

VALENCIA COLLEGE

Broadening Education, Access, and Momentum (BEAM) in Energy Management and Controls Technology

Year One Annual Report – April 2017

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**PREFERRED PROGRAM
EVALUATIONS**
"Unlocking Your Potential"

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EXECUTIVE SUMMARY

In June 2016, Valencia College was awarded a three-year National Science Foundation Advanced Technological Education (NSF ATE) grant in the amount of \$900,000 to support *Broadening Education, Access, and Momentum (BEAM) in Energy Management and Controls Technology*. Valencia College, with the assistance of its educational and industry partners, has designed an Associate in Science degree program in Energy Management and Controls Technology (EMCT) to meet the growing demand for work-ready technicians in energy building automation.

The vision, objectives, and framework of *BEAM* are detailed herein. The findings, recommendations, and recommendations that comprise this first annual evaluation report are based on grant-related activities and accomplishments occurring between June 2016 and early-April 2017.

The EMCT degree program is the first of its kind to be developed by an institution of higher education in the state of Florida. The impetus for the creation of this program was spurred by consultation with major regional employers and the realization that Valencia College was in a key position to train future technicians in a growing field that boasts tremendous economic and environmental impacts. *BEAM* is poised to increase the participation of underrepresented populations in the field of energy building automation, namely, veterans and females. Career pathways will be developed for students entering from the local school districts in order to provide seamless articulation opportunities through strong programming and partnership activities.

The EMCT degree program is purposefully aligned with the regional movement toward the establishment of standards for energy use by businesses, especially industries with high energy consumption such as the commercial, industrial, and transportation sectors. As business operations and energy consumption become further intertwined, the national need has increased for building automation technicians trained in technologies related to controls and systems engineering, computer software, and networking.

As of April 2017, the curriculum frameworks for the college's proposed EMCT degree program were submitted to the Florida Department of Education for review and approval. The new program will offer a series of 10 rigorous technical courses, several of which will utilize Valencia's own facilities as a living laboratory. In addition, the students will receive their academic training in a fully-equipped instructional laboratory designed to build technical skills

and competencies on specific industry equipment. Graduates of the EMCT degree program will have gained an unparalleled opportunity to secure the requisite technical and soft skills for employment in the field.

BEAM has been made possible through the sharing of resources with Orange Technical College (OTC). Per the articulation agreement currently being drafted with OTC, students of Valencia's EMCT degree program will complete the first year of the Air Conditioning, Refrigeration and Heating Technology 1 program offered at OTC as part of the A.S. degree requirements. EMCT degree-seeking students will be formally enrolled at Valencia College but will take their first nine credit hours at OTC.

The EMCT program introduces another area within the current complement of technology programs at Valencia College. *BEAM* is receiving early praise for its use of innovative practices and knowledge of community, and is representing an emerging field with burgeoning workforce needs. Not only has the EMCT program come highly requested by industry representatives, but it presents a very focused opportunity for collaboration among Valencia College, Orange County Public Schools, and Orange Technical College. Early involvement of the industry partners has been significant, and these partners have expressed their willingness to donate time, expertise, materials, and equipment to the EMCT program. Industry partners will also be serving as internship host sites for students enrolled in the degree program.

METHODOLOGY

The external evaluation of *BEAM* is intended to satisfy National Science Foundation requirements that all ATE projects conduct a comprehensive assessment of their activities and outcomes. Three goals will be central to the evaluation of this project: (1) to help the project better serve its constituents and improve its effectiveness related to student engagement and success; (2) to serve the broader energy management and controls technology education community by documenting accomplishments and disseminating critical project findings; (3) to participate in any cross-site or national evaluation activities requested of grantees.

The external evaluation is being led by Blake Urbach, Principal Consultant of Preferred Program Evaluations. The evaluation activities for *BEAM* have been designed to establish the impact – both projected and unanticipated – on curriculum development and design; collaboration with industry partners and the K-12 and higher education communities; establishment of career pathways, articulation agreements, and experiential opportunities for EMCT program participants; ability to access and recruit the target populations, and the participants' perceptions of the services and activities provided.

Preferred Program Evaluations is engaging the project team in a process based on a flexible and participatory approach using quantitative and qualitative data collection methods. The evaluator will continue to serve as an accessible resource to the project team at all phases of the evaluation by employing a systematic approach to data collection, summation, and adjustment. In partnership with the project team, the evaluator will develop the tools and protocols to evaluate all objectives thoroughly, and secure approval for evaluation instruments from Valencia College's Institutional Review Board.

Evaluation reports will be generated annually in addition to any ad-hoc monitoring that may be required. The evaluation is intended to examine programmatic successes and challenges, assess changes in organizational capacity, and guide decisions about future activities in the event of expansion or replication.

