and general education courses. **Assessment development** - Assessments are developed by different instructors than those who develop and teach the courses. - All assessment items are original content. **Accreditation and articulation** - CBE programs accredited as part of college's 2013 accreditation process; because CBE programs course-based and not substantially different from existing programs, did not require additional approval. - Articulation does not differ from traditional CSE courses or programs; developing articulation agreement with WGU.	**Scheduling and staffing** - Staffing determined by associate dean of CSE department. - Some instructors are adjuncts who are not bound by union contract; CBE instructors also teach traditional CSE courses. - Combine multiple CBE sections to meet faculty load requirements using existing load formula. **Registration policies and procedures** - Students can take up to four courses simultaneously, but one course at a time is recommended. - Students can enroll in a new course at any point during the first 12 weeks of the term. - Adding, dropping, and withdrawing from courses must be approved by an academic coach. **Course delivery** - Courses offered through the CSE department. - All courses are fully online except one hybrid course. - Assessments delivered in-person at college or testing centers or through Proctor U, an online assessment platform. - Students can test out of a course by passing an initial challenge assessment and passing all unit evaluations with a score of 81 percent or better; financial incentive for testing out.	**Recruitment, screening, and enrollment** - Recruitment focused on BC students who expressed interest in online courses or IT. - Visits to classrooms across disciplines has been most successful recruitment approach. - A single recruiter speaks to every applicant about his or her objectives and fit for the program. - Used commercial intake assessment at the beginning of grant; now use internally developed computer literacy assessment admissions criteria dependent upon students' objectives. **Retention support** - Initially used faculty advisors, but were overburdened; now two academic coaches offer support for approximately 75 students each. - Coaches are in weekly contact with students via phone or email. - Coaches use reports with student test results to monitor progress and are in close contact with faculty about student performance. - Recruiter also provides ad hoc student support but is not assigned a caseload of students. **Transition support** - Hired an industry partner coordinator in late 2014; she is developing contacts with employers and has limited contact with students. - Students can participate in BC's formal internship program and can access other resources in BC's career center.
Key staff - Instructional designer - CSE faculty and adjuncts who teach CBE courses - Quality Matters reviewers	**Key staff** - CSE faculty and adjuncts who teach CBE courses - CSE associate dean	**Key staff** - Academic coaches - Recruiter - Industry partner coordinator

COLLEGE CONTEXT	EXTERNAL CONTEXT
- **Student population.** Approximately 62,000 unique enrollments in 2012-13; 30 percent full-time; 37 percent age 25 or older; 22 percent take all or some courses via distance learning. - **Leadership.** Presidential interest in innovation; strong departmental leadership, but with turnover in associate dean and CBE project manager. - **College culture and climate.** CBE new to BC, but leadership interested in experimenting. Online college is vehicle for expanding e-learning capacity; was a priority to maintain competitiveness. BC is a U.S. Department of Education experimental site for direct assessment. - **Organizational structure and processes**. Prior to grant, CSE department offered most of same courses in traditional formats. Union contract dictates teaching load and faculty roles.	- **Local labor market.** Few large IT companies present in area, but demand for IT skills is high among local employers. Unemployment prior to the grant was 8.5 percent.

Figure B.3. Sinclair Community College: Accelerate IT competency-based model

- Accelerate IT is housed in the computer information systems (CIS) department and the distance learning division.
- Offers CBE programs leading to four short-term certificates (fast track programmer, IT fundamentals, Microsoft Certified Systems Administrator, and network engineering) and three associate of applied sciences degrees (network engineering, secure systems networking, and software development), which include five general education courses. Courses prepare students to sit for additional industry certification exams (Net+, Security+, and software testing).
- Additional CBE programming offered in multiple modalities, including traditional instructor-led online, hybrid/emporium, and web-enhanced face-to-face courses.

INDUSTRY AND WORKFORCE RELATIONSHIPS

- **Employers.** Developed Stakeholder Collaborative partnership framework that includes executives and line managers, as well as workforce partners to identify current and future skills needed for industry jobs.
- **Other partners.** Developed relationships with a number of other partners including community workforce and economic development organizations, industry-based recruiting agencies, and public workforce agencies. Department program advisory boards.

