UMass Boston’s Responses to the 2014 AASCU Regional Economic Development Award
Provide a brief summary of the program, describing the initiative’s primary intent and outcome, as well as key stakeholder groups that benefitted.

Created at the University of Massachusetts Boston in 2003, Broadening Advanced Technological Education Connections (BATEC) brings together cross-sector stakeholders from education, industry, and the community to collectively build a seamless and robust education-to-workforce pathway among students underrepresented in IT fields, including women, those from ethnically and culturally diverse backgrounds, and students with disabilities. Bunker Hill, Roxbury, and Middlesex Community Colleges and 7 metro Boston school districts were among the founding partners. Today the resulting regional collaborative includes seven community colleges and their 30 feeder public school districts, more than 75 industry, governmental, and community partners, and serves as a test bed for the national arena. Together, the collaborative is transforming IT education through innovative curriculum aligned across educational levels, experiential learning opportunities, and professional development that engages students, educators, and industry and community professionals. These programs address the specific fields of Computer Science, Information Technology, Web Development, and Data Analysis. They interweave the requisite technical knowledge and skills with employability/professional and entrepreneurial capabilities; enhance education-industry engagement; and provide for advancement from high school and/or community-based programs into two- and four-year colleges. BATEC also leverages the work of this dynamic partnership to impact policy through applied research. Its regionally coordinated system has been highly successful at attracting talented students from diverse demographics and backgrounds to IT careers, promoting lifelong learning of technical skills, and meeting the IT workforce needs of the region. Capitalizing on these successes, BATEC was encouraged to expand its scope by the National Science Foundation in 2011. A five-year grant was secured creating a National Center of Excellence for Computing and Information Technologies to include the metro regions of San Francisco, Las Vegas and Chicago.

Broadly speaking, BATEC’s professional development opportunities engage and leverage the diverse perspectives within its network of cross-sector stakeholders to explore a variety of opportunities. Examples include industry-led forums highlighting trends and opportunities, summits that engage educators in analyzing and innovating content, and six-week paid externships that enable high school and collegiate educators to work with local companies to gain additional content and case studies for classroom use. Its array of learning opportunities for educators interconnects with curriculum development to provide a holistic approach to faculty development. Curriculum models are designed in collaboration with industry with the flexibility to align with existing programs, provide multiple entry and exit strategies (i.e., stackable credentials), and be adaptable to local needs. The emerging picture of the “BATEC Educator” is one who, as a result of participating, has particular skill in designing and teaching courses that impart a high level of both technical and employability skills (including problem-solving, critical thinking, and teamwork) to students. Furthermore, its “Communities of Practice” team model enables educators to work within and across institutional boundaries to share best practices and create well-aligned systems and structures.

At the heart of its work, BATEC focuses on connecting the necessary enablers for attracting students underrepresented in IT fields to pursue related degrees and careers. BATEC and its partners have implemented a variety of evidence-based approaches to student engagement in IT fields. This includes working with guidance counselors, educators, and community organizations at the K-12 level, and admissions and advising offices at postsecondary settings. Special events, such as our High Tech College Fair, offer some of the only opportunities for urban youth to get targeted college awareness regarding technology-related careers and majors. Specialized
mini-tech fairs partner with specific feeder schools to provide K-12 students with what is often their first exposure to a college campus. In addition, dual enrollment courses, bridge programs, peer mentoring, and internships enhance the flow of students through the pipeline by providing direct connections to college-level work and IT employment. For instance, the Tech Apprentice program has a seven-year track record of placing Boston Public Schools students into seven-week, paid internships with local companies spanning industries like financial services, healthcare, non-profit, higher education, media and information technology.

Objectives

BATEC is transforming education to develop a diverse population of IT professionals for the 21st century workplace by:

1. Defining, extending and strengthening computing pathways and career opportunities in the disciplines of Computer Science and Information Technology;
2. Facilitating and leveraging strategic partnerships with education, business, government and community to build awareness, generate interest, and support learning opportunities;
3. Conducting actionable research to inform policy makers, IT educators, and workforce development agencies; and
4. Participating in and leading the national discussion on the subject of integrated curriculum and applied IT education.

Measurable Outcomes

BATEC’s primary outcomes are meeting the four main objectives of the center above. Unless otherwise noted, these outcomes are based on data from AY 2013-14.