Preferred Program Evaluations has been working closely with the project team to chronicle project activities, design, performance, and achievement of outcomes to remain proactive in addressing the complexities of implementation. Evidence-based recommendations intended to strengthen project elements and cohesion of activities are presented herein. Findings will be reviewed with the project's leaders and the parties will strategize the most salient ways to address identified challenges, as needed.

Beginning in year two of *BEAM*, the progress and performance of EMCT students will be tracked individually and in cohorts based on the term in which students first declare an EMCT major. This will allow the evaluator to analyze student-level and cohort-level comparison data.

<i>BEAM</i> Evaluation - Data Sources	Year 1	Year 2	Year 3
<i>Project-Related Materials</i>			
Project records, meeting notes, agendas	X	X	X
EMCT curriculum and materials	X	X	X
<i>Qualitative Sources</i>			
Student survey		X	X
Industry partner survey			X
Stakeholder interviews	X	X	X
Site visits	X	X	X
<i>Quantitative Sources</i>			
Demographic data of EMCT students		X	X
Enrollment, retention, and graduation data of EMCT students		X	X
Performance data of EMCT students		X	X

BEAM PROJECT OBJECTIVES AND INDICATORS MATRIX

The current evaluation matrix for *BEAM* is shown below. Based on the project’s projected implementation timeline, the outcome measures specific to student internships will need to be amended because the majority of EMCT students are not expected to have completed their internship requirement by the conclusion of the grant. As such, a request has been made to the project’s NSF ATE Program Officer to reapprove the evaluation matrix with new internship-specific outcome measures that will be a better reflection of students’ and industry partners’ experiences during the performance period. The outcomes in question are denoted with an asterisk in Objectives 2 and 3.

<i>BEAM</i> - Evaluation Matrix			
Objective	Process Measure	Outcome Measure	Data Source(s)
1. An Associate in Science degree in Energy Management and Controls Technology will be offered by the end of the grant period.	Develop a rigorous curriculum that balances regional workforce development needs with conventional academic models	The new curriculum and learning outcomes will be approved by Valencia College and become part of the college course catalogue <i>Slated for review summer 2017</i>	<ul style="list-style-type: none"> • Project records • Meeting minutes • Curriculum and materials • Stakeholder interviews • Institutional records • Site visits
	Leverage resource from ATE Centers and affiliates, and the Advisory Committee	The degree program curriculum frameworks will be approved by the State of Florida Career and Technical Education and become part of the college program catalogue <i>Submitted to DOE as of April 2017</i>	
	Design/refine content for nine new courses and three modified courses	10 new/modified courses will be offered at the college during the performance period	
	After pilot testing, amend content and delivery based on evaluation findings and feedback from the project team and Advisory Committee	75% of students who complete the core courses will earn a final grade of "C" or better	
	Establish an integrated framework of research and internship experiences by connecting with the non-profit, for-profit, and government sectors	Recruit 10 industry and community partners to offer experiential opportunities for students and build a service base for the degree program	

BEAM - Evaluation Matrix

Objective	Process Measure	Outcome Measure	Data Source(s)
<p>2. Increase the number of female students who declare a major in four related programs and the Energy Management and Controls Technology A.S. degree program to 25% by the end of the grant period.</p>	<p>Recruit and advance a diverse group of female students prepared to enter the industry of energy management and controls technology</p> <p>Participating students will conduct research in the college's living laboratory, and complete a field internship</p>	<p>25% of students will be identified as female</p> <p>95% of students will satisfactorily complete the requirements of their internship*</p> <p>90% of participating students will report the program is enhancing their confidence and competency to secure employment in a related field</p> <p>Industry partners will report that upon completion of their internship, 90% of participants have increased their requisite knowledge, skills, and abilities to be employed in a related field*</p>	<ul style="list-style-type: none"> • Project records • Meeting minutes • Institutional records • Field research partner survey • Student survey • Stakeholder interviews
<p>3. Increase the number of veteran students who declare a major in four related programs and the Energy Management and Controls Technology A.S. degree program to 15% by the end of the grant period.</p>	<p>Recruit and advance a diverse group of veteran students prepared to enter the industry of energy management and controls technology</p> <p>Participating students will conduct research in the college's living laboratory, and complete a field internship</p>	<p>15% of students will be identified as veterans</p> <p>95% of students will satisfactorily complete the requirements of their internship*</p> <p>90% of participating students will report the program is enhancing their confidence and competency to secure employment in a related field</p> <p>Industry partners will report that upon completion of their internship, 90% of participants have increased their requisite knowledge, skills, and abilities to be employed in a related field*</p>	<ul style="list-style-type: none"> • Project records • Meeting minutes • Institutional records • Field research partner survey • Student survey • Stakeholder interviews

