TRANSFORMING FUTURES

Building Maritime Partnerships and Career Pathways that Work

Barbara Murray, Executive Director and Principal Investigator of the Southeast Maritime and Transportation (SMART) Center
The maritime and transportation industry is undergoing a seismic shift. The need for maritime and transportation services is growing rapidly as the industry plays an increasingly critical role in national economic development and global competitiveness. However workforce development is not keeping pace. Industry employers are seeking innovative ways and new partnerships within regional community colleges to help identify, engage, train, and employ workers to meet the projected maritime and transportation industry growth pattern. The Southeast Maritime and Transportation Center (SMART Center), a National Science Foundation Advanced Technological Education (NSF ATE) Program working with community colleges, is gathering support of industry leaders in creating and expanding career pathways to facilitate the worker education, training, and employment process for industry partners with the goal of creating models for replicating successful projects nationwide to stimulate sustainable growth of a well-equipped and knowledgeable workforce.

Industry Background

The maritime and transportation industry facilitates the movement of people and cargo by waterway. It is a critical component of our nation’s economy. There are more than 3,700 marine terminals in the U.S. which move goods through an intermodal transportation system by train (on 174,000 miles of railway) and by truck (on 45,000 miles of interstate highway). Currently the marine portion of our nation’s transportation system accounts for $2 trillion worth of domestic and international cargo. The projected future growth of industry value is exponential because as U.S. Transportation Secretary Ray LaHood noted, “water transportation wcongestion.” The U.S. Department of Transportation’s Bureau of Transportation Statistics estimates that by the year 2020 the value of marine freight will increase by 43% domestically and 67% internationally.
The SMART Center

The National Science Foundation (NSF) awarded the SMART Center as an ATE (Advanced Technology Education) Center in September 2010. The SMART Center is Virginia’s first and only NSF ATE Center. The SMART Center’s mission is to help create a sustainable, highly-skilled knowledge-based workforce focusing on four sectors of the maritime and transportation industry:

- shipbuilding
- ship repair
- port management and logistics
- sea-going

The Center’s seven-pronged strategy to meet its overarching mission includes:

- Serving as regional and national model to catalyze synergy between research, career pathways, and education for industry, students, and faculty
- Promoting awareness of careers in maritime, transportation and logistics to high schools, community colleges, four-year institutions, and beyond
- Developing career pathways and education programs to align with industry workforce needs
- Consolidating education criteria for specific maritime occupations
- Facilitating portability of recognized credentials among regional employers
- Laying groundwork for future industry-developed education-based certifications for critical job roles in maritime and transportation
- Creating a maritime and transportation education and industry repository

Working with industry partners is vital to the SMART Center’s success. SMART Center leaders work closely with key industry partners to help design, develop, and implement models for maritime and transportation industry career pathways, and to facilitate needed education, certifications, and preparation of middle-skill workers to serve as our nation’s next generation of maritime and transportation industry workforce. Our industry partners represent 50,000+ employees and include Newport News Shipbuilding, BAE Systems Ship Repair, U.S. Naval Ship Yards, Colonna’s Ship and Yacht Repair, Earl Industries,

The SMART Center’s work also focuses on working with educators and faculty, from middle school to college to employment. Community colleges play an increasingly critical role in helping prepare well-skilled students to assume needed roles in industries that form our nation’s backbone such as the maritime and transportation industry. According to authors Dan Hull and Richard “Dick” Hinckley in their book Adult Career Pathways: Providing a Second Chance in Public Education, “the community college finds itself at the center of an economic and educational crisis as:

- demands for a technologically skilled workforce increase
- financial and societal pressures on unemployed workers mount
- remediation needs of the underprepared adult student population grow”

The SMART Center’s community college partner work is to help prepare future maritime and transportation industry workers with needed STEM competencies as well as technical skills training through the community college system, creating a pipeline of knowledgeable, well-equipped workers for our industry partners. This may result in less pre-employment training time and costs and enabling them to meet the projected industry workforce need (increased sustainability).

Maritime Transportation Industry Workforce Need

Maritime transportation occupations will be the fastest growing category in transportation occupations. However the industry is currently dominated by an aging workforce. The impending retirement of baby-boom era employees creates a high demand for a pipeline of younger workers. Currently there is a lack of technically skilled workers entering this industry. According to analysis results from 2011 SMART Center focus group participants from industry partners and educators in Florida, Mississippi, and Virginia, the need for skilled workers will greatly increase and entry-level and middle-skilled workers, will need to meet higher technical requirements than previous generations of maritime and
transportation industry employees.