1. Increased the student participation from underrepresented backgrounds in IT-related curriculum and career pathways by engaging 8,146 Massachusetts students (20,032 students nationally) from secondary, associate, and baccalaureate schools in at least one BATEC supported course within all programming.
   - The 20,032 students engaged in AY 2013-14 represents an overall increase of 239% since 2007.
   - Over 130 Boston Public Schools students participate in the Tech Apprentice program annually; 93% of Tech Apprentice participants attend college (compared to 69% of BPS graduates) and 75% of these students choose Computer and Information Technology programs.
   - In 2013 the Tech Apprentice model was adapted and scaled to three participating community colleges in Massachusetts, which has resulted in an additional 65 student internships in a year.
   - Leveraging its regional success to inform similar programs nationally, BATEC assisted Chicago Public Schools (CPS) to incorporate an IT Problem-Solving course that was developed by Bunker Hill Community College into the Early College high school curriculum. This course has also been implemented at City Colleges of Chicago allowing for dual enrollment opportunities. 1,500 students have completed this course.
BATEC is supporting CPS in its rollout of the “computer science for all” initiative with Code.org, which is expected to impact over 15,000 students within the first year and over 330,000 annually upon the completion of the three-year rollout.

2. Utilized professional development to build capacity of more than 207 educators across academic levels in order to develop and implement industry-informed curriculum and programming.
   - Participants of the Content in Context workshops collectively reported that their experience would cause them to modify the content of 125 different courses, and that enrollment in these modified courses is estimated to be 7,500 students on an annual basis.
   - The BATEC Summer Institute had an enrollment of 122 faculty members who attended one-week workshops in emerging fields of technology. Sixteen faculty attended a second weeklong workshop. The content and pedagogy is reported by the participating faculty to be impacting 17,000 students annually.
   - Four IT Summits with industry professionals and transfer institutions were held over the past year to garner significant input on curriculum, semester maps, and job expectations, setting the stage for ongoing curricular sharing with regional four-year colleges.
   - Seventeen faculty from the City Colleges of Chicago received IT Problem Solving training from Bunker Hill faculty on methods used in the introductory course CIS 118: Information Technology Problem Solving.
   - Faculty and administration from partner academic institutions meet quarterly to compare project plans in order to share experiences, collaborate on key issues and troubleshoot difficulties, and gain awareness of emerging trends and issues affecting ICT education.

3. Supported 12 projects that created and aligned new curriculum across academic institutions at the high school and postsecondary levels.
   - 9 of the 12 projects impacted curriculum at 6 institutions within the Massachusetts, 3 projects worked with partners outside of New England.
   - 56 participating institutions offered BATEC-influenced courses.
   - 39 of BATEC’s partner institutions participated in 49 articulation agreements between high schools, community colleges, and universities over the past year.
   - Quinsigamond Community College developed the Health Information Technology Certificate in response to a local workforce development need. It’s forecasted that 21% of IT career opportunities in the region will fall within the Health IT sector. An estimated 30-60 students will participate in this program annually.
   - Middlesex Community College created 6 new courses and revised 4 existing courses to align with the Secure System Administration track (IT), which was developed to address local workforce needs. The contents of this new degree program will impact all of the students enrolled in the Information Technology degree program, approximately 700 students over the next 5 years.
Bunker Hill Community College (BHCC) has developed and implemented a flexible, replicable curriculum model that integrates employability skills across a “stackable” curriculum with multiple entry points and “fast-tracking” time to completion and workforce entry; “Fast-Track Courses” are offered in compressed timeframes that allow for the completion of a certificate in one semester. The courses are then “stackable” into an advanced certificate, including an associate’s and bachelor’s degree at UMass Boston, meaning there are zero to minimal wasted credits. This stackable credential model is identified in a current Economic Development Bill being finalized by the MA Legislature. If successful, the Department of Higher Education will receive $1M in funding to expand this model across the Commonwealth. They will be working with BATEC and BHCC to advance the concept.

The City Colleges of Chicago has revised the curriculum in its Information Technology, Computer Science, and Networking Technology programs, involving redesign of 22 courses and 6 programs in transfer and career-oriented degrees, which will impact an anticipated 700 students.

4. Produced and disseminated 23 publications including industry reports, program manuals, and policy impacts (since BATEC’s 2003 founding).

- Nine studies on industry and workforce needs.
- Ten documents on best practices to increase educational access and success by historically underserved populations.
- Four program manuals and toolkits designed to assist replicating and managing programming.
- The director of BATEC has been named to the Statewide STEM Advisory Council and the Department of Elementary and Secondary Education’s Massachusetts Digital Literacy and Computer Science Standards Panel.

Criteria - Describe how your program or initiative meets both the general award criteria and the specific criteria for the award for which you are applying.

UMass Boston, celebrating its 50th anniversary, was established in 1964 with an explicit urban mission to increase educational access to historically underserved populations and serve society by connecting the resources of a research university to advance community efforts. From the first sentence, our “Mission and Values” statement (revised in September 2010) foregrounds the university’s “special commitment to urban and global engagement” and to “serving the public good of our city, our commonwealth, our nation, and our world.” BATEC epitomizes the university’s founding mission, and is an exemplary model among the university’s 938 unique community-serving programs and initiatives.