BEAM - Evaluation Matrix

Objective	Process Measure	Outcome Measure	Data Source(s)
<p>4. Disseminate information on processes and student outcomes, including lessons learned and key findings from the evaluation</p>	<p>Project leaders will submit presentation abstracts for professional conferences</p> <p>Formative and summative evaluation activities will be participatory and ongoing</p>	<p>Project findings will be shared at regional and/or national professional conferences on STEM education</p> <p>Findings from biannual evaluation reports will be used to inform project implementation, collaboration, and outcomes, and assist with mid-course correction</p>	<ul style="list-style-type: none"> • Conference presentation abstracts • Evaluation reports

FINDINGS AND RECOMMENDATIONS

In November 2016 and April 2017, a series of stakeholder interviews was conducted by *BEAM*'s external evaluator, Blake Urbach. The evaluator spoke with a total of five stakeholders on each occasion: four members of the staff and administration at Valencia College, and one external partner from the BEST Center at Georgia Piedmont Technical College. The interviews were conducted in person or via telephone, and verbal consent was gained from participants prior to the start of the question line.

Stakeholder interviews are valued for generating a candid, in-depth dialogue about project implementation and management processes. Respondents were asked to respond to a set of questions about their involvement with the project and the status of grant-related activities and accomplishments taking place between June 2016 and April 2017. Ideas about strengthening project design, processes, and partnerships were also solicited from the interviewees and are provided herein under the relevant subheading. The list of interviewees includes:

- Dr. Felicia Williams, West Campus President, Valencia College
- Dr. Nasser Hedayat, AVP of Career & Workforce Development, Valencia College
- Ms. Resham Shirsat, Director of Sustainability, Valencia College
- Mr. Robert Hickman, Operations Manager of Energy Efficiency, Valencia College
- Mr. Brain Lovell, Co-P.I., BEST Center at Georgia Piedmont Technical College

Project Background and Development

Dr. Hedayat, AVP of Career & Workforce Development, expressed the importance of up-front collaboration when piloting a project of this nature. He values “knowing your audience; knowing your community,” and believes Valencia College has been systematic in considering return on investment for key players and other stakeholders. The project’s leaders, Dr. Lisa Macon (P.I.) and Dr. Deb Hall (Co-P.I.) were lauded for their efforts in identifying and engaging community and industry partners early – before the formal grant writing process even began.

Dr. Hedayat noted that it is a practice of the college not to offer two-year A.S. degrees unless the field appears on the targeted occupations list. Specifically, the occupation must provide at least 25 new positions (annually) at a minimum hourly wage of \$13. Dr. Hedayat shared that an economic gap analysis for the region was conducted in an effort to determine sector-specific job demand and unmet need. This exercise served as the basis for a recommendation to college leadership about new programs to be developed.

Per Ms. Shirsat, her top priority when she assumed the role of Director of Sustainability at Valencia College was to promote and generate traction around the idea of an automated controls technology degree program. Pre-award, she organized two industry roundtables to understand local industry need and engagement. She views Orlando as a particularly great location for this program and she noted that the industry partners are fully committed to hiring EMCT program graduates.

The creation of the new EMCT degree program is in alignment with Valencia College's mission to build pathways to success. Students of the EMCT program are expected to have high-paying, in-demand jobs awaiting them upon graduation. There is a growing need for knowledgeable technicians and on-site operators as building codes continue to change, and those without a related degree face challenges when seeking advancement.

Project Administration and Leadership

Dr. Williams, West Campus President, views her role as “sideline coach” for Drs. Macon (P.I.) and Hall (Co-P.I.). She assists the project's leaders in framing *BEAM* within the strategic initiatives/master plan college-wide. She is an internal participant providing resources and guidance to navigate the unexpected. Dr. Williams is pleased with the way in which the grant is strengthening partnerships with both new and existing industry players. Coordination is regarded as pivotal insofar as it will allow the project team to stretch grant dollars as much as possible.

Mr. Lovell, Co-P.I., BEST Center, identified several key components necessary for successful project implementation. These include, first and foremost, finding a “project champion.” He defines this individual as one who has experience in the field inclusive of direct controls experience. Secondly, he recommends identifying the “talent pool” of faculty who will be charged with leading and teaching the program offering's courses. He noted that these faculty members are typically paid more than a standard instructor because as practitioners they are in high demand and continually being headhunted.

Per Mr. Lovell, Valencia is “in the driver's seat” because it will set state standards by being the first program of its kind in Florida. He referred to Valencia as a “pathfinder” for automation education in Florida. He stressed the importance of vertical buy-in and urged the project's leaders to have “reportables” to show success in order to maintain institutional commitment. Mr. Lovell mentioned that the planning process for a project of this magnitude can be lengthy – upwards of a couple of years – and not without stumbling blocks early on.

