C-BEN COLLABORATORY 4

Creating CBE Pathways:

Insights from C-BEN's
Employer Engagement Collaboratory

DRAFT
OCTOBER 2019

COMPETENCY-BASED
EDUCATION NETWORK

C-BEN COLLABORATORY FOUR

EXECUTIVE SUMMARY:

This part of the fourth collaboratory focuses on the business case for recognition of non-institutional learning, the processes required for recognition, and the resulting possibilities of recognition. With the assistance of Lumina, ACE and Corporation for a Skilled Workforce, university participants explored, developed, piloted, tested and shared tools and processes with an intended outcome of determining best practices in the following:

- Partnering with non-university/college organizations

- Determining the ROI of workplace – education partnerships

- Developing and implementing processes to evaluate non-institutional learning as academic credit opportunities

The intention of the above is to address objectives three and four specifically:

- Objective 3 (as found on page 8 of C-BEN proposal): Create guaranteed pathways for industry-recognized certifications. Utilizing existing research and frameworks, Collaboratory participants will assess the competencies validated through industry-recognized certifications, and determine how those competencies can align to degree programs. Collaboratory partners, working with Lumina, will publish those pathways. Collaboratory partners will also partner with ACE's competency-based CREDIT program to accept certifications and work-based learning through that channel.

- Objective 4 (as found on page 8 of C-BEN proposal): Recognize work-based learning. Learning from the experience of Brandman University, which has negotiated with employers to provide credit for competencies gained through work-based learning, Collaboratory participants will assess the competencies included in key work-based education and training programs, and determine how they can align with degree programs.

CBE institutions are elevated as a result of working through the above toward various results aligning competency based university competencies and programs with competencies found in non-institutional learning that is appropriately assessed. Thus, objective five is also addressed. The result of alignment and acceptance of the same toward credit and credential completion provides credibility to the argument that CBE institutions are effective partners to employers and for adult working learners who should be recognized for the learning mastered within these non-institutional environments.

To address the Lumina questions and stated objectives three and four, four teams were created. Each team was focused on an in demand sector and tasked with choosing an "appropriate" industry recognized certification and/or a work based learning program that would be the basis for evaluation as to whether academic credit should be awarded. The in demand sectors included: manufacturing, information technology, healthcare, and service sector. The hypothesis is that these certifications and work based learning opportunities demonstrate mastery of specific knowledge, skills and abilities which may map to university/college program competency outcomes and which could/should be legitimate pathways towards degree completion.

What did these teams consider?

- A process for determination of which certification or training should be evaluated

- Factors to consider in the determination as to whether the certifying organization or corporate "sponsor" of the work place learning is a willing and able partner in the evaluation process

- Current education institution processes and other recognized organizations (e.g. ACE) processes for evaluation for academic credit

- Other possible methods to evaluate for certifications and workplace training for academic credit

Each of the above factors resulted in a SWOT that will allow for replication of the processes. For example, in defining best practices in determining which certification or training should be evaluated and whether the certifying organization or corporate sponsor is a willing participant, the following questions were found to be important considerations:

- Strengths and Weaknesses:

  o Industry recognition of the certification or workplace acceptance and expectation vis-à-vis training

  o Alignment with industry sector or workplace recognized career paths and job titles

  o Past, current and future expectations re life span of certification or workplace training

  o Interest in evaluation by certifying organization or corporate sponsor of workplace training

  o Alignment with education institution's programs and strategic initiatives

- Threats and Opportunities

  o Viability of certifying organization or corporate sponsor of workplace training

  o Standing within industry sector

  o Competitive certifications

  o Current and continuing demand for certification or workplace training

Teams will report out on the certifications and/or workplace trainings they ultimately chose to evaluate, how the choices were made, how the evaluation process(es) were determined, and the results of the evaluation. In addition, the teams will report out on recommendations that will allow other education institutions to replicate the methods and processes chosen to ultimately make determinations as to viable pathways.

Attached team reports provide the basis for the reporting out that will be shared with the C-BEN board, at CBExchange, and specifically with Lumina. A summary of findings aligned with objectives three and four is as follows:

SECTOR ONE: MANUFACTURING

This team considered the APICS certifications, MSSC Manufacturing Skills, and the John Deere Accelerated Welding Certificate. Prior to evaluating these certifications and work based certificate, the team considered several other options but found that they were not viable for various reasons noted in their reporting. These credentials were aligned with participating university's programs in order to establish guaranteed pathways. Alignment processes were modeled on the Brandman process, other established university processes, a state Gold Standard list maintained by Florida and ACE processes.

SECTOR TWO: INFORMATION TECHNOLOGY

This team considered cybersecurity pathway possibilities. Ultimately, the team determined that viable options existed in the CompTIA entry level certifications and through the framework established by the National Center of Academic Excellence in Cyber Defense. As did other teams, this team considered various certifications and trainings for review and found some initially considered would not result in a clear pathway or roadmap to an end goal that would include a degree or other credential. This team reached an outcome that included a pathway map to indicate how cybersecurity certifications may align with core cybersecurity academic program requirements at the associate or bachelor level. The map also indicates the types of major employers seeking industry certified applicants, top technical and infrastructure service providers and top industry recognized certification providers. This overlay provides credibility to the reasoning behind the certification – university program alignment process.

SECTOR THREE: HEALTHCARE

The healthcare sector team, after review of several possible certifications and work based learning opportunities, found the most viable option for a pathway is American Red Cross' Certified Nursing Assistant (CNA) program. Each of the participant universities assessed their unique opportunity to align CNA with the competencies within one or more of their own healthcare programs in order to set a designated pathway.

SECTOR FOUR: SERVICE SECTOR

The Service Sector team also reviewed several certifications and work based learning options and found the Western Association of Food Chains (WAFC) retail management certificate to be the most viable option for alignment of competencies between the WAFC certificate and university programs. The team utilized CACE standards, Brandman standards and ACE processes to evaluate the certificate's alignment.

All teams concluded with pathway(s) and processes thereto which can be replicated by other institutions of higher education. Minefields and recommendations are noted in the attached reports. Many of the teams noted that the ACE recommendations would be accepted outside of a separate university alignment process though the university alignment process, per the Brandman case study, could move general credit determinations forward to competency equivalencies which result in much better alignment with requirements toward degree completion.

SECTOR ONE:
ADVANCED MANUFACTURING

COLLABORATORY MEMBERS / ACADEMIC OFFERINGS

Naomi Boyer
With over 20 years of higher education and K-12 experience, Dr. Naomi R. Boyer, President and Founder of NOME, LLC, is an internationally recognized educational strategist and innovative leader with a passion for educational transformation. Her work focuses on positively impacting regional economic vitality through a dynamic talent pipeline. She recently joined Education Design Lab as a Designer of Digital Credential Products and facilitates the dialogue between educational institutions, industry, the Lab and product vendors to identify solutions that support the successful deployment and scaling of the 21st Century Skills Badges. Dr. Boyer has national experience on the creation and implementation of competency-based education initiatives and worked locally to develop a collaborative, cross-institutional micro-credentialing system to address the industry expressed need for employability skills. She participates and leads many Boards and committees targeting education, workforce development, and community impact. In addition, Dr. Boyer maintains research and publication on the topics of self-directed learning, faculty technology professional development, and personalization of instruction.

Chris Carlson
I have been in the educational field for approximately 30 years instructing in formal and informal settings through-out my career at various community colleges in Illinois and Iowa, Trade Organizations, and Industry. In conjunction with my academic work I have worked as a Mechanical contractor in Northwest Illinois. After earning a BS from Western Illinois University I went onto obtain my MS in Industrial Management with the field of study being Engineering and Engineering Technology from Northern Illinois University. I earned my Doctorate in Educational Technology from the Department of Education, Technology, Research and Assessment at Northern Illinois University. I have been involved in curriculum design and implementation my entire working career focusing on authentic competencies to promote learning in Industry. I am currently the district wide Dean of CTE at Northeast Iowa Community College (NICC).

Mori Toosi
Mori Toosi, Ph.D., CMfgE. Director, Engineering Technology, Polk State College, Florida.
At Polk State College, both two-year, and four-year degrees offered, but Polk State is predominantly a two-year degree public higher education institution. Related degree offered; AS Degree in Engineering Technology with two specializations; Advanced Manufacturing, and Mechanical Design & Fabrications.

Mori Toosi has 35 years experiences in higher education, thirty-one years as full professor, teaching both mechanical and manufacturing engineering related courses at Murray State University, and Eastern Illinois University, and four years as director for engineering technology at Polk State College. He is certified manufacturing engineer. He has been CO-PI for a few Lumina Foundation grant related to competency education, and credentialing. He is currently CO-PI on an ATE NSF grant dealing with preparing simulations for both manufacturing and electric power related courses.

Ricardo Lorenzana
As Dean of Brandman University's School of Extended Education, Ricardo Lorenzana is never satisfied with the status quo and works to make "continuous process improvement" not just a mantra but the normal way of doing business. Responsible for supporting employers and employees through continuing and professional education, his ultimate goal is to increase student access to higher education by meeting learners wherever they are in their learning journey.

Ricardo holds a B.A. in Economics from the University of California, Irvine with a minor in management and an M.B.A. from the University of Hawai'i.

CERTIFICATIONS/TRAININGS REVIEWED AND JUSTIFICATIONS

PROCESS FOR CERTIFICATION/TRAINING DETERMINATION

The Advanced Manufacturing team began with the experiences of the participating members and the industry certifications that were in place within their individual institutions. In addition, current practice, research reports, and industry documentation was reviewed to substantiate the direction. Interestingly, beyond a variety of industry certifications in this field, there is also a differentiation between aspects of advanced manufacturing and supply chain and logistics. Given the interdisciplinary nature and extensive expertise across both the advanced manufacturing and supply and logistics of the team an inclusive approach was utilized to identify multiple certifications to attend to the manufacturing product creation to market pipeline. The disciplines of advanced manufacturing and automation tend to be developed into academic programs that are distinct from supply chain management; however, in the workplace, the skill set for manufacturers often combines "holistic knowledge-based manufacturing and the connected supply chains"[1]. This point is further substantiated as the "changes in consumer demand, the nature of products, the economics of production, and the economics of supply chain have led to a fundamental shift in the way companies do business"[2]. To account for the current models of a product ecosystem, the Advanced Manufacturing team has embraced a more comprehensive and representative approach in their reported work in this document.

Initially, the team utilized the report, "Examining the Quality, Market Value, and Effectiveness of Manufacturing Credentials in the United States"[3] published by Workcred in partnership with the National Institute of Standards and Technology (NIST) and Hollings Manufacturing Extension Partnership (MEP) to determine which credentials were of value to the Advanced Manufacturing industry. The report analyzed the responses of 945 individuals from the manufacturing industry, "representing a wide range of manufacturing sectors, facility sizes, geographic regions, and job roles" (p.6). Using the table of the "Most Commonly Cited Credentials Identified in the Survey According to Facility Size" (p.22), the group decided to focus on supply chain credentials that represented competencies that team members had familiarity.

Specifically, two Association for Supply Chain Management (APICS) supply chain certifications were identified by the report multiple times for small, medium, and large facilities. The two certifications were: **Certified in Supply Chain Management (CSCP)** and **Certified in Production and Inventory Management (CPIM)**. We later added certifications that represented the local needs, geographic certifications of value, and expanded to include advanced manufacturing certificates, inclusive of targeted skills such as welding, to incorporate the full product manufacturing to market ecosystem. Each participating team member organizational effort with the industry certifications is noted below:

Brandman University was already working with APICS to develop, deliver, and articulate the two certifications, which lent well to the goals of the collaboration.

Northeastern Iowa Community College (NICC) has academic, non-academic and career pathway certificates currently in place and being developed as industry demands. NICC also develops career academies in the high schools to channel students into welding, auto, diesel, advanced manufacturing and other professions. John Deere is a program partner on an accelerated welding certificate to train welders, which aligns to their industry needs. The program is time intensive, which meets 144 total hours over six weeks with scheduled meeting times Monday-Thursday, 8:30-2:30.

Polk State College reviewed twenty-seven (27) industry certificates related to manufacturing, that are identified as Gold Standard by the Department of Education in the state of Florida. (The related **Gold Standard**). The purpose of this review was to identify:
1. The industry certificates that have been validated and accepted for transfer credits toward degree completion, by other higher education institutions in the United States.
2. And establish nationwide articulation protocols, defining a common number of transfer credit hours for each industry certificate, and for each identified related academic degree program. The well-known college/university 2+2 (Associate-Bachelors) rule is an accepted United States model that has been implemented nationwide. To validate the credibility there is importance in working toward standardized transfer credit hour(s) for industry certifications as they articulate into different types of academic degree programs.

CERTIFICATIONS NOT CHOSEN AND JUSTIFICATION

Project Management Professional Certificate (PMP), Project Management Institute (PMI), Supply Chain Pro (SCPro), Certified Supply Chain Management Professional (CSCMP), Lean Six Sigma Yellow Belt, MSSC-CLT, and OSHA 10.

The above project management certifications were cited by regional members of the Council of Supply Chain Management Professionals, at a symposium hosted in Central Florida in the Spring, 2019. The selected certifications were also noted by symposium participants; however, those above were not identified by the Advanced Manufacturing team. The lack of institutional experience, faculty comfort, and local industry alignment lead the team to target the certifications noted in the first response.

Certifications that are not nationally recognized, nor related to the curriculum and skills training of manufacturing engineering design and/or manufacturing production (or supply chain), were excluded.

Due to team member's lack of experience, regional geographic employer needs, industry trends, and academic program constraints the following certifications were not selected for inclusion in this project despite alignment to the overall theme capturing the product development to market life cycle.

Themanufacturinginstitute.org:
- ACT (National Career Readiness Institute)
- MSI (Manufacturing Skills Institute)
- ISA (International Society of Automation)
- NADCA (North American Die Casting Association)
- SME (Society Manufacturing and Engineers)
- APICS (Association for Operations Management)

Certifications:
- AWS—American Welding Society
- NISSC

CERTIFICATION CHOSEN AND JUSTIFICATION

The institutions represented in this committee review offer the certifications noted below to align to the industry needs and the geographic areas.

Advanced Manufacturing (Includes Welding)
- OSHA 10
- MSSSC-CPT
- SolidWorks
- Autodesk
- NIMS
- OSHA10

Supply Chain Management and Logistics
- CSCP
- CPIM

To Market Busines
- Outside the scope of this project

ADVANCED MANUFACTURING

Curriculum content both theoretical, and hands-on training segments of each certificate listed under the Florida "Gold Standard", have been created and maintained/updated based on economic need/high wage, and workforce skills required, based on industry identified credentials needs. Several factors are considered such as: performance and students' success rates; capital investment recovery; and feedback received from both industry advisory boards and (CAPE) Career and Professional Education members.

The image below describes industry certification data for Florida collected during 2007-8 to 2016-17 academic years.

An example of the available data regarding rate of return on capital investment and productivity is **noted in this linked document**, which provides CAPE Industry Certification Funding List Pass Rate by "Title" during the 2015-18 academic years. Approximately 71.6% of 114,420 students who enrolled in courses and took exams relative to industry certifications passed the requirements.
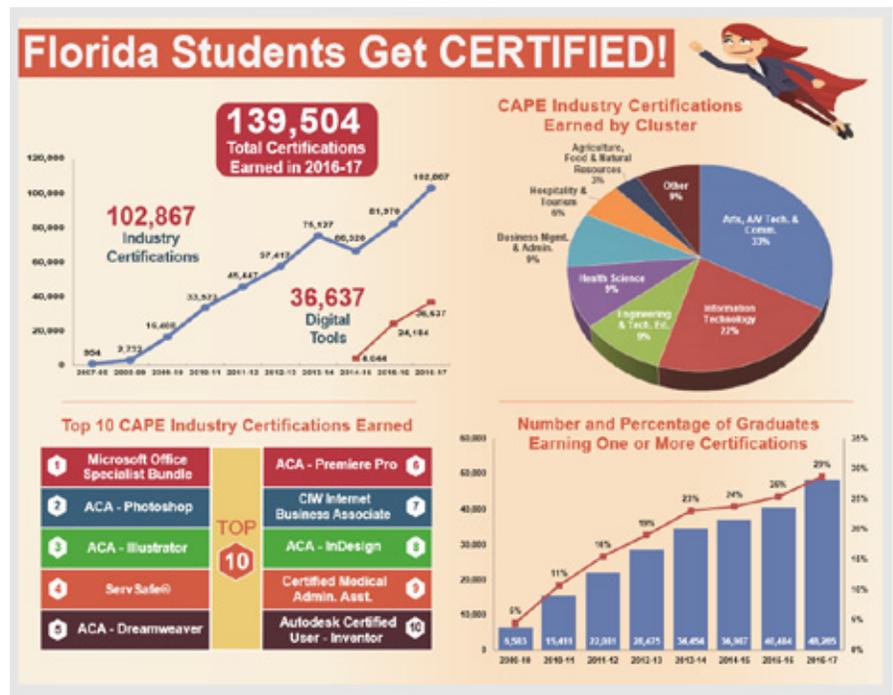
SAFETY

Safety is a main concern in any shop. For the NICC training the students are required to complete the OSHA 10 card. Safety applies to both advanced manufacturing and supply chain management/logistics and was embedded and analyzed with reference to a welding program that targets manufacturing skills for John Deere.