BATEC was established to create a seamless regional IT education system that would serve the IT training needs of Boston-area students, particularly those from groups traditionally underrepresented in IT as well as the workforce development needs of IT companies in the
BATEC has focused on creating the systems, processes and structures to reform and transform the region’s IT education into a coordinated system.

Curriculum at the college level has traditionally been developed by individual professors with a content focus. This model is not adequate if IT programs are to meet industry needs and capture the attention of 21st century learners. Cognitive theory developed by John Bransford and others clearly supports the idea that learners build on prior knowledge, so BATEC saw the need to develop programs that accommodate the wide range of backgrounds and learning needs that students bring to IT education.

While some IT students follow the traditional progression from secondary school forward, many others are changing careers, mixing school and work, or returning for training after initial employment in the IT industry. Although some students enter IT programs with strong academic and technical skills, many others require basic skills remediation and technical training that starts at “square one.” BATEC identified that programs had to be flexible in their scope and sequence, and offer a rich array of methodologies to foster student success.

Beginning as early as 2004, BATEC pioneered a model process for the integration of 21st century skills throughout local IT education programs. Rigorous content is collaboratively created in response to current and emerging industry needs. In 2007, BATEC published a groundbreaking IT Workforce Skills Study which included input from workers, hiring managers, and strategic planners across the country. The report concluded that employability skills (communication, collaboration, resourcefulness, and teamwork) and contextual skills (ability to apply skills in a real world environment) “are every bit as important as any technical skill element an employee may possess.”

Since then, BATEC partners have adopted outcomes-based curricula and participated in professional development focused on transforming teaching and learning so that students have opportunities to think critically, solve problems, work in teams and develop the habits and skills necessary for success in the new economy. Curriculum development centered on a team-based approach, with educators and industry partners working together to explore emerging technologies. This resulted in faculty routinely identifying employability skills in their syllabi and integrating classroom activities tied to 21st century skill outcomes. Ongoing student input also directly informs development of BATEC programming. For instance, in addition to student involvement in professional development activities, assessment tools used at the culmination of all courses and programs serve as a feedback mechanism that drives future adjustments before additional implementation occurs.

The impact BATEC has had on UMass Boston has been profound. The College of Management (CM) created new cross-functional/cross-departmental concentrations, merging concepts, faculty, and courses from separate departments and creating new options for transfer students. New concentrations include: Information Management (IM) for Finance, IM for Marketing, Management Science (MS) for Finance and MS for Marketing. Also developed was a Master’s of Science in Information Technology (MSIT) focused on the non-IT manager who needs to supervise applications of IT as a prime enabler of organizational change. Recently, the MSIT program was nationally ranked as one of the top 50 programs in the country.

BATEC also helped UMass Boston launch a cross-college Bachelor of Science in Information Technology (BSIT) degree in Fall 2008. For the first time, the computer science and information science departments within two different colleges worked together to fill a significant void for
advanced study of technology in the region. BATEC partners collaborated to develop this new
degree which was unique in that it was built on the community college associates degree. This
BSIT was designed as a 21st century degree that supports and extends the BATEC vision of
curriculum advanced in content and pedagogy, regionally-coordinated, and industry-linked. It was
not a mere re-grouping of computer science or management courses; rather, it is an applied
degree with multi-college collaboration that incorporates interdisciplinary approaches. The BSIT
consists of a common core of ten courses that mirror both the courses taken at the community
college and the foundational skills in the Association for Computing Machinery IT standards.
Thus, its design has allowed an innovative way of achieving seamless transfer across the region
and student enrollments have grown from 57 in its first year over 285 in its fourth year – an
increase of 500%.

BATEC has also had a great impact on UMass Boston through its ability to secure funding for
programming. Launched in 2003, BATEC has experienced continuous federal funding for 9 years
resulting in nearly $11 million. In 2011, the NSF granted BATEC nearly $5 million to take their
work to a national scale, supporting similar projects in Chicago, Las Vegas, and San Francisco.
Additionally, BATEC’s ability to secure and leverage funding extends beyond maintaining financial
support for the center. Recognized for her unparalleled expertise in creating educational
pathways in the tech sector, BATEC’s executive director Deborah Boisvert also received over $3
million in funding to run the NSF CPATH CB: A Community Addressing Seamless Information
Technology Education for Students (CSITES), CPATH-2: Advancing the Successful IT Student
through Enhanced Computation Thinking (ASSECT), and The Synergy Collaboratory for
Research, Practice and Transformation grants.