The interviewees noted that they are kept well-informed of project developments. One of the interviewees would like further clarification of how each project team member's role is defined. Another suggestion put forth was to appoint one person from the project team as the designated contact from Valencia College to interface with industry partners via e-mail for meetings and events. Essentially, correspondence with external stakeholders should originate from a single project leader, and all other members of the project team should be copied on emails so they can remain abreast of meeting dates and invites.

All of the stakeholders were provided an executive summary in fall 2016 to familiarize them with *BEAM's* objectives and outcomes. It was recommended that meeting minutes are shared with respective partners and to make representatives aware of the implementation timeline, sample curriculum, and touchpoints.

The stakeholders as a whole anticipate great success from this project, and it is viewed as a "win/win" for the college and the community. Implementation of the interrelated components of *BEAM* are being supported by several committees. Depending on the committee's purpose, the representatives are internal and/or external to the college. Each of the committees met at least once during *BEAM's* first year, and the committees will continue to meet throughout the performance period of the grant. They include:

- Curriculum Committee
- Communications and Marketing Committee
- Facilities Committee
- Industry Advisory Committee
- Leadership Committee

DACUM

To facilitate building the EMCT curriculum, a two-day DACUM for Energy Management and Controls Technology was held on Valencia College's west campus on September 22-23, 2016 (see Appendix). The DACUM was facilitated by Mr. John Moser from The Ohio State University, and the DACUM research chart was produced by the DACUM International Training Center.

DACUM is a process that is considered the foundation for competency-based curriculum. The DACUM's merit is driven by the content experts who serve as panel participants. These representatives are believed to be able to define their jobs better than anyone else. Over the course of two days, the panel engaged in a meaningful discussion about the specific duties and tasks that would be required of a technician employed in the field of energy management and

controls technology. Additionally, the panel brainstormed the general knowledge, skills, and behaviors that would be necessary for success, and the individual tools, equipment, and materials that a graduate of the EMCT degree program would be expected to use.

With the facilitator's guidance, the panel constructed several "enabler lists" that address the application of knowledge to perform each duty and task:

1. Knowledge
2. Skills
3. Behaviors
4. Tools and equipment/supplies and materials
5. Future trends and concerns
6. Glossary of acronyms/initialisms

Panel participants represented the public and private sectors:

- Chris Lock, Siemens
- Robert Hickman, Valencia College
- Kohnen Barry, TLC Engineering for Architecture
- Brian Lovell, NSF BEST Center
- Ben Fitzgerald, Florida Hospital
- Pam Armitage, Walt Disney Parks & Resorts
- Nate Boyd, Hanson Professional Services
- Rich Hansen, MC2
- Jack Lafferty, Automated Logic
- Brent Waluzak, Siemens
- Chris Castro, City of Orlando



The final DACUM Research Chart for Energy Management and Controls Technology has been disseminated among the project’s internal and external stakeholders. It is being used to inform program curriculum frameworks and course content, and even being consulted for the development of national BAS (building automation systems) credentials.

Program and Course Development

The curriculum frameworks for the 60-credit Associate in Science EMCT degree were submitted to the Florida Department of Education in April 2017. Valencia College expects to hear back from the state about its submittal by summer 2017. The design and sequence of the curriculum frameworks was greatly informed by the DACUM held in September 2016. Additionally, Mr. Lovell from the BEST Center reviewed the frameworks and provided edits prior to them being submitted for formal consideration.

Dr. Hall worked with the Florida Department of Education to create a discipline subject code for the EMCT degree program’s new courses. After much consideration and feedback from the state, the project team settled on “ETM – engineering, technology, mechanical.” Once state approval is granted, the courses and program will begin internal review by the college’s Curriculum Committee. The steps of the internal approval process will occur simultaneously, as the course and program outcomes are embedded in the program and interior courses.

- 1) Approve the degree
- 2) Approve the interior courses
- 3) Approve the program outcomes
- 4) Approve the course outcomes

Dr. Hall has been taking evening classes at Orange Technical College since August 2016. She is enrolled in the Air Conditioning, Refrigeration and Heating Technology I program in order to gain a more nuanced understanding of the learning objectives that will be necessary for inclusion in the EMCT curriculum. This experiential learning opportunity has assisted Dr. Hall in designing course content that is academically rigorous and has meaningful industry application.

The seven new courses associated with the EMCT degree program can be added to Valencia College's course catalogue at any time; the three modified courses cannot. The results of the DACUM held in September 2016 dictate the necessary course modifications. The professors slated to teach the courses requiring modification are expected to have their changes ready for review no later than July 2017. At present, the college is creating a "shell" course on Blackboard to facilitate the forthcoming course modifications.