SUPPLY CHAIN MANAGEMENT AND LOGISTICS

Certified in Supply Chain Management (CSCP)
Certified in Production and Inventory Management (CPIM)

Both industry certifications are offered by APICS and were identified by the report "Examining the Quality, Market Value, and Effectiveness of Manufacturing Credentials in the United States" published by Workcred in partnership with the National Institute of Standards and Technology (NIST) and Hollings Manufacturing Extension Partnership (MEP)3

ORGANIZATION/CERTIFICATION/TRAINING DESCRIPTION

CERTIFYING ORGANIZATION DESCRIPTION

Advanced Manufacturing
A. MSSC Manufacturing Skills Standard Council; MSSC-CPT
    https://www.msscusa.org/certification/production-certification-cpt/
B. SolidWorks
    https://www.solidworks.com/sw/support/mcad-certification-programs.htm
C. Autodesk
    https://www.autodesk.com/education/home
D. National Institute Metalworking Skills NIMS
    https://www.nims-skills.org/

Supply Chain Management
E. APICS
    www.apics.org
F. APICS is now an arm of the Association for Supply Chain Management.
    www.ascm.org

APICS/ASCM maintains a head office Chicago, IL and has hundreds of local chapters throughout the world, which serve as the main distributors of the certification trainings. The association also maintains over 200 student chapters at colleges and universities.

Safety
A. **CareerSafe OSHA 10**
    The OSHA 10 card is the recognized credential for the local manufacturers. Manufactureres feel this credential provides enough of a base for individuals entering the workforce. It provides a good starting point to build upon and add their own safety concerns.

PARTNERSHIP

Brandman has a current agreement with APICS that allowed us to develop and offer exam preparation courses online for the CPIM and CSCP. Currently there are only two other online providers for this curriculum: Fox Valley Technical College and California State University, Dominguez Hills.

APICS Academic Partners- **http://www.apics.org/partners/icpapp/academic-partner**
The courses that are provided to educational institutions complement existing curriculum and programs of study and target the core competencies of supply chain.

Polk State College
Autodesk provides all of their available CAD Computer Aided Drafting software free of charge to all students and faculty enrolled in engineering technology related courses. No annual fee for the institution, but students pay for certificate examinations.

SolidWorks, provides 45 seats/station of all of their available software to ET students and faculty for annual license fee of $1,990.00. Certification examinations are free of charge for both students and faculty.

Manufacturing Skills Standards Council, MSSC has recognized Polk State College as an official site for training and authorized proctoring MSSC-CPT exams. No annual fee involved, and students pay for examinations.

DETAILED DESCRIPTION OF CERTIFICATION

Brandman- (Curriculum Bridging Documents- CPIM and CSCP)
Certified in Production and Inventory Management (CPIM)
The CPIM Learning System from APICS is an online and interactive exam preparation guide inclusive of reading assignments, interactive study tools, and assessments. The system is only available through secure log in through the APICS portal. Access was provided as an academic partner to the system.

There are two (2) exams that learners must successfully pass to earn the CPIM certification. Though not required, all learners take an exam preparation course that typically takes 60 hours to complete part one and 90 hours to complete part two for a total of 150 contact hours.

Certified in Supply Chain Management (CSCP)
The CSCP Learning System from APICS is an online and interactive exam preparation guide inclusive of reading assignments, interactive study tools, and assessments. The system is only available through secure log in through the APICS portal. Access was provided as an academic partner to the system.

Polk State College
A.   MSSC Manufacturing Skills Standard Council; MSSC-CPT
       https://www.msscusa.org/certification/production-certification-cpt/

The Manufacturing Skill Standards Council (MSSC), a 501(c)3 non-profit, is an industry-led, training, assessment and certification system focused on the core skills and knowledge needed by the nation's front-line production and material handling technicians. The nationwide MSSC System, based upon industry-defined and federally endorsed standards, offers both entry-level and incumbent workers the opportunity to demonstrate that they have acquired the skills increasingly needed in the technology-intensive jobs of the 21st century. MSSC offers two certifications for this workforce: (CPT), and (CLT)The Manufacturing Skill Standards Council (MSSC), a 501(c)3 non-profit, is an industry-led, training, assessment and certification system focused on the core skills and knowledge needed by the nation's front-line production and material handling technicians. The nationwide MSSC System, based upon industry-defined and federally endorsed standards, offers both entry-level and incumbent workers the opportunity to demonstrate that they have acquired the skills increasingly needed in the technology-intensive jobs of the 21st century. MSSC offers two certifications for this workforce: (CPT), and (CLT).

CERTIFIED PRODUCTION TECHNICIAN (CPT)
The CPT Certification addresses the core technical competencies of higher skilled production technicians in all sectors of manufacturing. MSSC awards certificates to individuals who pass any of its Production Modules: Safety; Quality Practices & Measurement; Manufacturing Processes & Production; Maintenance Awareness; and Green Production and a full Certified Production Technician (CPT) Certification to those who pass all four original modules (NOTE: At this time, Green is not a requirement for full CPT certification).

DESCRIPTION
The purpose of the Certified Production Technician (CPT) program is to recognize through certification individuals who demonstrate mastery of the core competencies of manufacturing production at the front-line (entry-level through front-line supervisor) through successful completion of the certification assessments. The goal of the CPT certification program is to raise the level of performance of production technicians both to assist the individuals in finding higher-wage jobs and to help employers ensure their workforce increases the company's productivity and competitiveness.
The CPT program consists of five individual certificate modules: Safety; Quality Practices & Measurement; Manufacturing Processes & Production; Maintenance Awareness and Green Production. Candidates must earn the first four certificates to receive the full CPT certification. (Note: At this time Green is not required for full-CPT certification.)

CERTIFIED LOGISTICS TECHNICIAN (CLT)
The CLT Certification addresses the core technical competencies of higher skilled, front-line material handling and distribution technicians in all supply chain facilities: from factories to warehouses, distribution centers and transporters. MSSC awards the foundational-level Certified Logistics Associate (CLA) certificate and the mid-level Certified Logistics Technician (CLT) certification. CLA is a prerequisite for CLT.

CASE STUDY

As part of the Gold Standard, MSSC-CPT certificate articulates in different degree program and with different credit hours value;
 15 credit hours toward AS Engineering Tech.
6 credit hours toward AS Electronics Engineering Tech.
9 credit hours toward AS Manufacturing Tech.

SOLIDWORKS

https://www.solidworks.com/sw/support/mcad-certification-programs.htm

Parent company;
Dassault Systèmes provides business & people with 3DEXPERIENCE universes to imagine sustainable innovations capable of harmonizing product, nature and life. SolidWorks is a **solid modeling computer-aided design** (CAD) and **computer-aided engineering** (CAE) **computer program** that runs on **Microsoft Windows**. SolidWorks is published by **Dassault Systèmes**. According to the publisher, over two million engineers and designers at more than 165,000 companies were using SolidWorks as of 2013.[2]

SOLIDWORKS, offers many different curriculum of study with as many as related certifications.
Certificates related to Manufacturing is highlighted from the complete list of certificates offered by SOLIDWORKD, and one specific (**CSWA - Mechanical Design - Academic Version**) is identified by the FLDOE with articulated credit hours toward AS in Engineering Technology Degree program with Specialization in Mechanical Design & Fabrication.

CSWE - Mechanical Design

A Certified SOLIDWORKS Expert is someone who easily demonstrates the ability to utilize advanced functions and features to solve complex modeling challenges.

CSWE-Simulation

The Certified SOLIDWORKS Expert – Simulation (CSWE-S) certification tests your mastery of all the analysis tools available in SOLIDWORKS Simulation Premium. It demonstrates your ability to utilize advanced analysis tools in stress, contact, thermal, frequency, nonlinear, and dynamic studies.

CSWA - Mechanical Design

As a Certified SOLIDWORKS Associate (CSWA), you will stand out from the crowd in today's competitive job market.

CSWA - Mechanical Design - Academic Version

As a Certified SOLIDWORKS Associate - Academic (CSWA - Academic), students will demonstrate their expertise with SOLIDWORKS 3D solid modeling software, design concepts, and sustainable design, giving them a competitive edge in today's job market.

CSWP - Mechanical Design

A Certified SOLIDWORKS Professional **is an individual who has successfully passed our advanced skills examination.**

CSWP - Mechanical Design - Academic Version

Certified SOLIDWORKS Professional - Academic (CSWP - Academic) certification is intended for a student with a minimum of 1 to 2 years of SOLIDWORKS experience and advanced knowledge of engineering practices.

Platform Explorer Associate

The completion of the 3DEXPERIENCE Platform Explorer Associate Exam exam shows that you have successfully demonstrated your basic knowledge of the 3DEXPERIENCE Platform.

CPPA

A Certified PDM Professional Administrator (CPPA) is an individual who has successfully passed an advanced examination in SOLIDWORKS PDM Professional administration skills and is ready to manage a SOLIDWORKS PDM Professional implementation on behalf of his or her company.

CSWP-MBD

The completion of the Certified SOLIDWORKS Professional Model Based Design (CSWP-MBD) exam shows that you have successfully demonstrated your ability to use SOLIDWORKS MBD functionality and tools.

CSWP-CAM
The completion of the Certified SOLIDWORKS Professional CAM (CSWP-CAM) exam shows that you have successfully demonstrated your ability to use SOLIDWORKS CAM functionality and tools.

CSWA-Additive Manufacturing
A Certified Additive Manufacturing Associate is someone who possesses the basic knowledge of today's 3D printing market.

CSWA-Electrical
The Certified SOLIDWORKS Associate - Electrical (CSWA-E) certification shows that you have successfully demonstrated an understanding of the principles of SOLIDWORKS Electrical functionality and Electrical Engineering principles.

CSWA—Sustainability
The completion of the Certified SOLIDWORKS Associate Sustainability (CSWA-Sustainability) exam shows that you have successfully demonstrated your understanding of the principles of environmental assessment and sustainable design.

CSWA-Simulation
The Certified SOLIDWORKS Associate - Simulation (CSWA-Simulation) certification indicates a foundation in and apprentice knowledge of demonstrating an understanding in the principles of stress analysis and the Finite Element Method (FEM).

CSWP-Simulation
The Certified SOLIDWORKS Professional - Simulation (CSWP-Simulation) exam tests your understanding of SOLIDWORKS Simulation tools and simulation in general.

CSWPA-Sheet Metal
The completion of the Certified SOLIDWORKS Professional Advanced Sheet Metal (CSWPA-SM) exam shows that you have successfully demonstrated your ability to use SOLIDWORKS Sheet Metal tools.

CSWPA-Weldments
The completion of the Certified SOLIDWORKS Professional Advanced Weldments (CSWPA-WD) exam proves that you have successfully demonstrated your ability to use the SOLIDWORKS tools for Weldments.

CSWPA-Surfacing
The completion of the Certified SOLIDWORKS Professional Advanced Surfacing (CSWPA-SU) exam shows that you have successfully demonstrated your ability to use SOLIDWORKS Advanced Surfacing tools.

CSWPA-Mold Making
The completion of the Certified SOLIDWORKS Professional Mold Making (CSWPA-MM) exam shows that you have successfully demonstrated your ability to use SOLIDWORKS Mold Tools functionality with Mold Making Industry knowledge.

CSWPA-Drawing Tools
The completion of the Certified SOLIDWORKS Professional Advanced Drawing Tools (CSWPA-DT) exam proves that you have successfully demonstrated your ability to use the tools found in the SOLIDWORKS Drawing environment.

CASE STUDY

As part of the Gold Standard, CSWA - Mechanical Design - Academic Version certificate articulates 3 credit hours toward both AS Engineering Technology degree, and AS Manufacturing Technology degree.

AUTODESK

https://www.autodesk.com/education/home

Autodesk, Inc. is an American multinational software corporation that makes software services for the architecture, engineering, construction, manufacturing, media, education, and entertainment industries. Autodesk is headquartered in San Rafael, California, and features a gallery of its customers' work[2] in its San Francisco building. The company has offices worldwide. Its U.S. locations are Northern California, Oregon, Colorado, Texas, Michigan, New England, New Hampshire and Massachusetts. Its Canada offices are located in Ontario, Quebec, and Alberta.

The company was founded in 1982 by John Walker, who was a coauthor of the first versions of AutoCAD. AutoCAD, which is the company's flagship computer-aided design (CAD) software and Revit software are primarily used by architects, engineers, and structural designers to design, draft, and model buildings and other structures. Autodesk software has been used in many fields, and on projects from the One World Trade Center[3] to Tesla electric cars.[4]

Autodesk became best known for AutoCAD, but now develops a broad range of software for design, engineering, and entertainment—and a line of software for consumers, including Sketchbook. The company makes educational versions of its software available at no cost to qualified students and faculty through the Autodesk Education Community, and also as a donation to eligible nonprofits through TechSoup Global. The manufacturing industry uses Autodesk's digital prototyping software—including Autodesk Inventor, Fusion 360, and the Autodesk Product Design Suite—to visualize, simulate, and analyze real-world performance using a digital model in the design process.[5] The company's Revit line of software for building information modeling is designed to let users explore the planning, construction, and management of a building virtually before it is built.[6]

Autodesk's Media and Entertainment division creates software for visual effects, color grading, and editing as well as animation, game development, and design visualization.[7] 3ds Max and Maya are both 3D animation software used in film visual effects and game development.

CASE STUDY

As part of the Gold Standard, Any of Autodesk User Inventor or Autodesk Professional Inventor certificates articulates 3 credit hours toward AS Engineering Technology degree completion.

NATIONAL INSTITUTE METALWORKING SKILLS NIMS

https://www.nims-skills.org/

NIMS sets industry skills standards, certifies individual skills against the standards, accredits training programs that meet NIMS quality requirements, and promotes innovative solutions, such as competency-based apprenticeship, to connect credentialed and work-ready individuals with employers.

Our mission is to provide world-class, industry-developed and validated, competency-based skill standards, credentials, and training frameworks that enable collaboration between educators, manufacturers, policy makers, and community-based organizations in a joint effort to increase the skills of the manufacturing workforce.

NIMS offers many curriculum and training in metal related operation and certificates for each.

CASE STUDY

Following NIMS certificates are identified by FLDOE for articulation into both AS Engineering Technology, and AS Manufacturing Technology degree programs. Transfer credit hours value for certificates are not the same for both degrees.
NIMS Machining Level I - CNC Milling: Programming Setup & Operations
  1 transfer credit for ET   3 transfer credits for Mfg. Technology
NIMS Machining Level I - CNC Turning: Programming Setup & Operations
  1 transfer credit for ET   3 transfer credits for Mfg. Tech.
NIMS Machining Level II - Manual Milling Skills II
  0 transfer credit for ET   3 transfer credits for Mfg. Tech.

NIMS Machining Level I - Turning Operations: Turning Between Centers
        0 transfer credit for ET   3 transfer credits for Mfg. Tech.
NIMS Machining Level I - Turning Operations: Turning Chucking Skills
        O transfer credit for ET   3 transfer credits for Mfg. Tech.
NIMS Machining Level II - Grinding Skills II
        2 transfer credits for ET   3 transfer credits for Mfg. Tech.
NIMS Machining Level I - Drill Press Skills I
        0 transfer credit for ET   3 transfer credits for Mfg. Tech.

    NIMS Machining Level I - CNC Milling: Programming Setup & Operations (NIFMS001) to Engineering Technology A.S. Degree (PDF)

    NIMS Machining Level I - CNC Milling: Programming Setup & Operations (NIFMS001) to Manufacturing Technology A.S. Degree (PDF)

    NIMS Machining Level I - CNC Turning: Programming Setup & Operations (NIFMS002) to Engineering Technology A.S. Degree (PDF)

    NIMS Machining Level I - CNC Turning: Programming Setup & Operations (NIFMS002) to Manufacturing Technology A.S. Degree (PDF)

    NIMS Machining Level II - Manual Milling Skills II (NIFMS007) to Manufacturing Technology A.S. Degree (PDF)

    NIMS Machining Level I - Turning Operations: Turning Between Centers (NIFMS008) to Manufacturing Technology A.S. Degree (PDF)

    NIMS Machining Level I - Turning Operations: Turning Chucking Skills (NIFMS010) to Manufacturing Technology A.S. Degree (PDF)

    NIMS Machining Level II - Grinding Skills II (NIFMS012) to Engineering Technology A.S. Degree (PDF)

    NIMS Machining Level II - Grinding Skills II (NIFMS012) to Manufacturing Technology A.S. Degree (PDF)

    NIMS Machining Level I - Drill Press Skills I (NIFMS013) to Manufacturing Technology A.S. Degree (PDF)

NORTHEASTERN IOWA COMMUNITY COLLEGE

NICC Welding Curriculum
Currently NICC is involved in NSF grant for advanced manufacturing. NICC views advanced manufacturing from the broad spectrum of all processes involved in advanced manufacturing including but not limited to welding. CNC, Engineering Technology, Industrial Maintenance, etc. The welding certificate used in this study is a case study of specific industry specific competencies dictated by local manufactures. The competencies in the curriculum used ladder directly into the core academic classes and can be used to fulfill the nine month welding diploma.

CERTIFICATION ALIGNMENT PROCESS/ PATHWAYS

Brandman University utilizes a documented process that allows for outside learning to be evaluated by faculty members with subject matter expertise. The purpose of this process is to propose curriculum that will be bridged from training/education and examinations (i.e., certification examinations) that does not currently carry academic credit to credit opportunities and competencies within Brandman University. The steps of the process are as follows:

Description and Rationale needed to justify the resources to move forward. This section addresses the details of the project as well as the partner organization.