Moreover, these successes have not been exclusive to UMass Boston. For example, BHCC
credits their collaboration with BATEC for helping the school secure over $3.5 million in
additional sponsored projects. BHCC has also experienced a nearly 60% increase in degree
completion rates by the departments working with BATEC. Finally, 63% of Quinsigamond
Community College’s BATEC student interns last year received offers of employment from the
company at which they interned. This not only speaks to BATEC’s ability to enhance the quality of
the local workforce, but also to its success in helping with job creation or other economic
community impacts. Of the jobs secured by the Quinsigamond interns, 57 percent of the offers
ranged in pay from $9 to $14 per hour. Twenty-nine percent of the offers ranged from $26 to
$31 and 14 percent of the offers were at a rate of $75 per hour.

Challenges/Problems Encountered

The first challenge for BATEC, as a national center, is coordinating programming across such a
diverse set of stakeholders. In 2013 alone, BATEC collaborated with 295 organizations to
leverage their collective strength toward transforming educational opportunities in the IT sector.
To address this challenge, BATEC balances promoting verified best practices across partner
institutions and recognizing the unique factors at play for each region. The College of Southern
Nevada’s (CSN) student professional development program serves as a pertinent example of
BATEC’s ability both to lead and adapt to the needs of its partner institutions.

Typically, BATEC encourages the scaling of Tech Apprentice, a demonstrably successful student
internship model that has been in place in Boston since 2006. However, to better meet the
needs of the students and college, BATEC supported CSN in changing the focus of the initiative
from student internships to student professional development. CSN adopted, with modification, the five step process of student qualification, student preparation, employer recruitment, student/employer matching and follow-up/placement in ways that were appropriate for the programs, students and environment of Southern Nevada. In their modified program, Computer and Information Technology faculty identified 37 qualified students to take part in the initiative. Students participated in a workshop that taught resume preparation, interview, and presentation skills. Bolstered by their new skills, the students were prepared for networking with the 40 industry representatives who also attended the event.

Secondly, a systemic notion in higher education of what defines student achievement has impacted how BATEC’s programmatic success is viewed. Student success is often narrowly defined as graduation from a bachelor’s degree program within six years. This definition of success is outdated and doesn’t speak to the life experiences of a typical community college or transfer student. For example, the average Bunker Hill Community College student is 27 years old, juggles both work and school, and has previously completed some college credits. The center’s programs sometimes score poorly on evaluations due to the definition of student success as graduating from a bachelor’s degree within six years. In fact, many students viewed as “dropping out” are actually using their credential of a certificate or associate’s degree to enter the workforce. This is why BATEC advocates for student success to be measured on program completion at any level (certificate, associate’s degree, or bachelor’s degree) and by the student’s preparedness to enter the workforce.

BATEC’s report *Sizing the Middle-Skill Employment Gap: Significant Opportunities in Data, Information & Computing* states that while IT job growth is expected to outpace the average job growth through 2020, there is a middle-skills gap in the labor market. Almost a third of all jobs in the growing tech sector require middle-skills that can often be satisfied by graduates of a certificate or two-year degree program. Clearly, technology certificates and associate’s degrees hold significant weight in the labor market. BATEC’s model of stackable credentials across academic institutions promotes the recognition of student success at a variety of levels. Upon completion of a certificate or associate’s degree, a student can use that credential to secure a job that provides a living wage. That same credential also propels the student to the next academic program, should it fit into an individualized educational plan. BATEC’s discussions with its academic partners regarding student graduation data indicate a high level of interest for transfer to 4-year schools. Supporting this impression, 50% of UMass Boston’s BSIT students transferred into the program. While acknowledging the previous achievements of Massachusetts community college students, the University of Massachusetts system instituted a program in 2012 that supports further educational attainment by allowing them to choose a transfer institution prior to earning their associate’s degree.

Finally, measuring how the mid-level skills certificates are impacting student employment has also proven to be difficult. Tracking students via social security numbers would provide a complete picture of the value of a certificate in the regional economy. Unfortunately, Massachusetts’ and privacy protection laws prevent BATEC from tracking job placement in this manner. Recognizing the importance of aligning systems to measure the impacts of Massachusetts’ workforce development programs, Governor Patrick appointed a senior level advisor to coordinate the alignment, delivery, and tracking of workforce development services in 2012. BATEC has been involved with the planning and implementation of many of these efforts, advocating for improved data systems that would both protect participant privacy and provide better impact data to state agencies. In the meantime, BATEC tracks certificate and degree
completion rates through partner school registrar offices and through the National Student Clearing House. The center interacts with students via social media and surveys to track employment trends for each certificate and degree program.

**Additional Resources**

Resource 2: [http://cdn.umb.edu/images/ocp/Sizing_the_Middle_Skill_Employment_Gap_Final.pdf](http://cdn.umb.edu/images/ocp/Sizing_the_Middle_Skill_Employment_Gap_Final.pdf)