The three courses to be modified for the EMCT degree program include:

- COP 1000C – Introduction to Programming Concepts
- ETP 1501 – Introduction to Alternative and Renewable Energy
- BCN 2563 – Building Service Systems

In the students' second year of the EMCT degree program, they will be required to complete a three-credit-hour internship. *BEAM's* industry partners will be asked to provide students with this opportunity in order for the program to produce workforce-ready graduates who have hands-on experience in the field.

Two approaches to program recruitment and selection were outlined. Given that Valencia College is an open-door, open-access institution, the college strives to accommodate demand whenever possible. To that end, the college will consider opening additional sections of courses based on the availability of faculty. Per Dr. Macon, P.I., the college has approved the hiring of one EMCT full-time, tenure track professor to begin teaching in spring 2018.

Limiting access to the program is also a possibility, but doing so would require the college to create admission criteria that aligns with the targeted population. In line with grant outcomes, priority points would be given to females and veterans. Dr. Williams mentioned that the project team has latitude to shape program selection, but this decision needs to be made in advance of the marketing campaign because it will determine the eligible student population.

Educational and Industry Partners

The BEST Center, an ATE-funded project, is a principal stakeholder in the implementation of *BEAM*. Mr. Lovell shared that the BEST Center focuses on disseminating high-quality content (curriculum models) across the country. The center offers annual workshops and at least one representative from Valencia College has been in attendance for the last five workshops. Other resources provided by the BEST Center on an ongoing basis include technical support and access to collective best practices at Bestctr.org.

Through its partnership with the BEST Center, Valencia College has been selected to serve on the team of institutions working to design national BAS credentials. The results of Valencia's DACUM are being used, in part, to inform this process. If the credentials are officially in place by *BEAM*'s conclusion, the project's leaders are hopeful that Valencia's EMCT degree-seeking students will be able to test for the newly introduced credential.

BEAM has been made possible through the sharing of resources, namely, an existing facility, with Orange Technical College (OTC). Per the articulation agreement currently being drafted with OTC, students of Valencia's EMCT degree program will complete the first year of the Air Conditioning, Refrigeration and Heating Technology 1 program offered at OTC as part of the A.S. degree requirements. EMCT degree-seeking students will be formally enrolled at Valencia College but will take their first nine credit hours at OTC. The details surrounding financial aid payments will be ironed out by the two institutions in the coming months.

OTC offers day class on the Mid Florida campus and evening courses on the Westside campus, allowing EMCT students to take classes on the campus that best aligns with their schedule and proximity to the school. Although the partnership with OTC is key, Dr. Williams cautioned that counting on OTC as a pipeline for prospective students makes Valencia College dependent on another program's student pool. The degree program at Valencia represents a larger piece of the energy management spectrum while OTC's marketing is limited to HVAC. Per Dr. Williams, we "can't abort our own responsibility" and run the risk of falling short by relying too heavily on OTC.

Ms. Shirsat mentioned that the EMCT program will offer future students the opportunity to engage in a community service project whereby they assist low-income residents. By leveraging student skills and community partnerships, students will use their skills to help improve the energy efficiency of homes in economically disadvantaged neighborhoods.

The partnership opportunities with local industry have proven tremendous. The partners on the Industry Advisory Committee have vocalized their desire to serve as internship host sites for EMCT students. It is recommended at this point in the project's development, at least a verbal commitment is secured from industry partners regarding their per-semester capacity for internship placement and their company's recognized selection process for interns.

A representative from Florida Hospital has mentioned that the company's foundation may be able to offer student scholarships. Industry partners have inquired about becoming guest speakers, assisting with setting up the instructional lab, and providing a bevy of corporate donations. Once a lab space has been identified and the project's leaders have a better idea of the schematics, they are encouraged to provide *BEAM*'s partners with a formal equipment request list. The industry partners have even offered to store requested equipment at their warehouses until the lab space becomes available.

Living Laboratory and Instructional Lab

The living laboratory is expected to generate a better understanding of controls technology as it will allow for a real-time exchange between students and practitioners. Ms. Shirsat is involved in creating a real-world setting for students in the EMCT program via the living lab. She views this project as a natural fit with the City of Orlando's "Green Works Orlando," and believes that highlighting sustainability will be a great way to attract prospective students and further engage enrolled students of the EMCT program. At present, the project team is working to increase the walkability of the living lab by adding more signage and caution lines.

Mr. Hickman, Operations Manager of Energy Efficiency, inquired if the EMCT curriculum will incorporate off-campus field trips. Suggestions included the college's Winter Park campus and Poinciana campus currently under construction that features the latest in green technologies.

Regarding the on-campus instructional lab, the project team is aware that many moving parts must coalesce before a lab space can be assigned. Schematics of the instructional lab to be housed on Valencia College's west campus have been made available to the internal and external stakeholders of *BEAM*. The lab will be modeled after that of Georgia Piedmont Technical College, a best practice designed and promoted by the BEST Center as being affordable and replicable. Mr. Lovell and his team have assisted Valencia College in the development of laboratory specs; creation of a lab environment; pedagogy, and best practices on how to leverage the lab environment for teaching.