Review and Recommendation
>C1 - Curriculum Review for training/education which includes discussion academic faculty review of curricular materials as well as details of curriculum processes and implementation
>
>or
>
>C2 - Learning Outcomes (KSAs) & Assessment Review which includes requirements for an examination, preparation options, description of the examination, and information about the test setting, pass score, and psychometrics
>Credit Hour Calculation which requires information about hours devoted to direct and indirect instruction for the C1 Curriculum Review only
>Credit Recommendation which includes the level of learning, the method of bridging, and the course equivalency
>Review and Recommendation
>>Curriculum Team Discussion
>>Dean Review
>>Faculty Evaluator Recommendation
>>Review by Office of Institutional Assessment and Planning
>>Review by Academic Programs Services department
>>Submission to Deans' Council
>>Deans' Council Discussion
>>Recommended Outcome

Polk State College
All certificates are evaluated at the state level and with committee members from all degree program directors/coordinators, and the state program supervisor. An appropriate range of articulation credits are defined by the Florida group. Certificates do not carry the same articulation credit hours in all academic degree programs, and variations are depending on content and skills cross referencing between the certificate and the degree program. Example NIMS Machining Level I CNC Turning: Programming Set Up & Operations will have only 1 credit hour articulated in AS engineering technology degree program, specialization Advanced Manufacturing. While the same certificate carries 3 credit hours in AS degree in Manufacturing Technology. Engineering Technology is applied engineering and includes applied design, programming, troubleshooting, whereas *manufacturing technology* prepares a skilled workforce in the role of machine operator in *manufacturing productions.*

While each institution is obligated to accept a minimum number of credits for each certificate counting toward completion of certain degree program, the institutions may recognize additional credits. Since the course contents at each institution are varied and not uniform, each institution is obligated to perform course content mapping, extract related competencies, and then cross reference with competencies of the certificate, to identify appropriate courses for articulation. The defined articulations are then processed through the academic quality councils within the individual institutional structures.

The statewide committee recommends after a periodic review (Annual meetings, but once every 3 years review rotation) of all related certificates and modify/update both accepted and none-accepted list allowing for a continual improvement process.

Northeastern Iowa Community College
Certificates and pathways to help meet Industry needs are developed by the non-academic side of NICC. The process includes meeting with area businesses and addressing their training needs. Once this occurs the non-academic side will create a pathway utilizing academic courses which will transfer to the academic side for credit. The role of the instructor on the academic or nonacademic side include teaching in similar fashion to obtain the course learning objectives.

PATHWAYS CREATED AT PARTICIPANT UNIVERSITIES

Brandman University-As a result of the bridging process, both the CPIM and CSCP certifications are linked to academic credit via Brandman University course equivalencies. The CPIM certification is equivalent to MGTU 320 – Strategies across the Supply Chain. The CSCP certification is equivalent to MGTU 321 – Project Management and Supply Chain Leadership. Each course carries three academic credits toward the Bachelor's in Business Administration with a Supply Chain Emphasis. Students who hold one or both of the certifications are eligible to waive these courses, thereby lessening the total number of credits needed to graduate.

Alternatively, a student pursuing the BBA with Supply Chain Emphasis may seek to attain either or both of the certifications to 1) waive the courses, and 2) graduate with an industry backed certification to increase employability.

Northeastern Iowa Community College

Certificates and pathways developed at NICC on the non-academic are required to mirror the credit side programs. The certification earned by the students in the pathway allows the student to gain academic credit, to obtain credit the student must:
Successfully complete the non-credit course.
Meet the minimum program grade requirements for program progression.
Contact the advisor to verify the non-credit coursework has been documented in your academic record.

Appendix 1: Welding Crosswalk
Appendix 2: CNC Crosswalk

Polk State College

Polk State College utilizes three different paths articulating industry credentials into the degree and/or College Credit Certificate programs.

1. Pathway for industry certificates listed by FLDOE -Gold Standards. The Career Pathways Coordinator is responsible for creating and maintaining Polk State Career Pathway's Website – **www.polk.edu/pathways** - and maintain an updated Master Articulation List (this process is described below) for all CTE/Workforce articulations with Polk County School Board (local school district). In addition, the coordinator prepares marketing materials in partnership with Polk County School Board Workforce Education Division, to better market and reflect the "free credit" options that are available via career academy programs through articulated credit and CTE dual enrollment offerings. Brochure and Poster/Flyers can be seen at: **http://www.polk.edu/career-pathways/career-pathways-marketing/**

   Many certifications and licenses translate to college credit and can be applied towards an associate degree. The objective of industry certificate articulation is to assist students in earning a college degree faster, while working as a certified employee. Dual enrollment students also earn these credits by obtaining one or more industry certification or license. Credit is then granted for these credentials (stackable) and applied toward degree completion at no cost to the student.

   The State Board of Education has approved the listed Statewide Career and Technical Education Articulation Agreements "Gold Standard", which are based on industry certifications. This supports the Department's Next Generation Areas of Focus effort Number 3 – "to expand opportunities for post-secondary degrees and certificates." These agreements are intended to be a minimum guarantee of articulated credit and do not preclude institutions from granting additional credit based on local agreements. **CLICK HERE** to be directed to the Florida Department of Education's website to see a complete list of statewide certification articulations.

   Please note, Polk State College does not offer all of the degree programs listed in the Florida DOE website. The link below provides the master list of certifications that can earn college credit specifically to Polk State Associate in Science degree programs **https://www.polk.edu/wp-content/uploads/Certification-Articulations-Master-List-2019-20.pdf.**

   To update the Articulation Master List, each year, the Career Pathways Coordinator at Polk State College, communicates with all Program Directors, and Coordinators at Polk State, and provides an updated list of all programs offered by Polk School District leading to industry certifications. Each program director and/or coordinators are asked to review appropriate industry certifications and establish related articulated credits set by the FLDOE.

2. Pathway for credentialing apprenticeship programs offered in partnership between local industry, and Polk State Corporate College. If the apprenticeship program is approved by the FLDOE, the articulation process follows as the same for Gold Standards, and no further documentation is required. If the apprenticeship program is designed and conducted solely based on a unique need of a local

industry, then a unique method must follow several established rules and regulations to be creditable and valid to be transferable. Polk State College, and Mosaic Corporation have entered into two articulation agreements considering important factors as follows: A) All apprenticeship related lecture materials, exams, hands-on training with designated hours on each should be documented and officially submitted to the program director and/or department head for evaluation. B) Each apprenticeship segment and/or course will be mapped by the Polk State ET program director considering theory learned, skills gained, and grade level accomplished. Then, a comparison is made with existing Engineering Technology, A.S. program at Polk State College, to identify appropriate course equivalencies. C) Carnegie roles of lecture and lab and/or (OJT) On-Job-Training hours were and should be considered as part of the equation defining number of credits. D) Obtaining confirmation and consensus by other higher education institution in the state is required.

At least five other state educational institutions, who are offering the same degree program, should review and approve the process and articulated credits given. In the state of Florida all engineering technology directors meet twice a year at the annual ET Forum. On the agenda at the Forum is the opportunity to present any articulation related documents to the cadre of colleagues from across the state. In addition to ET directors, the FLDOE ET supervisor is present and provides necessary input and feedback.

OVERALL CONSIDERATIONS AND MINE FIELDS

MANUFACTURING-SUPPLY CHAIN CONSIDERATIONS:

1. Often, there is more than one industry certifying body in a given field. For supply chain, there are multiple certification granting organizations: The Institute for Supply Management (ISM), Council of Supply Chain Management Professionals (CSCMP), and APICS, which are just a few in the global marketplace. Though these bodies may have similar vocabulary and learning objectives, they may not necessarily be grouped in similar ways. Faculty who are evaluating for course equivalency must have a deep knowledge of the institutional course and whether or not it already aligns to a specific agency. This also makes it difficult for employers to keep track of the validity and "meaning" behind the different certifying bodies and individual certifications.
2. The local market of the institution of higher education must be considered. At the national level, the National Institute of Standards and Technology – Hollings Manufacturing Extension Partnership (NIST-MEP)3 report indicates that while many companies believe industry credentials are beneficial, there doesn't seem to be a clear indication as to which credentials are available or relevant (p.1).
3. Further outreach and data collection was conducted via an informal survey at a regional symposium of the Council of Supply Chain Management Professionals in the Spring, 2019. There was significant variance in the credentials reported as "of value" to local employers.
4. The "Manufacturing" sector landscape is not as clearly defined as other professions such as nursing, which relates to specific accepted skills and entry level expectations. Manufacturing and distribution includes a wide range of position descriptions and therefore a very broad range of associated industry certifications. It is important to be cognizant of which aspect of the product to market continuum being targeted by your employer partners and the specific job role to assure alignment with the appropriate academic program and skills framework.

CHALLENGES:

1. Existing faculty knowledge and expertise preferences may guide decisions rather than the industry sector being addressed. Mitigating internal resources with linkage and preparation for employment must be carefully considered.
2. The prevalence of professional chapters and associations in the region of delivery should be used as leverage to improve employer knowledge of credentials and industry certifications. There are times when employers are not aware or hiring with the most current credential opportunities in mind.
3. Students in the programs must be encouraged to assume a "professional" work environment attitude to be successful. It can be challenging to align the employment expectations to the student behaviors and attitudes.
4. The curriculum in these programs are often rigorous and require ongoing attention, which can be challenging to non-traditional learners. Without the appropriate supports, student lack of success may limit transition into work roles, thereby not fulfilling the talent pipeline expectation.
5. Facilitating ongoing faculty engagement and involvement with industry is critical to ensure that the curriculum remains current and responds to the local needs. The quick pace of technological change requires that faculty also remain up to date with their skills and connected to the ongoing changes of the workplace.

RECOMMENDATIONS

RECOMMENDATIONS FOR OTHER INSTITUTIONS SEEKING TO LEVERAGE INDUSTRY CREDENTIALS

See considerations above.

The APICS certifications had already been evaluated for academic credit by a third party, the National College Credit Recommendation Service. While this is an easier path to bridge outside learning, the recommendations are neither institution nor degree specific. The typical Brandman student already has many general education credits that they are transferring. A third-party recommendation will add to these credits. Though helpful, they are not necessarily as helpful as course equivalencies that apply directly to the desired degree program. This is why we chose to bridge the certifications specifically to the institutional degree program.

RECOMMENDATIONS FOR INDUSTRY CREDENTIAL GRANTORS

It is recommended by the participating members of this group that each State adopt a "Gold Standard" list that is described in the Florida description below to assist in the identification of certifications and frameworks of quality that colleges and universities can choose to implement at the local level to align with the regional workforce needs. Each articulation and industry certification should be cautiously and carefully reviewed for the number of credits that are awarded for the specific industry certification, as it relates the academic program.

California

Florida

A national "Gold Standard" list for industry certificates would be very useful for industry and training programs. The described process by the Florida Department of Education, which includes the formation of a committee with selected/elected subject-expert members to review, maintain, and modify the list periodically (with industry validation) would be essential. It is very important to identify applicable and measurable competencies related to each standard, as this allows for a common threshold for identifying what students know and can do upon completion of the industry certification.

It is further recommended that the aforementioned committee create a standard format for validating each certificate with transfer credit hour value for each and different degree program, based on national standards that can be established nationwide. Examples of Florida Statewide Articulation Agreements- Industry

Certification to AAS/AS Degree Programs can be found at this **site** and specific information relative to Manufacturing Industry Certification have been compiled in this **document**.

Iowa

Credentialing is required to properly train individuals to meet national and local needs. The current use of advisory committees in Iowa does help to develop appropriate competencies at the local level. The grantors of credentials need to understand that local demographics dictate the need. It is very possible that the needs in one area will not meet the needs in another area and this needs to be recognized. The local community colleges would be able to help develop the local needs to help develop the required competencies.

RECOMMENDATIONS FOR FUTURE FUNDING OR DEVELOPMENT

Funding to continue the work of identifying national protocols for industry certification acceptance, value, and validation would allow the team (and other Collaboratory 4 workgroups) to conduct more comprehensive research, and at annual meetings revisit, renew, and modify the list of acceptable industry certificates, with certain designated/allowed transfer credit hour.

The development of national standing committees to review appropriate certifications and credentials through an established cycle of updates, set priorities, and validate course credit to be awarded. Expanding the national dialogue of transfer credits between educational institutions with regard to industry certifications are critical to future alignment of workforce credentials.

The alignment of industry credentials is needed to meet the workforce needs. The development of credentials at the state level and comparisons will differ state to state. It has been made very clear to NICC through advisory meetings in Engineering Tech and other manufacturing sectors that the main concern is not national credentials but to meet the local workforce needs. However, we know that the use of stackable credentials is of value for the student. The state by state comparisons will lead to a more industry specific list which can be validated. The review should be done on an annual basis to keep current and relevant.

BEST USES OF THIS INFORMATION

Utilize the approved industry certificates, as a resource to evaluate local On-Job-Training, Industry certifications, stackable credentialing, and to learn from the best practices of other colleges and universities across the nation.

GENERAL RECOMMENDATIONS:

1. Programs and industry certifications must align to local employers, through official advisory boards, and economic development targeted sectors.
2. The programs, articulations, and industry certifications should satisfy accreditation requirements, match the mission of the educational institution, and meet state standards/guidelines.
3. The standards should be adopted at a statewide level to allow for transfer, quality assurance, and value to the industry certification articulation of credit.
4. Industry standards (state level frameworks and articulation lists) should be evaluated every three year by subject matter experts, with input from industry in that state.

REFERENCES

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3. Workcred. (2018). Examining the Quality, Market Value, and Effectiveness of Manufacturing Credentials in the United States. Retrieved from https://workcred.org/Documents/NIST-MEP-Report.pdf

List and Attach Appendices as appropriate (Links Embedded in the Document)

APPENDIX 1 WELDING CROSSWALK, NICC

ENTRY-LEVEL GAS METAL ARC WELDING (GMAW) STEEL CERTIFICATE 160 HOURS NONCREDIT TO CREDIT CROSSWALK

Certificate description:
The Entry Level GMAW certificate will teach students how to safely and effectively setup and MIG weld structural steel weldments. This program will stress principles of interpreting manufacturing blueprints, using basic measuring tools, and identifying weld symbols. Student will learn GMAW processes, principles, and benefits, while developing safe working habits with welding related equipment. At the conclusion of the program the student will be able to weld carbon steel in flat, horizontal, and vertical positions with .035 or .045 diameter wires to the following AWS standards:

CODE: D1.1
PROCESS: GMAW-S
GAS: 90/10
FILLER: ER70S-6 .035 or .045 wire
BASE: CARBON STEEL
POSITIONS: 1G, 2G, 3G, 1F, 2F, 3F
1/8"-3/4"

This program will be delivered and assessed in 3 modules of instruction. Soft skill building such as proper workplace behavior, timeliness, team building, and fiscal responsibility will not only be embedded throughout each of the program modules, but students will be enrolled in the Iowa Works Working It Out soft skills series where available.

Module 1: Welding Blueprint Reading (including weld symbols) 48 hours
Module 2: Weld Safety 16 hours
Module 3: Basic Gas Metal Arc Welding 96 hours

Non-Credit Certificate	Equivalent Credit Course(s)	Credit Hours *
Introduction to Welding Blueprint Reading 48 hours	WEL:110 Welding Blueprint Reading 16/32	2
Weld Safety 16 hours	WEL:228 Introduction to Welding, Safety, and Health of Welders 16/0	1
Basic Gas Metal Arc Welding 96 hours	WEL:433 Basic Gas Metal Arc Welding 16/80	3.5
160 contact hours	160 contact hours	6.5 credits total

*C- minimum required to receive credit Lecture/Lab

Entry-Level Welding (GMAW)
Course Hours
Module 1: Welding Blueprint Reading 48 hours
Module 2: Weld Safety 16 hours
Module 3: Basic Gas Metal Arc Welding 96 hours
Total Hours 160 hours
Six and one-half (6.5) credits from the Welding (GMAW) Career Pathway Certificate are transferable into the NICC Welding diploma program upon approval the college Registrar. Successful completion of each module is required to continue in program or receive college credit.

APPENDIX 2 CNC CROSSWALK, NICC

ENTRY LEVEL COMPUTER NUMERICAL CONTROL (CNC)
OPERATOR CERTIFICATE (148 HOURS)
NONCREDIT TO CREDIT CROSSWALK

Certificate description:

The fundamental principles and knowledge necessary to operate CNC machines are taught in our CNC lab, where a blend of classroom and hands-on experience keeps the learning focused on real, practical job skills. Students will begin by learning to use basic measuring tools, such as micrometers and calipers, and then reading and interpreting manufacturing-part blueprints. Student will learn how to safely and efficiently operate CNC mills and lathes, set tool and fixture offsets and use verified programs to build part projects on CNC machines. Finally, you will be introduced to G and M code programming for 2-axis CNC lathes and 3-axis CNC mills.

This program will be delivered and assessed in 7 modules of instruction. Soft skill building such as proper workplace behavior, timeliness, and fiscal responsibility will be embedded throughout each of the program modules. In addition, students will also be enrolled in the Iowa Works soft-skills program entitled Working it Out where available.