At the same time the need for new workers in the industry is expected to spike while the number of expected high school graduates is dropping. According to the U.S. Department of Education's National Center for Education Statistics (NCES) the number of high school graduates increased nationally by 32% over the 12 year period between 1995-96 and 2007-08. However the graduating population is projected to decrease by 3% over the 13 year period between 2007-2008 and 2020-21.

Despite an anticipated decline in high school graduation rates over the next eight years, the national education system is placing a stronger emphasis on Science, Technology, Engineering, and Math (STEM) curriculum to prepare students for the projected rate of occupation growth in STEM-oriented-related jobs. According to the U.S. Department of Commerce STEM-related job growth over the past 10 years grew three-times faster than non-STEM related jobs. Looking ahead, STEM-related occupations are projected to grow by 17% by 2018 (compared to 9.8% growth in non-STEM-related jobs).

The heightened emphasis on STEM-oriented coursework for middle and high school students in particular, bodes well for the maritime and transportation industry. Workers entering the maritime and transportation industry over the next two decades will need to meet higher technology requirements across job functions within the industry as compared to entry level requirements demanded for today's retirement age workers. At the same time future workers can look forward to enjoying a higher pay rate within the industry as compared to pursuing work in non-STEM oriented jobs. STEM-related occupation workers command 26% more than non-STEM occupation counterparts, a benefit which needs to be widely communicated to today's student population.

Career Pathway Construction

Currently there are three primary pathways or entry points into the maritime transportation industry:

- **High school students** graduating and going to work directly for a maritime transportation industry employer for a specific occupation (i.e. mariners, deckhand, marine electrician)
• **“Re-careering” adults** entering the industry through taking courses at regional community colleges or proprietary programs

• **Military members** transitioning out of active duty to civilian maritime careers (“military to maritime”)

One of the SMART Center’s goals is to collaborate with industry partners and educators to communicate effective maritime and transportation industry career pathways that align with identified industry entry points. According to the National Career Pathways Network, a career pathway is a “coherent, articulated sequence of rigorous academic and career/technical courses, commencing in the ninth grade and leading to an associate’s degree, baccalaureate degree and beyond, an industry recognized certificate, and/or licensure.” The goal of the SMART Center’s career pathway, long-term work is to create awareness about the maritime and transportation industry career opportunities within the field and to help define and clarify the educational pathways to those jobs. The SMART Center endeavors to demonstrate by disseminating the best educational and training choices to make at each point of the pathway between high school and full-time employment so that future workers can access the best, most suitable training, education, and hands-on experience relevant to industry needs.

The SMART Center is building on unique programs and endeavors to model the pathway to meeting identified industry workforce needs, create points of connection between a prospective workers’ background and skill competencies, and facilitate a more rapid pre-employment training process to get workers qualified and productive.

**ENTRY POINT: HIGH SCHOOL TO SPECIFIC MARITIME OCCUPATION**

There are three predominant career pathways for high school students interested in pursuing future employment in the maritime transportation industry:

• going to work for a maritime transportation industry company straight out of high school or upon completion of a GED,

• enrolling in a Department of Labor registered apprenticeship program following high school graduation, or with college courses

• enrolling in community college and taking classes toward earning industry recognized credentials and/or college diplomas designed with and by
industry working with regional community colleges.

The SMART Center partners with industry and educators to meet the challenges and opportunities presented through each of these three career pathways, to develop and sustain a new American workforce.

Pathway 1: Going to work for a maritime transportation employer out of high school

While high school graduates can and do enter the maritime transportation industry directly from high school there are not currently enough students aware of the vast number and type of potential career opportunities for well-prepared students to come onto employment sites in key, needed jobs.

The key issues at this entry point into the labor market for the SMART Center are two-fold:

• Raising awareness and preference for maritime and transportation employment opportunities with key influencers of high school students (i.e. career and guidance counselors; science, math, and technology teachers, coaches, principles, parents.)

• helping influencers and students (at both the high school and middle school level) understand the series of courses should be taken in order to be well-qualified for future employment in the maritime and transportation industry

The SMART Center’s first initiative toward meeting both of those goals is the SMART Maritime Educators Institute. The Institute was launched in 2011 to engage career counselors, STEM high school teachers, community college faculty, and industry partners by providing them with an immersive experience in the maritime and transportation industry so that they are better equipped to direct students along the right pathway to enter the industry. Over forty teachers participated in two, separate, five-day SMART Institutes.