According to the project team, the BEST Center staff cautions that the amount of time it will take to outfit a space so it is ready for student engagement is approximately one year. In preparation for the design and installation of the instructional lab at Valencia College, several members of the project team visited BAS labs at other colleges across the country. These included the BAS lab at Mount San Antonio College, El Camino College, Lane Community College, and Georgia Piedmont Technical College.

Per Valencia College staff, designating a lab space is more complicated than simply locating a vacant area that offers the right amount of square footage. An instructional lab of this nature comes with a host of contingencies from architectural and engineering standpoints, such as concrete load and acoustics.

Dr. Williams noted that substantive renovations were not budgeted for and infrastructure changes were not fully fleshed out in the proposal. She is of the opinion that the project could benefit from a fiscal analysis of major deliverables and commitment. Outfitting the lab will require an institutional investment of resources including personnel time and expertise. Although Dr. Williams is hopeful that a viable spot will become available soon, she noted the possibility of establishing the lab at an interim location until a permanent space is vacated.

Mr. Lovell spoke about the consequences of allowing one company to monopolize the lab with its equipment. He advised using manufacturers committed to an ongoing relationship with the college regarding the provision of equipment and training. Specifically, he mentioned the value of establishing a relationship with two or three systems to start: Triatek, Automated Logic, Siemens, and/or Kelly. Per Mr. Lovell, it is critical that instructors are intimately familiar with the specifics of each company's equipment, both old and new.

It is important to note that the BEST Center lab is never a finished product; it undergoes regular improvements. To that end, the creation and management of a building automation systems lab on Valencia's campus will require an ongoing institutional commitment.

Student Engagement

A student chapter of ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) was recently formed at Valencia College. In order to become established, a minimum of 10 students were required to become paying members of the club. The club's faculty liaison is Dr. Hall, and there are four elected officers serving in student leadership positions. In addition to monthly meetings, guest speakers, and industry tours,

ASHRAE membership will provide participating students with opportunities to network with members of other local and regional ASHRAE chapters.

The project team of *BEAM* is engaging K-12 public schools in a variety of capacities. Dr. Hall conducted a teach-in on November 16, 2016 at Eccleston Elementary School. She spoke to 63 4th grade students and their teachers about energy management and controls technology and how their choices impact the environment. Per Dr. Hall, she engaged the students using “gameification of learning.”

During the most recent Industry Advisory Committee meeting, one of the representatives from Orange County Public Schools offered to link Dr. Hall with two elementary schools – Zellwood Gardens and Millenia Gardens – focused heavily on STEM education and careers. There is also a possibility of building a career pathway with a feeder high school in Orange County, Florida, that is supposed to have an energy magnet program available in the 2017-2018 academic year.

Professional Development

The project team engaged in a number of professional development opportunities during *BEAM*'s first year in order to stay abreast of current trends in pedagogy, technology, and learning platforms. The list of trainings, workshops, and academic conferences to date includes:

- Sporlan Training Workshop:
August 9-11, 2016
- Orange Technical College HVACR Training:
August 16-17, 23-25, 30-31, 2016
September 1, 6-8, 13-15, 20-22, 27-29, 2016
October 4-6, 11-13, 18-20, 25, 2016
November 1-3, 8-10, 15-17, 22-24, 29-30, 2016
December 1, 6-8, 13-15, 2016
January 4-6, 11-13, 18-20, 25-27, 2017
February 1-3, 8-10, 15-17, 22-24, 2017
March 1-3, 8-10, 15-17, 2017
- Women in HVACR Annual Conference:
September 19-20, 2016
- WE16 – Society of Women Engineering Conference:
October 27-29, 2016

- Automated Logic Controls Training Workshop:
October 20-21, 2016
- BEST Center Winter Meeting:
January 11-14, 2017

Dr. Hall presented about Valencia's grant process and provided an update about the EMCT A.S. degree program; community outreach activities with 4th grade students, and the Women in HVACR annual conference.

- AHR Expo/Women in ASHRAE Continental Breakfast:
January 29 through February 2, 2017

Dr. Hall organized a booth titled "Womaning" at the AHR Expo and provided information about the development of the new EMCT degree.

- University of Wisconsin HVAC Fundamentals Training Workshop:
March 8-10, 2017
- National HVACR Educators and Trainers Conference:
March 27-30, 2017

Marketing

News about the college's ATE grant and the EMCT degree program was first featured in a July 2016 article in *The Grove* (see Appendix). With input from the Communications and Marketing Committee, the project team is working closely with the college's Office of Public Affairs and Marketing to design a full-color brochure to advertise the EMCT degree program. The informational brochure will be suitable for a host of audiences including high school counselors, prospective students, working practitioners, and industry partners. The brochure will prominently feature women and veterans – the underrepresented groups to be targeted for acceptance into this degree program. As the program nears its inaugural student recruitment period, a comprehensive marketing plan featuring print and electronic media will be rolled out.