Module 1: Introduction to Precision Measurement and Inspection Fundamentals 32 hours
Module 2: Plant Safety 20 hours
Module 3: Basic CNC Mill Operation 20 hours
Module 4: Basic CNC Lathe Operation 20 hours
Module 5: Intro to CNC Mill Programming 16 hours
Module 6: Intro to CNC Lathe Programming 16 hours
Module 7: CNC Programming Lab 24 hours

ENTRY LEVEL COMPUTER NUMERICAL CONTROL (CNC)
OPERATOR CERTIFICATE (148 HOURS)

Non-Credit Certificate Module	Equivalent Credit Course	Credit Hours *
Introduction to Precision Measurement and Inspection Fundamentals 32 hours	MFG:161 Intro to Precision Measurement and Inspection Fundamentals 32/0	2
Plant Safety 20 hours	MFG: 187 Plant Safety 12/8	1
Basic CNC Mill Operation 20 hours	MFG:293 Basic CNC Mill Operation 12/8	1
Basic CNC Lathe Operation 20 hours	MFG:295 Basic CNC Lathe Operation 12/8	1
Intro to CNC Mill Programming 16 hours	MFG:345 Intro to CNC Mill Programming 16/0	1

Intro to CNC Lathe Programming 16 hours	MFG:344 Intro to CNC Lathe Programming 16/0	1
CNC Programming Lab 24 hours	MFG:346 CNC Programming Lab 8/16	1
148 contact hours	148 contact hours	8 credits total

*C- minimum required to receive credit Lecture/Lab

 Course Hours: 148

Introduction to Precision Measurement and Inspection Fundamentals 32 hours
Plant Safety 20 hours
Basic CNC Mill Operation 20 hours
Basic CNC Lathe Operation 20 hours
Intro to CNC Mill Programming 16 hours
Intro to CNC Lathe Programming 16 hours
CNC Programming Lab 24 hours
Total Hours 148 hours

Eight (8) credits from the CNC Operator Career Pathway Certificate are transferable into the NICC Computer Numerical Control (CNC) Machinist Technician diploma program pending approval by the College Registrar. Successful completion of each module is required to continue in program or receive college credit.

SECTOR TWO:
INFORMATION TECHNOLOGY

COMPETENCY-BASED
EDUCATION NETWORK

COLLABORATORY MEMBERS / ACADEMIC OFFERINGS

Jeanine Nagrod is Director of Thomas Edison State University's Office for Assessment of Professional and Workplace Learning, a unit dedicated to expanding adults' access to higher education by creating pathways from workplace and other non-college credited training to a college degree. Jeanine holds a Master of Labor and Industrial Relations from Rutgers, The State University of New Jersey and a Bachelor of Arts from Tufts University. During her 20-year career she has been a union organizer, strategic researcher, program director, and grant specialist. Before coming to Thomas Edison, Jeanine managed initiatives focused on the apprenticeship communities in Washington DC and New Jersey, including New Jersey Pathways Leading Apprentices to a College Education (NJ PLACE) aimed at bridging the divide between academia and apprenticeship, as well as youth-focused education and outreach initiatives. She has extensive experience working collaboratively with workforce development, two- and four-year colleges, labor unions and labor-management training funds.

THOMAS EDISON STATE UNIVERSITY OFFERS THE FOLLOWING PROGRAMS OF STUDY RELATING TO CYBERSECURITY:

- **Undergraduate Certificate in Cybersecurity**
- **Bachelor of Science in Cybersecurity**
- **Graduate Certificate in Cybersecurity – Critical Infrastructure**
- **MS in Information Technology with specialization in Cybersecurity – Critical Infrastructure**
- MS in Cybersecurity (expected January 2020)

Janet Staker Woerner, Ph.D. and Faculty Associate currently serves as the Online Curriculum Program Manager for Faculty Professional Development for Division of Continuing Studies at the University of Wisconsin-Madison. Janet received her Bachelor's degree in Political Science from Illinois State University and a Master's degree from Illinois Institute of Technology in Marketing/ E-commerce. She earned her doctorate from Walden University William Riley School of Education with an emphasis on technology use in the online environment. Janet brings extensive experience teaching and developing curriculum in the online environment as well as holding administration positions in the business area. Janet also has over 20 years' experience as a consultant/practitioner in the business area of strategic marketing and strategic planning.

She has been involved with digital credentialing since 2015 and her research stream has turned to competency based initiatives, social media, and artificial intelligence and how they align with her institution and new opportunities. Janet works extensively with business to support development of online courses and facilitator support for making the transition into the online environment.

DEGREES AND CERTIFICATES OFFERED AT UW-MADISON ARE AS FOLLOWS:

- **BA/BS in Computer Sciences**
- **Certificate in Computer Sciences** https://www.cs.wisc.edu/graduate/ms-and-phd-program/
- **Professional Master's Program (PMP)** and the **Professional Capstone Certificate Program**,
- UW Systems has a flex program as follows: https://flex.wisconsin.edu/

P. Pamela Holt, MET, is the Director of Curriculum, Instructional Support and Teaching and Learning Technology at Milwaukee Area Technical College. At MATC, she is leading efforts of innovation and continuous quality improvement to better serve students and faculty. Mrs. Holt brings a wealth of experience in the areas of curriculum, assessment and educational technology. Pam has been working with faculty to develop two programs using the CBE format (Welding and IT-Networking).
She will defend her doctoral dissertation in Curriculum, Teaching, Learning and Leadership at Northeastern University, October 2019. She received her Master's in Educational Technology from Boise State with a Masters Certificate in On-Line Learning for Adults. Prior to that, Pam earned her Bachelor's degree in Management of Informational Technology from Cardinal Stritch University.

MATC offers just over 180 career and technical programs in the form of academic pathways. These offerings range from certificates to associate degrees. MATC's School of Business includes at least 5 pathways in the information technology field including an **IT Computer Systems Security** associate degree and a fully online **network specialist associate** degree.

CERTIFICATIONS/TRAININGS REVIEWED AND JUSTIFICATIONS

PROCESS FOR CERTIFICATION/TRAINING DETERMINATION

Initially we reviewed IT program suggestions from discussions that occurred during the December 10, 2018 meeting. Originally we were reviewing data analytics as a possible program, however after review, several issues arose. We could not find a national certification that we could then work from. We conducted a general job search for this position and soon discovered that most introductory employees would need at a minimum, a bachelor's degree. We decided to consider another career direction. A search on ONet and Burning Glass was conducted to determine which programs in IT are in great demand. We found that cyber security ranked near the top. Next we researched national certifications and soon found that CompTIA offered one in cyber security. In addition, we searched job postings/openings and found that most careers in this area preferred the CompTIA designation and introductory positions were available for those who had earned an associates degree.

One of the exercises we completed was a SWOT analysis of the area of creating pathways aligned with competence education. In preparation for our work of exploring pathways, we concurred to assess the landscape in terms of a SWOT analysis: Strengths, Weaknesses, Opportunities, and Threats. In reviewing the latest literature on the topic area, we noted the following broad areas of importance in terms of a SWOT analysis. Much overlap exists between the four quadrants, and many of the elements intertwine. Hence, these elements must be treated as entangled, rather than standing alone.

One of the most important strengths of pathways is that they are a clear roadmap leading to an end goal, which could be the final degree or a certificate. According to Inside Higher Ed, many learners are confused about all the available options for their studies and providing a clear course of action, a pathway, may result in a higher completion rate. Too many options or electives may cause confusion for learners about which the path that is most direct and beneficial for them. These "pathways" can be tailored depending on the program and student. In the workplace, pathways that are developed alongside the employer can align with current and future skills needed for workers. This supports collaboration as well as ways to support the learner. Overall, pathways can serve as a logistical and visual organizer to help support the learner as well as the environment they contribute to, such as workplaces and classrooms.

According to a 2018 Rand report regarding cybersecurity and education, it is crucial for instructors to understand the social and political context in which we educate our students. An innovative generation of students is needed to enter the workforce and establish a national program for cybersecurity awareness, which is pivotal for privacy rights and data security. In addition, educational institutions need to determine the best practices to stimulate cybersecurity education as it evolves. Ongoing new developments in cybersecurity demand that education is aligned with those changes and that we prepare students who can imagine new methods of cybersecurity.

The preferred outcome is to provide learners with the needed knowledge and skills to successfully fulfill an IT or cybersecurity related job. This pathway could be initiated at primary grade levels to identify and understand, at a foundational level, what cybersecurity is, and this concept would be by advanced in the secondary school level. Interest would then be created among students to motivate them to pursue cybersecurity as a possible pathway for education and employment.

Strengths

Flexibility of pace. People learn at different rates, and some need multiple opportunities to demonstrate their skills and learning. This type of approach could be helpful for those with responsible for many roles.

Affordable. Can a certificate offer a better price point to continue ongoing education. This may be an option for those who want to avoid student debt.

Industry connection. A strength would be "a just in time" for when the credential is needed and also to support ongoing job responsibilities.

Affordable. The certificate or pathway may support a lower price point, without sacrificing quality.

Industry connection. Pathways programs may provide an opportunity for schools to align competencies to the key skills that are often determined in connection with employers in the industry. Learning this at the onset might be beneficial to all.·   4

Weaknesses

Departure from "traditional" models.   A new model like this will require additional processes and staffing to ensure quality and consistency. It is not as simple as launching a new program, it›s an entirely different structure.

Resistance. Again, CBE is a new way of doing business for most schools. Faculty and staff can be resistant to this concept. Implementing a CBE program can mean fighting multiple decades of momentum in more traditional higher education models.

Determining competencies. Not all industries have clear-cut competencies that employees should have. Often times, it is difficult to gain consensus on what these competencies should be. In the case of cybersecurity, we found that the body of knowledge is not consistent in the field as it is still evolving.·

Supporting students. How best to support learners will be important going forward. This may require additional resources.

Learner Accountability. In this evolving space the learner will need to be a partner with the faculty to ensure a smooth path to completion. The learner will need to possess intrinsic motivation.

Opportunities

Currently the following schools are listed as looking at pathways and using Competency Based Education to support learners.

Current Players:

[Western Governors University](#)

[Purdue University](#)

[University of Wisconsin System](#)

[Southern New Hampshire University](#)

[Capella University](#)

[Find a comprehensive list here](#).

Opportunities:
The overarching opportunity is three- fold; one to support learners who want to continue their education in cybersecurity in a world of accelerating change, support alignment with ongoing education with what the workplace needs for effective job skills and placement, inform higher education there is room outside of the traditional approach to meet these needs. The "pathway" model presents a new opportunity for higher education to be nimble and agile.There is a window to open up our thinking about what continuing education is and how it can be transformative.

"Pathway programs facilitate increasing transnational education, which serves as an additional revenue stream for universities." (according to the Brooking Study) Although small in numbers there is increasing attention in this area.

https://www.brookings.edu/blog/education-plus-development/2019/01/10/top-6-trends-in-higher-education/

Threats: The most obvious is the cost of building out new processes, support for learners, and how this approach will align with the more traditional programs. Asking faculty and program directors to look at things differently may require a new perspective on how we educate; especially those areas that are in the midst of rapid change. Commitment from the top down may be imperative and identifying champions who can work within a particular institutional environment may be needed to take on the multidisciplinary approach.

The group then turned to exploring the cybersecurity pathway within information technology which appeared to contain more entry-level certifications than data analytics. The group referenced the "Burning Glass: Top 40 Credentials," and also learned through interviews with faculty, deans and companies that most industry-recognized credential issuers have already mapped their credentials to job skills, while other major companies like IBM and Google issue their own certifications. As the group researched further, we learned that industry demands for cybersecurity knowledge and skills are quite fluid. There is a need to be nimble and pivot as new threats arise, constantly incorporating new knowledge gained from practical experience while always thinking ahead to what may be next. Rather than focus on one credential exclusively, the group sought to devise a process model for mapping credentials to academic programs that would allow for the fluid and nimble nature of the industry. We used CompTIA's Security+ credential to test and illustrate the model.

Jim Daniels
Sr. Manager, Global Learning and Credential Strategy
IBM Transformation, Skills and Globalization
Visit the IBM Skills Gateway at **http://www.ibm.com/training**

Jim Daniels shared that IBM uses bading credentials to follow the progress of an employed to keep skills updated and to reflect the latest professional development for the employees. He went on to share the pathways, and credentials are solidly entrenched in the computer science, software world.

The human resources department reviews resumes and digital sites to learn more about the talent they are recruiting. Badges and pathways show another avenue for the recruits to reflect their path and skills

Applied Tech https://www.appliedtech.us/

CERTIFICATIONS NOT CHOSEN AND JUSTIFICATION

Initially the group chose data analytics as a certification to review and develop a pathway. The team conducted a thorough search but decided against this focus of study for a couple of reasons. The main reason not to pursue data analytics was, there was no national certification that we could locate in order for us to work with. In addition, most job openings required, at a minimum, a bachelors degree.

CERTIFICATION CHOSEN AND JUSTIFICATION

As a start, the group utilized the "Burning Glass: Top 40 Credentials" report provided by C-BEN to identify CompTIA Security+ as having the highest cybersecurity industry demand (100,361 job postings over a 1-year period when both Security+ listings are added together). This certification "establishes the core knowledge required of any cybersecurity role and provides a springboard to intermediate-level cybersecurity jobs." (**https://certification.comptia.org/certifications/security** as of 8/6/2019). Ultimately, the group decided to use this credential to test a pathways model which aligns credentials with academic knowledge units. During its development, we expanded the scope of credential alignment to 1) those reputable, in-demand certifications TESU had already mapped to its undergraduate cybersecurity programs and 2) the remainder of cybersecurity-related credentials on the Burning Glass Top 40 list. To accommodate the fluid nature of the cybersecurity specialty, the key would be to devise a replicable operational process that connects credential-certified job skills with academic program content regardless of industry certification or institutional academic program. TESU's Associate Dean of Applied Science and Technology, Dr. Amjad Ali, helped the group make this connection using a government-developed academic framework called CAE-CD.

ORGANIZATION/CERTIFICATION/TRAINING DESCRIPTION

CERTIFYING ORGANIZATION DESCRIPTION

CompTIA (https://www.comptia.org/): CompTIA was founded in 1982 as the Association of Better Computer Dealers (ABCD), with a goal of "creat(ing) an open dialogue between IT vendors and partners....Two years later, ABCD held its first major conference, and out of this came the decision to establish a full-time staff and permanent headquarters. In 1990, ABCD changed its name to the Computing Technology Industry Association (CompTIA) to reflect the expanded scope of its activities, and two years later, ...introduced vendor-neutral IT certifications, which are now a core (business) component..." (https://www.comptia.org/about-us/our-story as of 8-20-19). Currently, CompTIA has four IT certification series spanning entry-level to expert: Core, Infrastructure, Cybersecurity, and Additional Professional. The three in-demand certifications on the Burning Glass list fall within CompTIA's Core series. The CompTIA certification-job skills Roadmap is available at: https://certification.comptia.org/docs/default-source/downloadablefiles/it-certification-roadmap.pdf

Utilized resources from NSA/DHS National Centers of Academic Excellence in Cyber Defense (CAE-CD) (www.iad.gov/nietp), a government-sponsored validating body for academic cybersecurity programs similar to an accreditor. "The goal of the CAE-CDE program is to reduce vulnerability in our national information infrastructure by promoting higher education and research in Cyber Defense (CD) and to produce a growing number of professionals with expertise in CD disciplines. This program will contribute significantly to the advancement of state-of-the-art CD knowledge and practice" (National Centers of Academic Excellence in Cyber Defense Education Program (CAE-CDE), "Criteria for Measurement: Associates, Bachelor, Master, and Doctoral Level" 2019 Cycle). CAE-CDE resources, including its Knowledge Unit Framework and interactive Matrix that figure prominently in our pathway and process models are available at http://www.iad.gov/NIETP/CAERequirements.cfm.

PARTNERSHIP

CompTIA has an Academy Partner Program which is intended to offer educational institutions "tools and resources to assist schools in recruiting, training, certifying and upgrading the skills of their students in IT. CompTIA's Academy program is designed to help schools promote certification and enhance student career opportunities" (https://partners.comptia.org/become-a-partner/academy-partner). In our group, the Milwaukee Area Technical College is the only institution that is a CompTIA Academy Partner, but partnerships span many types of educational institutions and non-profit providers worldwide.

The NSA/DHS National CAE-CD's Vision is to "(e)stablish a process that will:
*   Provide programs that commit to excellence in the field of Cyber Defense education at the graduate and undergraduate levels.
*   Provide the Nation with a pipeline of qualified students poised to become CD professionals.
*   Continuously improve the quality of CD programs, curriculum, faculty, students and other institutions.
*   Emphasize faculty efforts in improving CD scholarship, professional development and instructional capabilities.
*   Foster and encourage further development of strong CD focused education and research
*   depth at U.S. institutions."
*   (National Centers of Academic Excellence in Cyber Defense Education Program (CAE-CDE), "Criteria for Measurement: Bachelor, Master, and Doctoral Level" 2019 Cycle).

To meet this vision, CAE-CD designates institutions which apply and successfully meet its criteria for Associate, Bachelor, Masters, or Doctorate level cybersecurity programs. A list of all designees is available at http://www.iad.gov/NIETP/reports/cae_designated_institutions.cfm. In our group, Thomas Edison State University is preparing to apply for this designation in the future.