CURRICULUM DEVELOPMENT	CURRICULUM DELIVERY	LEARNER SUPPORT
Development and mapping of competencies - Program-level competencies are based on Ohio's state IT standards and specific industry certification standards, including Cisco Certified Network Associate, Microsoft Certified Solutions Associate, and CompTIA Network+ and Security+. - Official college curriculum revised and all course outcomes and competencies revised to align with new standards prior to development of CBE courses. - Master course model and common template standardize course organization and presentation. - Outcomes and competencies mapped to course content and assessment items. **Development and packaging of programs and courses** - Two to three instructors work with instructional designers to develop CBE courses. - Faculty serve as content experts and develop all course materials; instructional designer serves as project manager, guides team through course development, and edits and approves all content. - All CBE courses developed with adherence to Quality Matters and Americans with Disabilities Act requirements. - As of spring 2015, developed 27 CBE courses leading to four short-term certificates, four industry certifications, and three AAS degrees. - Programs include CIS and general education courses required for associate degrees. **Assessment development** - Assessments are developed by faculty from the course development team, who may not have been involved in content development. - At the end of the semester, assessments for each course are reviewed and revised as needed. **Accreditation and articulation** - SCC submitted CBE application to HLC; after review HLC determined that the CBE programs are covered under SCC's existing accreditation of asynchronous distance-learning program; however, HLC requested additional information to support the new June 2015 requirements. - Articulation does not differ from traditional CIS courses or programs; articulation agreements signed with WGU, University of Cincinnati, Ohio University, Franklin University, and Wright State University.	**Scheduling and staffing** - Staffing determined by CIS department chair. - Most instructors are full-time CIS faculty. - CBE instructors also teach traditional in-person and online CIS courses. - All CBE students in one section per course; faculty payload calculated at independent study rate. **Registration policies and procedures** - Students can take as many as four courses simultaneously, but one course at a time is recommended. - Students can enroll in a new course any Monday of the 12-week term. - Rolling starts are supported by separate "flex term" section in the SIS for each start date and a single "content" shell in the LMS for interacting with instructor, classmates, and course materials. IT process automatically combines all students from individual registration sections into a single content shell. - Adding, dropping, and withdrawing from courses must be approved by an academic coach. **Course delivery** - Courses offered through the CIS department in four modalities: flex-paced online (Accelerate IT), instructor-led online, hybrid/emporium, web-enhanced classroom. - High-stakes online assessments require in-person proctoring either on campus or another proctored testing site; performance assessments not proctored. - 80 percent required passing grade to advance. - Existing college PLA allows students to demonstrate proficiency through a variety of methods.	**Recruitment, screening, and enrollment** - Focus on recruiting students who are a good fit for CBE—typically adult learners with some college and experience in IT (or CIS coursework) who have succeeded in past online courses. - Recruit students both internally to SCC and externally via local resources such as the workforce office and the Dayton Area Higher Education Consortium - Used commercial intake assessment at the beginning of grant, however developed a computer literacy assessment and course that better capture the skills needed to be successful in program. **Retention support** - Three academic coaches provide day-to-day support for Accelerate IT modality. - Coaches work with students to develop a MAP in Student Success Plan (SSP) and use pace charts to help students track progress through courses. - Coaches are, at a minimum, in weekly contact with students via phone or email. - All coach interactions with students documented in SSP. - Check-ins are guided by LMS progress reports, which include information on student log-ins, assignment submissions, course progress, and grades. - Coaches provide targeted interventions to students who exhibit high-risk behaviors (for example, not logging in, low assessment scores). - "Light" coaching model implemented for traditional online CBE students. **Transition support** - One coach focuses on internship and career placement. - Career counselling embedded throughout five-phase student support process. - Coach embedded at county American Job Center, building relationships with displaced workers and employers; provides referral to SCC career services offices when appropriate (for example, for resume writing support). - Internship coordinator secures internships as needed. - Students may participate in reverse job fair, hosted by Ohio Department of Job and Family Services, co-sponsored by Accelerate IT.
Key staff - CIS department chair - CIS faculty - Instructional designers	**Key staff** - CIS faculty - CIS department chair	**Key staff** - Academic coaches, one of which focuses part-time on developing career services - Recruiter/admissions counselor

COLLEGE CONTEXT	EXTERNAL CONTEXT
- **Student population.** Approximately 29,500 unique enrollments in 2012-13; 23 percent enroll full-time; 47 percent are age 25 or older; 29 percent take all or some courses via distance learning. - **Leadership.** Strong college and departmental leadership supporting CBE. - **College culture and climate**. Existing culture of assessment (since mid-80s) and sound instructional design (over 10 years). Strong support from leadership, however, more challenging to get faculty onboard with new delivery mode. - **Organizational structure and processes.** Over the past decade, a deliberate shift toward implementing CBE through the eLearning Division (formally the Distance Learning and Instructional Support Division). Self-pacing is new for the department.	- **Local labor market.** Unemployment was 8.2 percent in spring 2012. Dayton region stabilized since the loss of 13,000 jobs in 2008 when GM factory left. Currently a strong focus on bringing start-ups and small companies to Dayton. - No large IT corporations, but IT embedded in many industries; Wright-Patterson AFB and associated contractors have large IT workforce; regional focus on IT. - **State policies.** State developed technical and academic content standards for the IT field.

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APPENDIX C.
CUMULATIVE PARTICIPATION

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Table C.1. Cumulative CBE program enrollment by term

	Fall 2013	Spring 2014	Summer 2014	Fall 2014	Spring 2015	Summer 2015	Enrollment target
ACC	58	206	249	365	541	592	684
BC	14	25	76	181	227	268	517
SCC	468	901	1,066	1,946	2,637	2,937	867
Consortium	540	1,132	1,391	2,492	3,405	3,797	2,325

Source: College administrative data; targets from consortium implementation planning documents.

Note: Consortium target is not sum of college targets. Enrollments reflect definition of program participation implemented with DOL guidance in October 2015.

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