The BEST Center's informational YouTube video was provided to Valencia College to modify and use for its purposes. Mr. Lovell noted that the video in its current format is best suited for web-based or kiosk applications, but could possibly be reformatted for television.

Site Visit: Valencia College West Campus Chiller Plant

The P.I., Co-P.I., and external evaluator toured the chiller plant on Valencia College’s west campus in October 2016. The tour was given by Mr. Robert Hickman, Operations Manager of Energy Efficiency. The chiller plant will be integrated into the course curriculum and serve as one part of the “living laboratory” visited by students of the EMCT degree program. Students will be able to interact with the equipment in real-time in a controlled environment. Prior to the first class of students visiting the lab, several improvements to signage and access to restricted areas will need to be addressed.

The college’s EcoScreen presentation was viewed at the beginning of the site visit. The EcoScreen tool is being used as an educational and informational tool for EMCT students, K-12 students, and industry partners who are interested in learning more about the college’s energy conservation efforts and partnerships.

Site Visit: Orange Technical College – Mid Florida Campus

In February 2017, the P.I., Co-P.I., and external evaluator met with several members of the administration at Orange Technical College – Mid Florida Campus, and received an extensive tour of the facility from HVACR Professor, Mr. Howard Corbett. The students in attendance were observed in the lab working with each other on a series of physical tasks related to HVACR assembly and maintenance. Mr. Corbett explained that the students are in the classroom Monday through Thursday, and Friday is “hands-on lab day” where the students experiment in the adjacent lab scape. He noted that in addition to the standard curriculum that combines theory and practice, he works with the students to hone their soft skills. Graduation from the Air Conditioning, Refrigeration and Heating Technology 1 program (a 750-hour post-secondary adult vocational program) signifies that students have completed the three levels of training: Helper, Assistant Mechanic, and Mechanic Level 1. (See Appendix for the program plan.)



APPENDIX

Appendix A – DACUM Workshop Agenda

Appendix B – OTC - Air Conditioning, Refrigeration and Heating Technology 1 Program Plan

Appendix C – Article from *The Grove*

DACUM Workshop Agenda Valencia College

Thurs., Sept. 22

8:00 a.m.	Continental Breakfast
8:30 a.m.	Welcome and Introductions*
	Orientation to the Workshop Process
9:15	BREAK
	Review of the Job
10:15	BREAK
	Identify the Major Duties
12:00	LUNCH
1:00 p.m.	Identify the Tasks
2:30	BREAK
	Continue Identifying Tasks
3:30	BREAK
5:00	Adjourn

Fri., Sept. 23

8:00 a.m.	Continental Breakfast
8:30	Resume Identifying Tasks
10:15	BREAK
	Continue Identifying Tasks
12:00	LUNCH
1:00 p.m.	Complete Task Identification
2:00	Develop enabler lists: General Knowledge and Skills; Worker Behaviors; Tools, Equipment, Supplies and Materials; Future Trends and Concerns; Glossary of Acronyms
3:00	Conduct Chart Refinement and Sequencing
4:30	Evaluation and Conclusion of Workshop

* After the welcome and introductions, times are approximate

Appendix B

Orange County Public Schools - Career & Technical Education CTE - Mid Fla Campus
 Air Conditioning, Refrigeration and Heating Technology 1 C400100
 Student Training Plan & Record - Program 1 of 2

Student Last Name:	First Name:	DOE#	Start Date:	Withdraw Date:											
DATE	IL	DOB	OCCPS	A/C, Refrigeration and Heating - HELPER	GD%	RACT	GD%	HP	GD%	EVA	GD%	FUND. REF	GD%	EBHAC	GD%
AC1-13:14			1.02	Complete Program & Industry Orientation		4									
AC1-1			2.01	Assembling Jobs and Industry Safety Protocols	Division	5									
AC1-2			2.02	Proper Care and Use of Trade Related Hand Tools		5									
AC1-3			2.03	Proper Care and Use of Trade Related Power Tools		5									
AC1-2			2.04	Proper Care & Use of Trade Related Specialized Tools		2		1							
AC1-3:15			2.05	ACW, Locks Measurement Techniques		143									
AC1-6			3.01	Identify Basic Refrigeration Cycle & Components		12				1				1.82	
AC1-4			4.01	Applying Electrical Fundamentals											
AC1-22			13.0A	Employability Skills - Cover Letter & Resume	Work										
9 Course Final Grade															
Work															
9 Course Exam															