DETAILED DESCRIPTION OF CERTIFICATION

COMPTIA EXAM OBJECTIVES

https://certification.comptia.org/docs/default-source/exam-objectives/comptia-security-sy0-501-exam-objectives.pdf

Exam objectives cover the following knowledge domains to the extent indicated by the percentage:

- Threats, Attacks and Vulnerabilities 21%
- Technologies and Tools 22%
- Architecture and Design 15%
- Identity and Access Management 16%
- Risk Management 14%
- Cryptography and PKI 12%

(CompTIA, CompTIA Security+ Certification Exam Objectives EXAM NUMBER: SY0-501, 2017, pg 3)

CAE-CDE Knowledge Units **https://drive.google.com/open?id=1SoezxVllF0a5cb_m6-KtwWPFY5wNxnRC**

https://www.nsa.gov/resources/students-educators/centers-academic-excellence/

The Centers of Academic Excellence in Cyber Defense (CAE-CD), co-sponsored by the National Security Agency (NSA) and the Department of Homeland Security (DHS), offers a recognized Cyber Defense program of study framework for higher education and research institutions in order "to reduce vulnerability in our national information infrastructure ...and to produce a growing number of professionals with expertise in CD disciplines."[1]

A current regionally accredited two-year, four-year college or graduate-level university is eligible to apply to become a designated "CAE in CD Education (CAE CDE) for Associate, Bachelor, Masters and Doctoral Programs"[2] by mapping the institution's programs to required knowledge units (KUs), demonstrating that a student can reasonably complete these KUs within the course of study, and demonstrating various programmatic criteria indicating institutional commitment to quality, teaching and practice. The KU's are a combination of:

- 3 Foundational KUs common to all cybersecurity programs (Cybersecurity Foundations; Cybersecurity Principles; and IT Systems Components)
- 5 Core KUs
    - Technical Core KUs apply to all programs of study leading to technical cyber security jobs (Basic Cryptography; Basic Networking; Basic Scripting and Programming; Network Defense; and Operating Systems Concepts) OR
    - Non-Technical Core KUs apply to all programs of study leading to non-technical cybersecurity jobs (Cyber Threats; Cybersecurity Planning and Management; Policy, Legal, Ethics, and Compliance; Security Program Management; and Security Risk Analysis). This category deals with the management, human, legal, policy, privacy and ethical aspects of cybersecurity.
- 3+ Optional KUs which align with a multitude of specialties within the field of cybersecurity and may be utilized as appropriate to a program of study. Programs wishing to combine technical and non-technical cores may utilize Optional KUs to do so.

At a minimum, each KU contains a description of the KU scope and content, expected learning outcomes, topics and sub-topics, related specializations, and, as of 2016, connections with the NICE Framework[3] at the Categories Level. Some KUs also list vocabulary terms and suggested textbooks, and may identify a list of related KUs. By identifying the required knowledge, the CAD-CD KU structure gives institutions the flexibility to develop either traditional or competency-based programs.

A complete list of CAE requirements and resources is available at **https://www.iad.gov/nietp/CAERequirements.cfm**. Linked resources of particular note are:

- A description of CAE-CD 2019 Knowledge Units at **https://www.iad.gov/NIETP/documents/Requirements/CAE-CD_2019_Knowledge_Units.pdf** . The chart on page 4 of this linked document is particularly useful in visualizing how the KUs fit into a program of study, from the associates through the doctoral levels.
- An interactive KU Matrix Map in Excel format at **https://www.iad.gov/NIETP/documents/Requirements/2019-CAE_KU_Mapping_Matrix.xlsx**.

A 2019 CAE-CD 20th Anniversary Book detailing the program and its history is also a useful resource available at **https://www.caecommunity.org/sites/default/files/CAE_Book_Version_1.5.pdf**.

[1] National Centers of Academic Excellence in Cyber Defense Education Program (CAE-CDE), Criteria for Measurement Bachelor, Master, and Doctoral Level, Jointly Sponsored by the National Security Agency (NSA) and the Department of Homeland Security (DHS), 2019 Cycle.

[2] Note: There is also a National Centers of Academic Excellence CAE in CD Research (CAE-R) designation as well as a separate and highly technical CAE in Cyber Operations (CAE-CO) designation.

[3] The National Initiative for Cybersecurity Education, part of the National Institute of Standards and Technology (NIST), U.S. Department of Commerce, publishes the NICE Cybersecurity Workforce Framework, known as the "NICE Framework" that categorizes and describes cybersecurity work regardless of sector, employer, or location. (https://www.nist.gov/itl/applied-cybersecurity/nice/resources/nice-cybersecurity-workforce-framework)

Pathway Map DRAFT

https://drive.google.com/open?id=1WWJRuAII9YdPf9orrhIHgQ3N1Cl3TFFo

Based upon the CAE-CD KUs described above, the group developed a pathway map to indicate how cybersecurity certifications may align with core cybersecurity academic program requirements at the associate or bachelor level. As a starting point, the group focused attention on CompTIA's Security+. Our SME consultant, TESU's Dr. Amjad Ali, expanded the scope of initial mapping to cybersecurity certifications already aligned with Thomas Edison State University's degree programs which are included as a separate table. The pathway map also indicates the types of major employers seeking industry-certified applicants, the top technical and infrastructure service providers and the top industry recognized certification providers. In this digital age, employer demand for cybersecurity technicians and professionals is nearly ubiquitous. To maintain data integrity, paying cybersecurity professionals and technicians, whether employed in-house or contracted, has become a cost of doing business for every medium to large company, and many small companies as well. In addition, the US government and military are both employers and drivers of innovation in the cybersecurity sector, as evidenced by both NSA/DHS National CAE-CD program to advance cybersecurity education as well as the US Department of Commerce's NICE Framework to describe cybersecurity jobs and skill sets. While we stayed with a national focus, it is worth noting the international demand from these same types of employers around the globe.

Industry Certification Alignment with Core Cybersecurity Collegiate Academic Program Requirements*

Employers—public and private sector companies and organizations including military and government entities

Top Industry Technical & Infrastructure Service Providers: Cisco, Oracle, Microsoft, Amazon, IBM

Top Industry Recognized Certification Providers: CompTIA, Cisco, Microsoft, EC-Council, Linux, Oracle, ISC2

Associate & Bachelor Academic Program Components

KU MAP: ComptTIA Security+ **
Note: depth & level of coverage vary by KU

Bachelors: +14 Optional KUs
Associate: +3 Optional KUs
from 50+ options

Non-Technical Core KUs

- Cyber Threats (CTH)
- Cybersecurity Planning & Management (CPM)
- Policy, Legal, Ethics, and Compliance (PLE)
- Security Program Management (SPM)
- Security Risk Analysis (SRA)

OR

Technical Core KUs

- Basic Cryptography (BCY)
- Basic Networking (BNW)
- Basic Scripting and Programming (BSP)
- Network Defense (NDF)
- Operating Systems Concepts (OSC)

Foundational KUs

- Cybersecurity Foundations (CSF)
- Cybersecurity Principles (CSP)
- IT Systems Components (ISC)

KU	Description
NSA	Network Security Administration
VLA	Vulnerability Analysis
BCY	Basic Cryptography
NDF	Network Defense
OSC	Operating Systems Concepts
CTH	Cyber Threats
PLE	Policy, Legal, Ethics, and Compliance
SRA	Security Risk Analysis
CSF	Cybercecurity Foundations
CSP	Cybercecurity Principles

*Academic Program requirements are based upon the National Centers of Academic Excellence in Cyber Defense (CAE-CD) program 2019 Knowledge Units downloaded from https://www.iad.gov/nietp/CAERequirements.cfm . CAE-CD is a program jointly sponsored by the National Security Agency (NSA) and the Department of Homeland Security (DHS) . All programs are grounded by a common foundation, focus core courses in technical or non-technical (management, human, legal, policy, privacy and ethical) aspects of cybersecurity, then add a number of optional courses, either technical, non-technical, or a mix of both, to complete the academic program.

** CompTIA Security+ is most In-demand ,industry recognized certifications identified on the "Burning Glass: Top 40 Certifications" list provided by C-BEN.

Certification alignment and employer/industry principals identified by Dr. Amjad Ali, Associate Dean, School of Applied Science and Technology, Thomas Edison State University.

COMPETENCY-BASED EDUCATION NETWORK

CBENETWORK.ORG

CERTIFICATION ALIGNMENT PROCESS/ PATHWAYS

INSTITUTIONAL PROCESSES

TESU: To align certifications with institutional credit, TESU has a unit (OAPWL) dedicated to managing a detailed process termed academic program review (APR) where an industry-recognized credential is evaluated by a team of subject matter experts for college-level learning. The team produces a report detailing the academic elements of the credential along with recommended college equivalencies by subject area, credit, and level of learning. This report is utilized by the respective School housing the related degree program(s) to identify equivalent college courses for which credit may be awarded.

UW: Currently the process is being discussed, but nothing formal in place.

There are the following degree and certificate programs are as follows:

- **Associate of Arts & Science**
- **Business Administration**
- **Diagnostic Imaging**
- **Health Sciences**
- **Information Science & Technology**
- **Nursing Degree (RN to BSN)**

CURRENT CERTIFICATE PROGRAMS ARE:

- Business and Technical Communications (UW-Milwaukee)
- Project Management (UW-Parkside)
- Substance Use Disorders Counselor (UW-Madison)
- **https://flex.wisconsin.edu/**

MATC: During the development of a program, faculty and the associate dean work with industry experts and credentialing bodies to ensure the program's competencies/objectives align with those required to either sit for the credentialing examination or earn it as part of their coursework at the college. When programs are modified, this process is repeated to ensure consistent alignment and program validity. MATC maintains a list of all external certifications and licensures that a student may be eligible to test for. This list is reviewed and updated annually and then posted for each college. School of Business link--http://www.matc.edu/business/upload/School-of-Business-Certifications-and-Licensures-2017.pdf

OUR PROCESS AS A GROUP:

Janet: IBM, Applied Tech met with Kurt Sipple former CEO of Applied Tech. He just recently (February 2019) sold an 80% interest in his organization. They are a Microsoft partner. According to Kurt, cyber security is one of the faster growing career paths as it touches so many other areas as artificial intelligence, data analytics, and business analyst. Kurt noted these jobs will demand a life long learning approach to stay current.

Jeanine: In May 2019 and periodically throughout the summer, Jeanine consulted with Dr. Amjad Ali, Thomas Edison State University's Associate Dean in the School of Applied Science and Technology who oversees all cybersecurity programs of study. Through this consultation, Dr. Ali advised the group about proper industry terminology (e.g., industry-recognized certification rather than credential), existing academic resources and the KU framework from the NSA/DHS National CAE-CD, and the basics of the industry's structure. In an attempt to understand how to align certifications with academic programs in cybersecurity, Dr. Ali performed an initial mapping of the certifications already aligned with TESU courses to the CAE-CD KUs. This mapping was then transferred to the group's Pathway Map. Dr. Ali also identified the in-demand cybersecurity certifications on the "Burning Glass: Top 40 Certifications" list and provided a link to CISCO certification job-level maps.

As the group continued to work over the summer, Dr. Ali expanded the mapped certifications to those on the Burning Glass Top 40 list and further refined his mapping process. Industry-recognized certifications will publish the knowledge domains covered by their exams and detail each domain to indicate topic coverage. Using these details, Dr. Ali identified elements in each certification's knowledge domains covered within the CAE-CD knowledge units. He found that many certifications cover a wide breadth of knowledge, but the depth and level of knowledge vary. Each certification can add to a student's ability to demonstrate competency in a knowledge unit or core area, but would not stand alone as a demonstration of academic competency. Still, by mapping the industry-recognized certifications to academically-recognized knowledge units, Dr. Ali provided the group with a replicable operational process to marry certification and academic knowledge.

Dr. Ali noted that cybersecurity certifications are driven by industry demand even if most academics and professionals agree that the certification exams do not fully prepare people for cybersecurity work. This is why cybersecurity education within the academy is increasingly incorporating certification preparation into a broader scope of learning. Dr. Ali recommends that academic institutions design their associate and bachelor degree programs to incorporate key reputable certifications; in this way an academic program can both prepare its students to earn in-demand certifications and award appropriate credit/competencies for students who already hold those certifications.

PATHWAYS CREATED AT PARTICIPANT UNIVERSITIES

Sections D and E describe the connection between the CAE-CD framework/knowledge units and industry-recognized credentials, forming the basis for the pathway and process maps included in the Appendix. The group illustrated its pathway model using the CompTIA Security+ certification. Following the process map, Dr. Ali went through the detailed exam objectives to identify the breadth of corresponding NSA/DHS CAE-CD KUs:

- Foundation: Cybersecurity Principles (CSP), Cybersecurity Foundations (CSF)
- Non-Technical: Security Risk Analysis (SRA), Policy, Legal, Ethics, and Compliance (PLE), Cyber Threats (CTH)
- Technical: Operating Systems Concepts (OSC), Network Defense (NDF), Basic Cryptography (BCY)
- Optional: Vulnerability Analysis (VLA), Network Security Administration (NSA)

Depth and academic level of coverage in comparison to academic program requirements is best determined by each institution.

UW: 7-22-19 4:00 p.m. Computer Sciences Building

Professor Michael Swift
Computer Sciences Department
College of Letters and Sciences
The University of Wisconsin, Madison

UW-Madison takes a holistic approach to computer science education, which marks itself as a foundational approach to computer science. However, UW-Madison has no immediate plans to pursue a pathways approach. The closest UW program to a pathways approach is the custom program for EPIC (electronic medical records) that helps the EPIC computer science staff expand their skills. Currently, UW-

Madison has over 1700 undergraduate majors with 38 faculty. Classes have an average of 350 students. They have tripled in size due to the demand. Their goal is to educate as many as possible for the number of students. Notably, they do not have a cyber-security program. Professor Swift understands the community /technical college approach, and shares that this is something they are not interested in at this time. Due to budget and resources, they offer no online courses. Further, the job placement rate is 95%, so little investment is put into career placement. The program staff also feel that more work could be done to promote team building and group work. Lastly, the assumption is that students enter the program with no background in computer science, which levels the playing field for others. Swift explained how skill development could come into play more after earning their undergraduate degree by partnering with community colleges/institutions.

Of our graduating students, 86% plan to seek employment and and 14% were admitted to graduate school. Of those seeking employment, 70% had found positions already by the time of graduation and 23% were still seeking, and 6% planned to start looking after graduation.

TESU: The pathways map was developed in part by utilizing TESU's existing mapping of industry-recognized certifications to select courses in our cybersecurity certificates and degrees programs. These programs are in the process of being more closely aligned with the CAE-CD framework as TESU plans to apply for the CAE-CD designation in the coming years.

MATC: About four years ago MATC initially reviewed all of its programs (200+) to map to a pathway model. The following requirements guided this work: all lower level credentials must fully embed into the higher level program(s), each credential must prepare a student for a job/career, and there must not be any waisted credits in the programs.   After a multi-year process, 95 program pathways were created. MATC then applied to be part of the second cohort of the official Guided Pathways group. This process is helping MATC align its support/ student services to the career pathways academic model. In addition to defining a student centric process, MATC is refining processes in the areas of: developmental education, application, financial aid, admissions and enrollment, the administrative model and counseling/ advising.

OVERALL CONSIDERATIONS AND MINE FIELDS

ROI: consider salaries and available jobs **https://www.cyberseek.org/pathway.html**

O-Net (need for pathways): **https://www.onetonline.org/link/summary/15-1122.00**

A key consideration in developing cybersecurity programs aligned to industry certifications is which school houses it. Connecting industry certifications in cybersecurity to an academic degree program may fit better, and therefore find greater acceptance, when housed in a technical or applied science and technology school/department at a college or university, than in arts and sciences. This is particularly true of programs concentrating on the technical core in the CAE-CD framework.

Computer Science degrees are generally derived from physics, math, electrical engineering, and even linguistics -- subjects befitting the arts and sciences schools/departments in which it is generally housed but not those generally covered by industry certifications. On the other hand, degrees in (applied) computer studies or technology cover the design, development, implementation, support or management of electronic information systems and are generally housed in the applied science and technology or technical school/department. It follows that cybersecurity degrees would be similarly housed, particularly those with technical cores as defined in the CAE-CD framework. Since these more technical knowledge areas align better with industry certifications, it follows that there is likely a better academic fit, and perhaps a greater willingness to recognize their academic value.

When discussing the needs of employees in this field, one concern remained part of the conversation. The need to develop computer science employee soft skills was reported quite frequently. One's ability to communicate computer-related processes, data and other work products was a need that many new employees lacked. Other soft skills mentioned were critical thinking, cultural awareness, effective problem solving and professionalism.

RECOMMENDATIONS

RECOMMENDATIONS FOR OTHER INSTITUTIONS SEEKING TO LEVERAGE INDUSTRY CREDENTIALS

Process to consider to leverage industry credentials:

- Reach out to all stakeholders - administrators, faculty, businesses, professional organizations, entrepreneurs in the cybersecurity space
- Build partner relationships with stakeholders
- Create and build advisory boards from a multidisciplinary perspective
- Consider grants and other ways to bring the topic to the forefront
- Consider creating a non-profit organization to support research
- Create accountability partner

- Develop program with industry credentials in mind, partner with professional orgs/ establish relationship
- Build options into career pathways
- Work with local business organizations for their input and neets
- Marketing, public outreach, business engagement (MATC: focus group discussions)
- Be visible in the business community to understand the changing needs.
- Partner with the legal aspects, ethical , and societal aspects to understand the holistic nature
- Highlight this growing need by hosting guest speakers from other institutions and research areas.
- Involve the state and local government.

RECOMMENDATIONS FOR INDUSTRY CREDENTIAL GRANTORS

Organizations granting industry-recognized certifications related to cybersecurity may wish to explore two emerging opportunities intended to illuminate educational pathways for those seeking a career in cybersecurity.