DATE	IL	DOB	OCCPS	A/C, Refrigeration and Heating - ASSISTANT MECHANIC	GD%	RACT	GD%	HP	GD%	EVA	GD%	FUND. REF	GD%	EBHAC	GD%
AC1-21			2.07	ACW, Tubing & Piping Connection Methods (2.08)		7		8							
AC1-21			2.10	Use Solder and Slew Brazing Skills (2.09)		6									
AC1-NA			2.12	Identify HVAC and Connection Fundamentals		23									
AC1-17:18			3.02	Troubleshoot and Service Basic Compressors		22									
AC1-17:19			3.03	Troubleshoot and Service Basic Condensers		218:14									
AC1-17:20			3.04	Troubleshoot and Service Saturated Evaporators		8									
AC1-24			3.08	Locate and Repair Refrigeration Cycle Leaks				2						3.45	
AC1-6			4.02	Understanding Basic Electrical Circuits & Loads										4.87	
AC1-10			4.03	Using Test Instruments to measure electrical circuits										8	
AC1-NA			4.04	Service Protection Devices		13								12	
AC1-NA			4.05	Troubleshoot and Service Thermostat Controls											
AC1-12:28			7.02	Identify Blueprint/Construction Drawing & Specifications											
AC1-22			13.0B	Employability Skills - Cover Letter & Resume	Work										
9 Course Final Grade															
Work															
9 Course Exam															

DATE	IL	DOB	OCCPS	A/C, Refrigeration and Heating - MECHANIC LEVEL 1	GD%	RACT	GD%	HP	GD%	EVA	GD%	FUND. REF	GD%	EBHAC	GD%
AC1-NA			2.06	Apply Slat Rigging, Hoisting & Handling of Materials		24									
AC1-17			3.05	Troubleshoot and Service Basic Metering Devices		9									
AC1-24			3.07	Test and Identify Refrigerants & EPA Certification		10									
AC1-24			3.09	Apply Derivation and Evacuation Procedures		10									
AC1-24			3.10	Charge Mechanical Refrigeration Systems											
AC1-NA			4.06	Troubleshoot and Service Condensers and Releas		17								11	
AC1-7:8			4.07	Single Phase Motor Operation and Controls				3						9.5:0	
AC1-NA			4.09	Use Electrical Component Symbols and Diagrams		15.2:20		7						5	
AC1-5			4.10	Diagnose - Electrical Components & Systems		43.2:48		6						15.3:18	
AC1-NA			4.11	Apply Domestic Refrigeration & A/C Appliance Skills										16	
AC1-23			7.06A	Basic Air Distribution Systems and Fabrication		40		11							
AC1-NA			8.01	Routine, Preventive & Predictive Maintenance Concepts											
AC1-22			13.0C	Employability Skills - Cover Letter & Resume	Work										
9 Course Final Grade															
Work															
9 Course Exam															

Two Recently Awarded Grants Help Valencia Deliver on Commitment to the Community

Jul 5

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Valencia's commitment has always been to not only improve the lives of the students within our campuses, but to also improve our community — and our world at large. In recognition and celebration of that commitment, Valencia's leaders continue to find new and innovative ways to deliver on our promise. Recently, the College was awarded grants that will help Valencia do just that.

A partnership award from Northern Virginia Community College (NOVA), entitled the *Community College Initiative (CCI) Program*, and a grant from the National Science Foundation, *Broadening Education, Access and Momentum (BEAM) in Energy Management and Controls Technology*, are designed to help Valencia support its strategic goals to build pathways and strengthen our community.

Appendix C (continued)

The CCI Program partnership award by NOVA, totaling \$215,604, was funded through the **Department of State, Bureau of Educational and Cultural Affairs**. This program will help increase the number of **international students** served at Valencia as part of the College's efforts to achieve greater internationalization. Through Valencia's **Continuing Education Department**, the College will provide services to 14 people through the CCI Program. This is an academic exchange program designed to enhance the skills, leadership ability and English language proficiency of underserved and underrepresented populations that will help the College's overall efforts toward internationalization.

The BEAM in Energy Management and Controls Technology is a three-year grant, funded by the **National Science Foundation** in the amount of \$900,000. Under the leadership of **Lisa Macon**, dean, engineering, computer programming and technology, and **Deb Hall**, professor, electronic engineering technology, the program is designed to promote education in STEM (science, technology, engineering and math) fields by developing the first Energy Management and Controls Technology Associate in Science degree available in Florida. This program is in direct response to regional employers' critical need for trained technicians in STEM-related fields. To help close the employment gap, the program will also focus on increasing the number of female and veteran students who declare a major in the new field of study.

Together, these awards will help Valencia improve the lives of our students, our community and our world.

For questions, contact **Kristeen Christian**, assistant vice president, resource development, at kchristian6@valenciacollege.edu or extension 2909.