The first opportunity lies with state and federal registered apprenticeship programs (known as "RAs") and newer federal efforts around industry recognized apprenticeship. While RA has been in existence for decades and is well-established in the building and construction trades, there have been more recent state and national efforts to expand the apprenticeship model into burgeoning industries like cybersecurity. Registered apprenticeship is a combination of hands-on, paid learning at a job under the direction of a mentor and related theoretical instruction in a classroom (virtual or physical). Industry recognized certifications can be incorporated into apprenticeship programs focused on cyber security careers, particularly in competency-based RA programs, serving as benchmarks for program progression. As apprentices gain knowledge of theory and technique, as well as apply skills in practice in a laboratory setting and on the job, they work toward qualifying for and successfully earning industry recognized certifications. The large companies issuing certifications that build in difficulty, such as CompTIA and Microsoft, can work with the US Department of Labor's Office of Apprenticeship to build a model competency RA program that lattices and scaffolds related certifications. To go one step further, the model can be aligned with the NSA/DHS CAE-CD framework to integrate college equivalent elements, and ultimately college degree achievement, as a step within or beyond the RA program. The jointly sponsored US Departments of Education and Labor's Registered Apprenticeship College Consortium (RACC) may provide support for such an effort. To learn more about apprenticeship, we recommend visiting **https://www. apprenticeship.gov/** .

Another opportunity for certification-issuers to consider is registering with Credential Engine's Credential Registry.   "Credential Engine is a non-profit whose mission is to create credential transparency, reveal the credential marketplace, increase credential literacy, and empower everyone to make more informed decisions about credentials and their value " (**https://credentialengine.org/about/** as of 8/27/19). Using a common language and cloud technology, the organization created a Credential Registry "that collects, maintains, and connects information on all types of credentials..in an easily-accessible format" (**https://credentialengine.org/about/ credential-registry-overview/** as of 8/27/19).   Along with organizational information, industry certification-issuers can publish their certifications' competencies and intended learning outcomes, level of learning, accreditations and related careers among many available data fields in the Registry. Approved organizations may be granted the option for batch uploads to the Registry. "The Credential Registry captures, links, updates, and shares (the uploaded) information about credentials so it can be organized and centralized within the Registry, made searchable by **the Credential Finder**, **customized applications** and linked to from anywhere on the open Web" (ibid). Sharing detailed information through the Credential Registry will not only inform cybersecurity certification seekers, but also provide academic institutions with a snapshot of the certification, including KUs, which may also be compared with other certifications in the Registry.

On August 28, 2019, Credential Engine announced that Microsoft is committing grant funds so the organization to expand its work with states and "develop more specific efforts around credentials for IT and cybersecurity." (Credential Engine, "Credential Engine to Expand Engagement and Support of a Transparent Credential Data Infrastructure, with Support from Microsoft," 8/28/2019, Washington, D.C.)

RECOMMENDATIONS FOR FUTURE FUNDING OR DEVELOPMENT

One of the overarching trends that this literature review found was the inconsistent use of definitions and lack of expert knowledge used to describe cybersecurity. While businesses and other institutions have operationalized the use of cybersecurity within their environments, the definition of cybersecurity exists on a varied spectrum.

We know that cybersecurity within organizations is an important part of daily business. The role of the cybersecurity has traditionally fell in the information technology job sector, Now, the issue at hand is how we can prepare talent to fill new job gaps as the need for cybersecurity grows. Not only are skills needed, but compliance has become part of the conversation. It can be viewed that compliance is an offshoot of training. Reddy and Dietrich (2017) have identified there are three pathways that can promote a career in cybersecurity; those being cybersecurity awareness, increasing proficiency, and cybersecurity self-efficacy.

The importance of cybersecurity at a corporate level is crucial to note, as is cybersecurity at the individual level. The awareness of cyberthreats can perhaps start at an early age. Overall, a general awareness of cyberthreats can be a powerful part of the overall strategy to develop the field.

Ramirez & Choucri (2016) also note that their literature review revealed that the cybersecurity still lacks a consistent uniformity on the definition of what cybersecurity encompasses. Recommendations from them followed from comparing this lack to current practice and ongoing projects. They first recommend some general principles to foreground: the fundamentals of cybersecurity education and training, addressing the multiple target student groups, and the timing of various training and education efforts ranging from near-term (within a few months) all the way to long-term (over many years).

POSSIBLE RECOMMENDATIONS FOR CYBER EDUCATION ARE:

In the long term, employ the use of group projects and team building to take a "system approach" to the issues. Implement internship to fully prepare learners into the environment with real-world experience under the supervision of professionals. Develop certification programs on specific topics and again take a holistic approach to the entire discipline. Short term goals could be to cultivate specific competencies' and skills for the discipline. This could be done by using a "best practices" approach to identify and document the crucial elements of cybersecurity environments and processes.

As we move toward possible pathways, four main questions come into play regarding how to ensure that training and education align with the evolving demands of cybersecurity. What are the different pathways to ongoing cybersecurity training and education in different environments? How do we adequately assess the training and education? Are there unique differences for educating in the cybersecurity space? Although there is a shared body of knowledge, how do we account for the unique differences?

Another study supported the further need for consistent definitions of cybersecurity and an entire research stream of the term. This might be considered when accrediting new programs and certificates along with professional organizations. The need for a consistent and well-thought approach is quite evident, which could result in a preferred outcome if one is developed and executed. Other questions include asking where cybersecurity education does and should occur. An earlier report stated that cybersecurity awareness should start at a very young age, even during K-12, at an individual level. Another approach might be to develop and seek out alternative pathways to reach cybersecurity proficiency.

BEST USES OF THIS INFORMATION

ACTION STEPS CHART

- First identify all stakeholders: faculty, industry, program and dept chairs, administration as high up the hierarchy as allows, learners, industry, innovation organizations
- Review of job futures
- If an advisory board has not been created - perhaps request your industry partners to participate
- Participation in professional organizations to learn what others are doing
- Conduct benchmarking visits with other institutions.
- Change Management best practices put into place
- "Skunkworks" or under the radar new initiatives put into place.

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List and Attach Appendices as appropriate

Process Map v4 https://drive.google.com/open?id=1IA6mNn40tg0rxdk7yFuabCNEe2E3aplT (Word) or https://drive.google.com/open?id=1viCy7UDZ1cOu0ad9zRK3gHIpbOk_FQDr(use pdf version if Word formatting is off)

Career Pathway-CAE-CD v7 https://drive.google.com/open?id=1lN2v5BW6Pb83O75oBFJPs65pIt2ZhBjo for pdf; (Publisher file emailed to Yedid)

Certifications_CAE_CD (https://drive.google.com/open?id=1bk-KmGVZPz1mEm2kP0Z_WF-joJ6wVkGo)

Developing a Comprehensive Academic Cybersecurity Program Incorporating Industry-Recognized Certifications

Utilize CAE-CD Academic Framework

Map Your Cybersecurity Academic Program to CAE-CD KUs*

Delivery Options
1. Traditional
2. Competency-based
3. Hybrid

CAE-CD Alignment Options
1. Seek Designation
2. Use as program model (w/out seeking designation)
3. Identify points of KU alignment w/existing program

Examine Certification

Validate Certifications Credibility and ID KUs

Info Source: Certif. Issuer
1. Official Website; Avoid 3rd Party sites
2. Official Study Guides
3. Official Sample Exams

Items for Consideration
1. Prerequisite Knowledge
2. Learning Outcomes, Topics, & Knowledge Domains
3. Exam Blueprint/Details
4. Exam Format, Currency, Security, & Grading
5. Issuer's Reputability & Certif. Administration

Incorporate

SME(s) Map Certification to Academic Program

Map breadth of certification exam topics to program KUs

1. Consider depth and academic level of coverage
2. Consider extent of match among learning outcomes
3. Supplement certification KUs with theoretical concepts, academic research, & labs
4. Award equivalent credit or evidence of competency for mapped certifications

*The National Centers of Academic Excellence in Cyber Defense (CAE-CD) is a program jointly sponsored by the National Security Agency (NSA) and the Department of Homeland Security (DHS). CAE-CD provides a framework for higher education degree programs in cybersecurity consisting of Knowledge Units (KUs) within the foundational, technical and/or non-technical (management, human, legal, policy, privacy and ethical) aspects of cybersecurity. The 2019 KUs may be downloaded from https://www.iad. gov/nietp/CAERequirements.cfm . The CAE-CD framework of KUs are intended to provide a roadmap in developing high-quality Associate, Bachelor, and Graduate cybersecurity degree programs.

"Examine Certification" and "Incorporation" suggestions derived from:

1. Collaboration among Dr. Amjad Ali, Associate Dean, School of Applied Science and Technology, and Jeanine Nagrod, Director of the Office for Assessment of Professional and Workplace Learning, both of Thomas Edison State University, May-August 2019.

2. Riccioni, R. and J. Nagrod. Academic Program Review Guide: Rubrics and Resources for the Review Team. Creative Commons Licensed: April 2015; adapted for Thomas Edison State University by J. Nagrod, August 2015; updated May 2016.

CBENETWORK.ORG

COMPETENCY-BASED EDUCATION NETWORK

SECTOR THREE:
HEALTHCARE: PATHWAYS FOR CERTIFIED NURSING ASSISTANT CREDENTIALS

COMPETENCY-BASED
EDUCATION NETWORK

COLLABORATORY MEMBERS / ACADEMIC OFFERINGS

Deanna Bowman
Project Manager - Strategic Program Development
Indiana Wesleyan University - National & Global
Bio: Deanna Bowman graduated in 2010 with a Bachelor of Arts with a major in Spanish and Intercultural Studies. She began her career at Indiana Wesleyan in 2011, and has been there ever since, albeit in several different roles ranging from academic support, to enrollment, to corporate partnership, to project management. She has been a part of the CBEN Collaboratory since December of 2018 and continues to push for the development of CBE programs at Indiana Wesleyan.

Indiana Wesleyan University:
Indiana Wesleyan University is currently developing its first CBE program, a B.S., Management, which will launch in November of 2019. The post-licensure BSN (RN-BSN) is also being developed in a CBE modality, targeting a January 2021 launch. There are no plans to develop any CBE pre-licensure nursing programs. Additional CBE programs are being discussed outside of the nursing field.

Eleisha Garland, MSW, LMSW
Lecturer in Human Services; Flex Program Coordinator, Anderson University, Anderson, South Carolina
Bio: Eleisha Garland is a Lecturer in Human Services and Flex Degree Coordinator at Anderson University, where Eleisha developed the Human Services Curriculum in a flexible learning model for adult learners, educates the next generation of Human Services professionals within the School of Allied Health, conducts trainings with Anderson University's Flex Degree faculty, and acts as a liaison for Flex Program faculty.

Eleisha has been in the higher education field since 2011, first as an Adjunct Instructor, Coordinator of Competency Based Education, Lecturer, and Flex Degree Coordinator. Prior to entering the education field, Eleisha was a clinical therapist for youth with emotional and behavior problems, focusing her expertise on trauma focused therapy. Eleisha is a Licensed Master Social Worker in the state of South Carolina, a member of the Southern Organization of Human Services, a member of the National Association of Social Workers, and a member of CBEN.

Anderson University (Anderson, SC)
Anderson University offers several nursing programs including, TBSN, ABSN, RN-BSN; Master of Science in Nursing (Concentration areas in Family Nurse Practitioner, Nurse Educator, Executive Leadership, Psychiatric Mental Health Nurse Practitioner); Post-Graduate Certificate (Concentration in Psychiatric Mental Health Nurse Practitioner); Doctor of Nursing Practice (Concentration areas in Advanced Practice, Executive Leadership, Family Nurse Practitioner, Psychiatric Mental Health Nurse Practitioner). Pertaining to Competency Based Education programs, Anderson University offers a Bachelor of Human Services, the first CBE program launched at the University in Fall 2018. The RN-BSN has been redeveloped into the University's CBE model and launched Fall 2019.

Bette Bogdan PhD RN-BS, PHN
Current: Manager RN-BSN-LPO option at Winston-Salem State University in Winston Salem, NC
Current : Nursing Chair American College of Education
Bio: Dr. Bogdan Ph.D.serves as a CBE Consultant and Online Faculty/Manager for Winston-Salem State University helping to develop and provide support to the groundbreaking WSSU Learner Paced Option RN-BSN program. Dr. Bogdan earned her Bachelor of Science from Regis University Denver, CO, Master of Science in Nursing from American Sentinel University Aurora, CO, and Doctor of Philosophy in Nursing Education and Administration from William Carey University, Hattiesburg, MS. Dr. Bogdan's clinical background spans nearly 35 years, and she has worked in academia for the last 10 years. Her positions include: Program Director for an online RN-BSN program, Associate Professor at the Undergraduate and Graduate level, Subject Matter Expert in Population Health, Research, and Nursing Theory, as well as Lead faculty in both clinical and didactic on-ground Nursing Programs. She currently volunteers as the Chair for the State of New Hampshire Board of Nursing Practice and Education Committee, Editor-In-Chief for Stat Pearls (Nurse- Professional Ethics, and Community Health) and for Sigma.   Her personal philosophy of Nursing is based upon Dr Jean Watson's' Theory of Caring, and she strongly believes in mentoring the next generation of nurses.

Ruben G. Flores, Ph.D., MBA, MPA
Professor, Bachelor of Applied Science in Organizational Leadership – South Texas College
Adjunct Faculty – National American University Master in Business Administration Program
Lecturer/Instructor Dual Credit Political Science and AP Economics - South Texas College
South Texas College offers a Bachelor of Applied Technology in Medical and Health Services Management (CBE).
Bio: Dr. Flores holds a Ph.D. in Business Organizational Leadership and a Master in Business Administration from Our Lady of the Lake University in San Antonio, Texas. He also holds a Master in Public Administration from the University of Texas – Rio Grande Valley. He served

as a medical practice administrator with an internal medicine/pulmonary practice, two cardiology practices, a rheumatology practice, and gastroenterology practice. He was the Director of the Medical Staff Office and the Physician-Hospital Organization (PHO) at Mission Regional Medical Center. He has worked at South Texas College since 2010 when he worked as an adjunct faculty member in the Political Science Department and the Bachelor of Applied Science in Organizational Leadership (BASOL) program. He is now a professor at South Texas College in the BASOL program. He is the owner/CEO of an independent insurance adjusting firm. He also worked as a police officer and criminal investigator with various law enforcement agencies and as an administrator in a state correctional agency.

CERTIFICATIONS/TRAININGS REVIEWED AND JUSTIFICATIONS

PROCESS FOR CERTIFICATION/TRAINING DETERMINATION

Healthcare is a vast field with many opportunities for workforce credentials, licensure, and post licensure credentials. When the participants of the Healthcare pathway began reviewing these options, data was utilized from the **Burning Glass Report** with information on the top certifications in the Healthcare field. When first meeting, the pathway's group began brainstorming about several credentials that would be applicable for further research to determine pathways to higher education. Some of the initial credentials that were discussed were Certified Case Manager, Critical Care Nursing, Certified Medical Practice Executive, and Certified Nursing Assistant. The team then brainstormed about the largest employers in the industry (both nationally and regionally) and whether they offered work-based learning programs. Further assessment was conducted to determine if any of the institutions in the pathway group offered acceptance of industry credentials and/or work-based learning. According to a report by Burning Glass Technologies (2017), "Certifications fall into two broad categories, each with its own distinct impact: Door Openers, which help new labor market entrants enter a field; and Career Escalators, which pave the path for experiences workers' upward mobility" (p. 3). For our pathway team, it was important to focus on a credential that was a "Career Escalator" and could allow someone to build upon their foundational knowledge in their field of interest and determine the best path for them in that process.

CERTIFICATIONS NOT CHOSEN AND JUSTIFICATION

After the brainstorming and assessment of the top certifications, the focus of the review turned toward the Certified Nursing Assistant Credential, the Certified Medical Assistant and the Certified Health Unit Coordinator. Each certification offered different paths for students/employees utilizing them. Once the pathways team began reviewing the Certified Medical Assistant credential further, it was determined to be more terminal and would not offer a pathway to a Registered Nurse (RN). The Certified Health Unit Coordinator pathway was also discussed as a possibility. It was researched and the group found the history to be compelling but also terminal and not a clear pathway to the RN.

CERTIFICATION CHOSEN AND JUSTIFICATION

The team narrowed the research down to the Certified Nursing Assistant Credential and began assessing how this credential was obtained in specific states, organizations/institutions that offered the credential, and criteria for candidates of the credential. Each participant reviewed and evaluated the state standards for these credentials as well as the National Standards. Further review of these standards can be accessed below:

- **South Carolina CNA Standards**
- **Texas CNA Standards**
- **Indiana CNA Standards**
- **North Carolina CNA Standards**

Once each member reviewed the state specific CNA standards, it was determined there were many variances across states and determined American Red Cross's CNA program would allow the group to focus on a broader spectrum instead of state specific credentials. The American Red Cross is a comprehensive/universal program and can be considered the gold standard (used in 11 states) for CNA programs. This certification seems to form a foundation of knowledge in the nursing field which allows for transition and paths to continued education (American Red Cross, 2019).

ORGANIZATION/CERTIFICATION/TRAINING DESCRIPTION

CERTIFYING ORGANIZATION DESCRIPTION

The American Red Cross was founded on May 21, 1881 by Clara Barton and a circle of her colleagues. Since founded, the American Red Cross has dedicated its purpose as an organization to serving people in need (The American National Red Cross, 2019). This organization is unique in that it exists as a non-profit charitable organization but also has been granted a charter by the United States Congress. The American Red Cross has the legal status of a federal instrumentality, due to their charter requirements because of this status, the American Red Cross has responsibilities to carry out delegated by the federal government. Some of these responsibilities are as follows:

- Fulfill provisions of the Geneva Conventions
- Provide communications and other types of support for families in the United States military
- Maintain a system of domestic and international disaster relief (The American National Red Cross, 2019).

Since the American Red Cross is a non-profit, charitable organization, funding sources are utilized from various sources to help fulfill their mission. According to the article Our Federal Charter, "We receive our financial support for the American Red Cross comes from voluntary public contributions and cost recovery charges for some of our services" (The American National Red Cross, 2019, para. 3). This organization also receives funding, at times, from state and federal agencies to help provide materials and assistance pertaining specifically towards the organization's obligations of their charter. Along with funding sources, the organization relies heavily on persons donating their time for the organization's programs and blood donations for blood bank programs.

The American Red Cross has adapted throughout its existence for over a century to meet the needs of those they serve, but the organization always stays true to its mission and values. According to the American Red Cross (2019) the mission and values of the organization are:

- ARC Mission Statement: "The American Red Cross prevents and alleviates human suffering in the face of emergencies by mobilizing the power of volunteers and the generosity of donors." (para. 1).
- ARC Vision Statement: "The American Red Cross, through its strong network of volunteers, donors and partners, is always there in times of need. We aspire to turn compassion into action so that...
   o ...all people affected by disaster across the country and around the world receive care, shelter and hope;
   o ...our communities are ready and prepared for disasters;
   o ...everyone in our country has access to safe, lifesaving blood and blood products;
   o ...all members of our armed services and their families find support and comfort whenever needed; and
   o ...in an emergency, there are always trained individuals nearby, ready to use their Red Cross skills to save lives." (para. 2).

PARTNERSHIP

Collaboration among organizations, including those in higher education and the workforce, is fundamental for networking and growth to serve potential students with workplace skills that could leverage a pathway for continued education. When the healthcare pathway group began looking into specific certifications to assess and focusing on the American Red Cross' Certified Nursing Assistant program, a member of the CBEN organization, assisting the healthcare group, was able to reach out to ARC and develop a working relationship with a member from the organization. Laurie Wilshire, MPH, BSN, Nursing Assistant for Training and Testing was welcoming and willing to collaborate with the healthcare group to allow analysis of the CNA training program. Ms. Wilshire allowed the group to have access to the **Nursing Assistant Training, Instructor's Manual (2018)** and the textbook, **Nursing Assistant Training (2018)**. Throughout the group's assessment of the curriculum, members of the American Red Cross Training and Testing programs were open to meeting with the group and discussing alignment with the identified competencies, knowledge, skills, and abilities of the healthcare pathway and of their curriculum. During one of the meetings with Ms. Wilshire, the American Red Cross informed the group of an opportunity to meet with Cinematic Health, an outside organization American Red Cross contracts with pertaining to their online curriculum. This did not come to fruition during the group's time in the pathway collaboratory.

DETAILED DESCRIPTION OF CERTIFICATION

The American Red Cross Certified Nursing Program offers training programs throughout the United States that prepares participants with the knowledge, skills, and abilities they need to become a Nurse Assistant in long-term care facilities, hospitals, home health care and hospice settings (The American Red Cross, 2019). The training program has two components, theory and clinical. Enrollment varies by state. Curriculum focuses on the art of caregiving, promoting safety, providing care, special care instructions, transitioning from student to employee. The following content topics are incorporated in the training program for the CNA certification:

- CPR, First Aid, and AED usage
- Infection control
- Taking vital signs
- Range of motion exercises
- Becoming a valuable and adaptable employee
- Communication, teamwork and diversity skills for the workplace
- The art of caregiving
- Promoting safety
- Special care instructions
- Transitioning from student to employee

When this pathway group began assessing the CNA curriculum, the following competencies were identified:

- Interprofessional Communication/ Collaboration
- Ethics/ Legal/ Rights
- Fundamental of Patient Care
- Infection Prevention
- Cultural Competency
- Safety
- Infection Prevention

Each competency theme was first identified and then specific knowledge, skills, and abilities were mapped to the competency "buckets". See **Overarching Competencies** for further examination of competencies. Winston-Salem State began the process of bridging the CNA curriculum competencies created to their curriculum. Further assessment of this process can be seen in **Dynamics of Professional Nursing spreadsheet.**

CERTIFICATION ALIGNMENT PROCESS/ PATHWAYS

Each university involved in the healthcare pathway has unique experiences for their respective programs that could potentially form pathways for the certification assessed. Below are overviews of each university, if they currently offer any programs that could benefit from a pathway from CNA to higher levels of education, and specific processes utilized to determine credit for learning (if applicable):

Indiana Wesleyan University:
Indiana Wesleyan University does not have plans to develop a CBE pre-licensure nursing program at this time. Though there are plans to develop a CBE version of our RN-BSN, projected to launch in January of 2021. In the meantime, there is willingness, on the part of the School of Nursing, to pre-evaluate the American Red Cross's Certified Nursing Assistant curriculum to award college transfer credit for anyone holding the Certified Nursing Assistant license. This credit would then be put toward an RN-BSN or any other bachelor completion program within Indiana Wesleyan University - National and Global. No pathway was developed for the American Red Cross's Certified Nursing Assistant credential because IWU does not offer an Associate Degree Nursing/pre-licensure program in a CBE modality. The credential may be reviewed through Prior Learning Assessment (PLA).

Anderson University:
Anderson University currently offers a CBE degree in Human Services and the RN-BSN program has been redeveloped over the past year to be the second CBE program to launch for the university in Fall 2019. We offer an Accelerated BSN program that allows 59 previous college credit hours. Anderson University also offers Traditional BSN. The Graduate Program for Nursing at Anderson University also offers many concentrations including Family Nurse Practitioner, Nurse Educator, Executive Leadership, and Psychiatric Mental Health Nurse Practitioner. In the Doctor of Nursing program, the following concentrations are offered; Advanced Practice, Executive Leadership, Family Nurse Practitioner, and Psychiatric Mental Health. Finally, in the School of Nursing, there is a Post-Graduate Certification offered in Psychiatric Mental Health.

Anderson University currently offers a pathway for Licensed Practicing Nurses (LPN) to receive college credit for both classroom contact hours and clinical contact hours. Anderson University has not determined a pathway for the CNA credential at this time, but it could be created using a similar process at that of the LPN.

The university currently only does not have a process for aligning and other certifications. If Anderson University were to implement a process, we would develop policies or procedures to review certifications and align them with bridging of curriculum. This could be done at the program level and/or curriculum committee level.

South Texas College:
South Texas College has a Patient Care Assistant Certificate Program where students are trained to provide basic nursing care of adults, children, infants and the elderly. After successful completion of the Texas Department of Aging Nurse Aide Competency Examination, students will focus on acute care and specialized patient care. Entry-level skills in phlebotomy, EKG, and monitor technician are included.

South Texas College has a Vocational Nursing Program which is an intensive three semester program that offers classroom instruction and related clinical practice in the four basic areas of nursing care: adults, mothers and newborns, children, and the elderly. Graduates of this program will have a wide array of opportunities for providing nursing care for patients in structured health care settings. Patients cared for by Vocational Nurses typically are experiencing common, well-defined health problems with predictable outcomes.
South Texas College has an Associate Degree Nursing (ADN) Program that prepares students with the basic competencies to become safe practitioners in the healthcare field. Upon successful completion of the Associate of Applied Science major in Associate Degree Nursing, the graduate will be able to sit for the National Council Licensure Examination for Registered Nurses (NCLEX-RN). After successful completion of this exam, the individual will be a registered nurse and can work in hospitals, day-surgery centers, rehabilitation centers, physicians' offices, home health care agencies, among other areas.
South Texas College will have an RN to BSN program that is projected to be available starting in Fall 2020. All these programs are traditional programs not CBE.

Winston Salem State University:
Starting to include bridging work in the MHA program, do honor BLS certification (2 gen ed credits), to obtain a BSN in nursing (curriculum committee reviews and recommends that the credit be awarded) WSSU has a traditional pre licensure BSN as well as seated and hybrid RN-BSN programs, and a Learner Paced Option (LPO) which is competency based for Masters in Healthcare Administration. The second cohort of the LPO RN-BSN pilot finishes in December 2019, and is not planned to resume.

PATHWAYS CREATED AT PARTICIPANT UNIVERSITIES

After assessment and review of the CNA certification, each pathway participant brought the findings of the competencies for the certification to their respective universities. Each university identified possible pathways for this workforce credential. Winston Salem State University assess competency overlap/alignment with their RN-BSN competencies. Indiana Wesleyan is still in the development phase of their RN-BSN program in a Competency Based format. Anderson University currently offers a pathway for Licensed Practicing Nurses (LPN) to receive college credit for both classroom contact hours and clinical contact hours. Anderson University has not determined a pathway for the CNA credential at this time, but it could be created using a similar process at that of the LPN.

At this time, pathways for the CNA credential were not created at the participant universities. All of the universities represented in the pathway of healthcare offer baccalaureate or higher degrees. It seems that the pathway of a CNA, being that it is an entry level credential, would work best with an Associate Degree program first, and then allow for further pathways from the associate level to the baccalaureate level and so on. Policies and procedures need to be created within each university as to how they would determine credit for the workforce credential.

OVERALL CONSIDERATIONS AND MINE FIELDS

When making recommendations for pathways, it was determined that there is a lack of Competency Based Education awareness. There also seems to be a lack of understanding at the higher level administration about the importance of pathways for prior workforce learning or credential credit offering, as well as cost-saving measures. If the administration is not on board, this opportunity can be missed for students. Another important consideration is the lack of CBE gen eds for students in a competency based program. At some of the participating universities there has also been a lack of available consultants, appropriate learning management systems. When beginning to discuss pathways for credentials, accrediting bodies need to be at the table, this does not always translate well in the CBE realm of higher education. Another consideration and mine field is that of faculty remuneration. How will universities avoid grade inflation? How will universities, accrediting bodies, and other stakeholders manage this process? What is the role of the advisor/academic coaches in the creation of pathways?

When choosing the certification, it seemed that in the field of healthcare, there were many options to choose from. However, CNA seemed to be the right choice due to the "entry level position", and potential for students to progress toward higher education levels. Some mine fields that come to mind after reflecting back would be how each state oversees CNA's differently (Department of Health and Human Services, Board of Nursing, etc.). American Red Cross was very willing to work with the pathways group and accommodating to offer their training materials. However, not all organizations may be this forthcoming. In the field of healthcare, program standards are usually built around competencies already, there are many potential pathways that could be developed. The challenge will be forming relationships and building partnerships from workforce stakeholders to higher education to ultimately benefit the student.

RECOMMENDATIONS/ BEST USES OF THIS INFORMATION

RECOMMENDATIONS FOR OTHER INSTITUTIONS SEEKING TO LEVERAGE INDUSTRY CREDENTIALS

Relationship is paramount. In order to leverage industry credentials, for the benefit of the industry, institutions of higher education must develop working and sharing relationships with credential grantors, accrediting bodies, and employers. Each of these entities ought to have a seat at the table because all control and maintain a crucial ingredient, which yields a healthy, growing industry.

A. Institutions of higher education bring theory, history, philosophies, higher ideals and soft-skills to the table. The byproduct is well-rounded students who possess a depth of industry knowledge, but also bring the theoretical background and soft-skills to their industry.

B. Credential grantors provide a quicker route for employees to learn the most foundational and technical knowledge needed on the job. Students get the right information, just in time.

C. Accrediting bodies control and maintain the standard to which employees are educated.

D. Employers are the frontline. They need a workforce that has the technical knowledge to do the job credibly, but they also greatly benefit from the well-rounded employees who bring more than just technical skill.

At the heart of all of this is the customer, or in our case, patients. Employers need workers who serve well and save lives. Over the past few decades we've seen a trend developing; employers are resorting to creating their own, internal learning paths to fill knowledge and skill gaps that neither higher education nor credentialing bodies provide in full. This shift has yielded another trend: the closing of institutions of higher education.

To reverse the trend and maintain relevance, institutions of higher education must listen and quickly respond to what employers need, and incorporate workplace learning and industry credentials to provide a comprehensive approach to preparing excellent employees. The CBE modality is beginning to address just that.

RECOMMENDATIONS FOR INDUSTRY CREDENTIAL GRANTORS

As with institutions of higher education, partnership with community colleges, universities, employers, and/or ACE during credential/training development will ensure that learning can be mapped to college credits or competencies. Once the learning is recognized as college credit or competency, credential grantors may partner with area community colleges and universities to create seamless pathways for credential completers/holders to enroll in a degree in that or a related field

The second phase includes partnering with key employers to offer a path from workplace learning, to the credential, to related degrees, to career advancement. In order for employers, and the industry at-large to thrive, employees must be provided with paths to use tuition assistance dollars to advance in education and their profession. The pathway could look something like this:

A.   Employee starts working at Company X in an entry level position
B.   Employee completes workplace training program and the successful completion leads to a small promotion and/or pay increase
C.   A seamless path is identified to incorporate the workplace learning the employee has received toward earning an industry credential/certification
D.   Employee proceeds to earn a credential/certification in the field - this yields yet another promotion and/or pay increase
E.   Employee is also encouraged to continue the learning path through to an associate degree
F.   The associate degree incorporates the workplace learning and the industry credential to help the employee earn the degree quickly, without duplicative learning, and economically
G.   Employee earns their associate degree. The path could continue on to a bachelor's, master's, or doctorate, depending on the field
H.   At each step, the employee receives career path incentive to continue the path of lifelong learning
I.   CEUs could also be incorporated into this path
J.   Employers should consider how they are going to help these dedicated and continually developing employees pay for each level of credential attainment, along with how the training will lead to an ever-increasingly fulfilling career.

RECOMMENDATIONS FOR FUTURE FUNDING OR DEVELOPMENT

Recommendations include the suggestion that healthcare organizations and accrediting bodies align with military as far as competency-based education and award credits that are nationally recognized as they are obtained (similar to recognized military offerings in General Ed: CLEP/DANTE). Given that most entry-level nursing positions are at minimum wage, we recommend that subsidized learning agreements with healthcare organizations (long-term care, acute care) provide a full-time (with benefits) living wage during training as well as gainful employment post CNA certification. Finally, this Collaboratory recommends that strong partnerships with post-secondary institutions and accrediting bodies for institutions of higher Learning (HLC, CCNE, Regional and National) are formed to facilitate and streamline the process of entry level to nursing practice, while recognizing existing competencies gained from life and workplace experiences.

BEST USES OF THIS INFORMATION

Forming pathways from workforce credentials/certifications to college credit is imperative to supporting the main stakeholder, the student. Developing the relationships with credential grantors, accrediting bodies, and employers is paramount to the development and implementation of pathways. This group suggests that a coalition be formed to identify logistics in quantifying CBE, awarding certificates or college level credits for clinical/didactic courses that can be used to advance degrees in healthcare and that are recognized by accrediting bodies.

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SECTOR FOUR:
SERVICE SECTOR

COLLABORATORY MEMBERS / ACADEMIC OFFERINGS

In the Service Sector areas,

Prior to the collaboratory, **Salt Lake Community College** (SLCC) offered the following to learners: Hospitality Management (AAS), Retail Management (CC), and the Hospitality Career Pathways Foundations training in two tracks: Expert Guide to Housekeeping and Back-of-House Culinary (noncredit, Workforce Certificate program). Additionally, SLCC is in the process of evaluating and aligning the WAFC curriculum to its marketing management program.

Karah Altman joined Salt Lake Community College in June 2017, following a 17-year career in the Dallas-Fort Worth Metroplex where she served in roles of broad marketing communications and leadership responsibility in education and government. Karah served as Interim Assistant Vice President for Workforce Training & Continuing Education in fall/winter 2018-19 and, effective with the new academic year, serves as the College's Director of Foundation Relations. Karah holds a Master of Public Affairs degree from The University of Texas at Dallas with a concentration in local government management.

Ohio Association of Community Colleges (OACC) offers

Michael Evans serves as the Director of Workforce Partnerships for the Ohio Association of Community Colleges (OACC). He partners with Ohio's 23 community colleges and Ohio's business community to develop strategic partnerships and programs to align workforce skill training to the needs of business. In May of 2019, Mr. Evans was appointed to the State Apprenticeship Council where he is responsible for advising on policies and procedures for Ohio's Registered Apprenticeship system and helping Ohio businesses and the Ohio workforce grow with Registered Apprenticeship. Michael, who earned his associates degree from Columbus State Community College before completing his bachelor's degree from Ohio State University, worked in the Ohio Governor's Office of Workforce Transformation from 2012 to 2018. He has also served as a workforce program administrator with the Ohio Development Services Agency and as a policy aide for then-Speaker Jon Husted.

Prior to the collaboratory, **Sinclair Community College** (SCC) offered the following to learners: Hospitality Management & Tourism (AAS), Bakery & Pastry Arts (AAS), Culinary Arts (AAS), Lodging & Tourism (AAS) Meeting & Event Planning (AAS), Food Service Management (Cert) Food Truck and Street Food (STC) Hospitality Reception * Service Specialist (STC), Call Center

/Customer Service (STCt) Retail Management (STC)

Dennis Brode is a Professor of Management at Sinclair Community College where he teaches a variety of courses including HR Management, Supervision, and Retail Management. He just completed a grant which enabled him to develop a competency-based Retail Management Certificate program in conjunction with the Western Association of Food Chains. Dennis has developed four competency-based courses and is active in promoting CBE not only within the college, but with organizations and retailers. Dennis holds a BSEET degree from DeVry University, and an MBA from Wright State University with a concentration in Operations Management.

SUNY Empire State College educates more than 17,000 students in person, online, and through a blend of both, at 34 locations in New York and at eight international sites worldwide. Together with one of SUNY Empire's more than 1,300 faculty mentors, each student designs their own individualized pathway to a college degree that accommodates their schedule and awards credit for prior college-level learning. The most relevant area to this project are associate and bachelor's degrees within the Business, Management and Economic division. The college also has more structured bachelor's degrees in the areas of business administration, human resource management, and management, but these too will accept evaluated learning.

Nan Travers Dr. Nan L. Travers is the **Director of the Center for Leadership in Credentialing Learning (CL2) at SUNY Empire State College.** The CL2 provides SUNY Empire State College with internal and external leadership in the areas of prior learning assessment, professional learning evaluations, competency-based education and other related practices that support the credentialing of pathways to enhance students' economic opportunities, social mobility, and talent development within workplace and educational settings. Dr. Travers focuses on research, policies and practices of the recognition, validation and credentialing learning. She is widely published nationally and internationally, and provides leadership in many prior learning assessment efforts, including the Learning Recognition Collaboration, Prior Learning International Research Consortium, Connecting Credentials Initiative, and the Global Learning Qualifications Framework. She is a co-editor for PLA Inside Out: An International Journal on the Theory, Research, and Practice in Prior Learning Assessment (www.plaio.org).

CERTIFICATIONS/TRAININGS REVIEWED AND JUSTIFICATIONS

PROCESS FOR CERTIFICATION/TRAINING DETERMINATION

The team researched different certifications in the retail and hospitality areas. Those already evaluated by the American Council on Education (ACE) and the National College Credit Recommendation Service (NCCRS) were identified. The team eliminated those that had already been evaluated by ACE and NCCRS. Decided not to evaluate what any certifications that had already been reviewed. The team then determined the certifications that each of the member Looked at those our institutions could use based on existing degree programs and that had not yet been evaluated. The group met bi-weekly to discuss possibilities, explore ideas and identify the best certification to pursue evaluation.

The National Retail Federation (NRF) has three certificates (Retail Industry Fundamentals, Customer Service and Sales, and Advanced Customer Service and Sales) within their Retail Industry Skills and Education (RISE UP) program. These certifications are used by many retail companies and align with existing degree programs at the member institutions. Held The team held two Zoom calls with the National Retail Federation to discuss partnership opportunities to learn more about the RISE UP program and the possibility to review the certificates for credit through a partnership. In addition, the team explored the Western Association of Food Chains (WAFC) Retail Management Certificate and had one phone call meeting with the organization Western Association of Food Chains to discuss possible partnership to learn more about the certificate.

CERTIFICATIONS NOT CHOSEN AND JUSTIFICATION

The following certifications were researched and found to have existing evaluations with college credit recommendations. These certificates were not chosen because the evaluation would be redundant to the existing evaluation recommendations.

ACE	NCCRS	NOCTI (Also evaluated by NCCRS)
McDonalds Corp Hamburger University	Institute of Culinary Education	Commercial Food
National Restaurant Assoc Safe Serv Food Management Professional		American Culinary Fed—Culinary Arts Cert
Sales 2 Job Academy Level 1 Sales Training		Certified Food and Beverage Executive
Starbucks Coffee		Certified Lodging Mgr
Walt Disney		Recreation Amusement and Attraction
Certified Hotel Admin (CHA)		Rest Food and Beverage
		Retail Commercial Baking
		Retail Merchandising
		Travel and Tourism

CERTIFICATION CHOSEN AND JUSTIFICATION

The team Selected two certification options to explore further: the NRF RISE UP credentials and the WAFC Retail Management certificate.

- National Retail Federation RISE UP Credentials (Retail Industry Fundamentals, Customer Service and Sales, Advanced Customer Service and Sales). The RISE UP credentials have not been evaluated for college credit and : better alignment with curriculum our offered by the member institutions are offering, not yet evaluated for college credit. The RISE Up training credentials are used by many large national retailers such as Macy's and Walmart and, to date, over 60,000 people have participated in the training. The national footprint of the training, combined with the numbers of people who have completed it, suggests a large number of prospective students could benefit from evaluation of this training and apply the credit toward a college degree.
- WAFC Retail Management Certificate. : some of our institutions are already offering this (Sinclair CNM and SLCC). This certificate is already offered for college credit and, in some cases, the program is a bridge to a Bachelor's degree. The certificate is already offered at two of the team's institutions (Sinclair Community College and Salt Lake Community College). The WAFC has clearly defined competencies learned through the program, which is taught through its college partners. They published a list of each partner college and how the credits are applied to their degrees. The team has developed a crosswalk for colleges of these college offerings for other institutions to be able to transfer the courses into their to be able to use for existing curriculum, or for developing new curriculum.

ORGANIZATION/CERTIFICATION/TRAINING DESCRIPTION

CERTIFYING ORGANIZATION DESCRIPTION

https://nrffoundation.org/training-and-credentials/about-rise
As the philanthropic arm of the National Retail Federation, its Foundation builds a bridge between a growing industry with hundreds of thousands of open positions and people looking for a first start, or a second chance. In January 2017, the Foundation launched RISE Up (Retail Industry Skills and Education) training and credentials program. The NRF Foundation has brought together dozens of retailers and nonprofits to present RISE Up, a groundbreaking training and credentialing initiative designed by the retail industry to help people — regardless of educational background, economic means or age — acquire the skills they need to land jobs in retail and advance into promising careers.

https://retailmanagementcertificate.com/
Established in 1921, the Western Association of Food Chains (WAFC) is a nonprofit organization comprised of retailers and wholesalers in the Western United States representing over 7,500 supermarkets and $200 billion dollars in annual sales. The WAFC's primary mission is to provide educational and leadership opportunities for food industry associates that help advance employees into successful careers. The WAFC's most far-reaching educational program is the Retail Management Certificate, an accredited community college program that provides the core skills and knowledge to move into a management role in the retail industry.

The WAFC's education efforts are guided by their board of directors, which includes many of the food industry's top leaders. WAFC company employees are strongly encouraged to earn the Retail Management Certificate and receive special benefits upon completion.

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PARTNERSHIP

NRF: The National Retail FederationNRF is in the process of updating and sharing their curriculum, and certification exams and will share with the team so that it can be evaluated for credit. Although the curriculum is offered by many non-postsecondary institutions, everyone must complete the certification examination. NRF is very interested in having the certification reviewed for college credit and to pursue partnerships with colleges and universities. Currently, most of the partners with the NRF and their Rise-up credentials are local high schools, but they have expressed a high interest in partnering with Colleges and Universities to offer their curriculum for credit.

WAFC: The Retail Management Certificate program was first envisioned in 1999 by a group of forward-thinking retail leaders who shared a concern over the growing skills gap among the workforce in their companies. Together, this group determined a need for education depth among management-level employees to meet the increasingly complex business demands. Utilizing the research of an industrial psychologist, the group identified a set of competencies considered critical for success in retail management and began a collaborative partnership with community college leaders to develop the Retail Management Certificate. In 2013, four of the Retail Management Certificate partner colleges were awarded a $12 million dollar federal grant to enhance the program, and expand nationally to the entire retail sector. The WAFC provides a curriculum crosswalk tool for Community Colleges to use in evaluating current, or developing new curriculum for the certificate program.

DETAILED DESCRIPTION OF CERTIFICATION

NRF: The NRF designed the RISE UP curriculum through input from dozens of retailers and nonprofits to develop a groundbreaking training from retail basics to advanced selling skills. The three certificates are in Retail Industry Fundamentals, Customer Service and Sales, and Advanced Customer Service and Sales. Some of their industry partners who accept the certifications are Macy's, Walmart, The Home Depot, The Container Store, Goodwill, and others. The certifications are undergoing a major revision and will be offered through Penn Foster starting in September 2019.

Examples of topics covered in the curriculum include:
- Retail Industry Fundamentals: 10 lessons across 3 courses and exams in areas such as:
  - o Overview of the retail industry, including career opportunities
  - o Customer service (retail industry standards, customer communication, resolving complaints)
  - o Product sales and merchandising
  - o Safety and security in the workplace
  - o Professionalism and personal effectiveness in the retail environment
  - o Applying, interviewing and preparing for employment in the retail industry
- Customer Service and Sales: 40-60 hour program that is designed to help entry-level sales and service associates larn skills related to frontline work in retail or other industries that use customer service and sales skills. These include, but are not limited to:
  - o About products and services
  - o How to assess and meet customer needs
  - o Preparation for selling, gaining customer commitment and closing the sale
  - o The basics of store operations and inventory control
  - o The process of merchandising
  - o The importance of common employability skills
  - o How to craft a polished resume
- Advanced Customer Service and Sales: 40-60 hours program that is designed for sales and service associates looking to expand their skills in retail and other sales and service-focused industries. These include, but are not limited to:
  - o Preparing for selling
  - o Gaining customer commitment and closing a sale
  - o Developing and implementing plans for selling and follow-up
- In addition to specific information on retail basics, customer service, and sales, the new curriculum will include career development information.

WAFC: The WAFC provides a Community College Toolkit containing an overview of the Retail Management Certificate Program and the step-by-step guide to becoming an approved participating college. Also, an informational webinar that walks through the steps for program implementation using the Toolkit as a guide is provided.

The **Course Outcomes** provided by the WAFC were updated in February 2013 to establish the most relevant, competency based Retail Management curriculum. Community Colleges seeking endorsement from WAFC must demonstrate that their selected courses include at least 75% of the required outcomes listed.

The WAFC also provides curriculum modules designed to enhance all 8 Retail Management Certificate courses. These modules have been developed to help new and existing colleges bring their courses in closer alignment with the required outcomes for each class.

CERTIFICATION ALIGNMENT PROCESS/ PATHWAYS

SUNY Empire State College has an established procedure in place to evaluate training or credentials for college level credit. These procedures follow those developed by the **Consortium for the Assessment of College Equivalency (CACE)**, which also align with those used by ACE and NCCRS. The team decided to adopt SUNY Empire State College's procedure to evaluate the RISE UP program. The process begins with a proposal that addresses the following:

- Justification as to why the organization has not, or is not pursuing American Council on Education (ACE) or National College Credit Recommendation Service (NCCRS) evaluation.
- Frequency of individualized prior learning assessments conducted for the proposed professional learning evaluation or the number of past credits awarded for the ESC PLE approaching renewal.
- The potential number of students (current or prospective) who have completed the training (even if concentrated in one region or program).
- The monetary costs associated with creating and maintaining this professional learning evaluation (e.g., compensation for the individuals on the evaluation team, travel costs, etc.). An explanation of the cost benefits compared to individual prior learnings should be included.
- A justification of potential benefits (e.g. Marketing, Partnerships) and ways in which this review is aligned to the college's mission.
  - o Evidence of stable program administration and sustainability.
  - o Additional supporting materials can be included.

Once the Office of Academic Affairs has approved the proposal, work on the evaluation can begin.At this point, the proposal has been completed and is undergoing approval. Once approval is completed and the RISE UP curriculum is ready (based in their revisions), then a faculty team will be formed and the review completed. The next steps include:

- The Evaluation Team -
- The CL2 coordinates the professional learning evaluation team and its work. The Director of CL2 appoints the evaluation team and the chair, in consultation with the Dean of Undergraduate Studies and appropriate Associate Deans.
- The team includes two or three Empire State College faculty members from different regions with expertise in the areas to be evaluated, and a subject area expert from outside the colleges for any areas where additional expertise is needed. .
- The outside subject area expert can be solicited from other postsecondary institutions, professional and educational associations or non-collegiate organizations.
- Evaluation Procedures - The particular evaluation procedures depend upon the level and nature of the learning being developed, the types of instructional activities or events involved, and the means employed to judge the student's grasp of the learning being evaluated.

The evaluation team reviews and assesses:
  - o Learning content (e.g. curriculum)
  - o Educational or training materials
  - o Instructional activities
  - o Consistency in instructional delivery
  - o Credentials and qualifications of course developers and instructors
  - o Assignments or other activities expected of students both in and out of a classroom

- o Length of training
- o Learning evaluation or assessment procedures
- o Competencies/learning outcomes
- o Registrarial integrity and verification procedures for individuals completing the training or courses

The particular evaluation procedures depend upon the level and nature of the learning being developed, the types of instructional activities or events involved, and the means employed to judge the student's grasp of the learning being evaluated.

The evaluation team should conduct site visits where training or courses are delivered, examine appropriate mediums of instructional delivery, and consult with personnel directly involved in the program delivery. Such personnel are in a position to provide valuable information and assistance that could aid the review team in their determination of college-level learning and possible credit designations. For programs delivered in non face-to-face environments, site visits need to be adapted as appropriate.

The Written Evaluation Report -
The written evaluation report is an in depth description of the review process that documents the team's findings and provides a credit recommendation. In addition, the final report informs the decision-making process for college approval. The final report will includes the following components:

1. Organization overview: A clear description of the organization, including the organizational history, mission, and structure; the location(s) of instructional delivery, with website; constituents served; summary of specific training being evaluated; and the sustainability of the program. Much of this information can be used from the original approved PLE Proposal.
2. Investigative Methods: An outline of the steps the evaluation team followed in the evaluation process.
3. Observations: This is the team's opportunity to detail their observations, including:
   a. Site visit findings.
   b. Documents reviewed.
      i. Specifics of the learning content, such as the specific skills, knowledge and learning outcomes that comprise each component.
      ii. Brief description of the learning experience, objectives, learning outcomes, and methods of instruction.
   c. Evaluative Criteria: A description of the criteria that the team established to determine the academic integrity of the offerings and how these criteria were applied to assess reasonable undergraduate command of the learning components under consideration.
   d. Recommendation: A summary of the review team's findings with justification for credit recommendation, including any specific credit designations as appropriate (e.g., liberal, advanced, general education designation, etc.) If the committee decides to recommend no credit, then justification must be included in the written report.
   e. Start and renewal date: The team's recommendation for a start date, whereby a student who successfully completed the training would be eligible for the credit (i.e., how far back can the training be verified), and a renewal date. All evaluations are reviewed minimally every five years. If the review committee determines that a different evaluation cycle should be implemented, then justification needs to be included within the report.
   f. Verification Procedure: Identify the record keeping procedures, including exact documentation that represents appropriate verification of students' learning. The team should also provide the source of official documentation.
   g. Concerns: Other issues, such as potential redundancy within the program being evaluated or potential overlap with learning obtained through other means.
   h. Review Team Qualifications: A list of the review team members and their qualifications.

PATHWAYS CREATED AT PARTICIPANT COLLEGES

ACE/CSW REVIEW

Will follow SUNY Empire State college (CACE standards) which are built off of wh.at ACE does. CSW took framework and built out competencies for retail. This group will use these competencies in the review.

Pathways Created at Participant Universities

The WAFC Retail Management Certificate Program has an established pathway at Salt Lake Community College (SLCC) and Sinclair Community College (SCC). At SLCC, the certificate program aligns with the marketing management program. At SCC, the certificate program is embedded into the General Business Management AAS degree. SUNY Empire State College accepts the credits transcribed from any regionally accredited institution into business and management degree pathways at both the associate and bachelor's degrees.

The RISE-UP certificates will align with many program pathways at SLCC, SCC, and SUNY Empire in the retail and business areas. Specific pathways will be determined once the evaluation is complete.

OVERALL CONSIDERATIONS AND MINE FIELDS

Through the team's experience, members learned:

Be aware that many certifications have already been reviewed (by ACE and NCCRS); , so do some research and find out what work has already been reviewed are completed.
- While the team identified a long list of organizations with internal programs, getting access to the curriculum is troublesome. Many organizations consider their training curriculum to be proprietary, and are not readily willing to share it with anyone, even for the purpose of evaluating it for credit. Be willing to sign an agreement for non-disclosure with the organizations willing to share the curriculum and materials.
- Be sure to gather information about where a certification is in the revision cycle.
- In the case of RISE UP, the certifications were just entering a review cycle, which delayed the process considerably.
- Org revamping certifications, timelines not always aligned

RECOMMENDATIONS

RECOMMENDATIONS FOR OTHER INSTITUTIONS SEEKING TO LEVERAGE INDUSTRY CREDENTIALS

Do not try to reinvent the wheel. Follow **CACE standards**, which are already proven.
- It is important to buildBuild a relationships first and be clear about the benefits, risks, and expectations to organization.
- Understand that once a credential that you offer is available, getting to the correct decision maker in the industry that can adopt and approve it is not an easy task. Getting the buy-in from industry partners up-front is a key to success.
- Develop a funding model to cover expenses, such as faculty compensation and travel to visit any partner training sites.

RECOMMENDATIONS FOR INDUSTRY CREDENTIAL GRANTORS

- Ensure the credentials have clear learning outcomes or competencies
- Have clear assessment processes (easy to understand what is being assessed) Make sure assessment processes match learning outcomes/ competencies
- Ensure there is clear alignment of curriculum with learning outcomes/ competencies
- Develop a non-disclosure agreement for any training that the organization has concern about sharing. The legal document will help protect proprietary materials.

RECOMMENDATIONS FOR FUTURE FUNDING OR DEVELOPMENT

- Provide different Financial Model that institutions can utilize to compensate faculty and cover other costs.
- Develop a strategy model that is feasible faculty needed and compensation Feasibility of the model at different institutions to conduct workplace learning for credit.
- Review of the ROI/ expected ROI results and provide guidance around, what is expectation and how to determine if it is worth moving forward?

BEST USES OF THIS INFORMATION

The lessons learned by the team and recommendations should provide other institutions with ways to engage in reviewing industry training, licenses and certifications.

REFERENCES

WAFC Retail Management certificate Community colleges crosswalk combined:
https://docs.google.com/spreadsheets/d/1nfqPtGLDTb-HX0ag5Rvh1iG0CRNHWxsV/edit#gid=1957695667

WAFC Crosswalk Form:

WAFC Website:

NRF Website:

COMPETENCY-BASED
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