As the SMART Center expands its cadre of SMART education leaders, they will replicate the Maritime Institute more to include front-line educators and career coaches. These “student influencers” will be better equipped to get students on the career pathway to the maritime transportation industry and take classes that will help ensure they have the education and skills to be a well-qualified candidate for employment.
Pathway 2: Enrolling in a Department of Labor Registered apprenticeship program:
The strong, predominant pathway from high school, or community college, to a maritime and/or transportation industry career is through a registered apprenticeship program. Through this pathway, an apprentice enters a 4 year (typical) program during which he or she:

- gains transferable on-the-job (OTJ) experience under supervision of a craft mentors
- completes at least 144 hours (equivalent to 3-4 courses) of Apprenticeship Related Instruction (ARI) per year
- obtains an academic load of college classes, where tuition is usually paid by the employer
- earns incrementally increasing wages for all work experiences
- usually receives employment benefits including paid vacations and holidays, pension plan, health insurance, life insurance, worker’s compensation, etc.

Graduates of most maritime registered apprenticeships programs in Virginia also earn an academic credential (such as an AAS degree) Associate of Applied Science, or a college certificate in Maritime Technologies, in addition to earning their Department of Labor national credential, the “Journey Workers” certification in their earned trade (occupation).

One local Virginia model for Academic credentials, embedded in the maritime registered apprenticeship curricula includes earning college (career studies diplomas) certificates:

- Maritime Technologies
- Maritime Welding
- Marine Diesel
- Marine Electrical
- Marine Mechanical
- AAS in Maritime technologies
- AS in Engineering (advanced program/NNS grads)

“It’s important for people to realize that apprenticeships aren’t just for students coming directly for high school. In fact 60% of our students at The Apprentice School are graduates from four-year colleges who haven’t been able to find a job or want to move into an industry that promises opportunities for upward mobility. Apprenticeships offer students and workers the ability to learn one of 25 different needed trades that can become the foundation for an entire lifetime and successful career.

Everett Jordan
Director
the Apprentice School
Newport News Shipbuilding
These academic credentials are earned in addition to the goal of earning their “journeyperson’s” certification while in the apprentice program, which may assist the graduates’ eligibility for a higher pay rate and benefits in post program full-time employment.

The registered apprenticeship program also provides employers with several important benefits. One successful outcome, gaining in strength over 6 years, is collaboration of otherwise “competitors” in the industry meeting together each quarter at the “neutral community college site” of SMART Center to work with the college's dean, workforce, and one another to request specific cohort-based courses filled with apprentice students. This has spun into networking and sharing among the industry leaders, as well as a leadership-base for reviewing SMART Center strategies, materials, events, and curricula concerns and innovations. Chiefly the program creates a multi-credentialed, motivated workforce. Employers running a registered apprentice program have demonstrated a higher employee retention rate which reduces cost and produces a more loyal workforce. In addition apprenticeship programs have been shown to result in higher production rates. Companies can train employees according to organizational preferences. In addition companies may lead on contracts such as the Navy/DOD contracts awarded to organizations with proven highly skilled workforce.

The SMART Center is creating the model by which to communicate and disseminate these pathways, so to encourage greater student participation in, registered apprenticeship programs nationwide and specifically in the Southeast. In addition the SMART Center is linking registered apprenticeship programs with embedded academic credentials to expand career pathways. For example, registered apprenticeship students complete a specific number of classroom training hours annually (minimum of 144 ARI hours) as well as structured on-the-job (OJT) training. Typically the classroom hours would not accumulate toward a degree. However at the SMART Center’s headquarters (Tidewater Community College) students’ coursework is planned so that earned college credentials are embedded in the apprenticeship related instruction (ARI), 4 year curriculum, opening the opportunity for students to build upon their education and potentially earn a certificate, then degree. SMART Center’s Executive Director Barbara Murray oversees the (20+) Hampton Roads Sponsor’s, program ARI curriculum approval for more several maritime-related registered apprenticeship programs.
Pathway 3: Enrolling in the community college and taking classes toward earning college or industry certifications in a maritime and transportation industry-related job.

Through initiatives like the Maritime Teacher Institute, the SMART Center is raising awareness among STEM teachers, college faculty, career counselors/coaches, and other student influencers about opportunities for future employment in the maritime and transportation industries for high school and college students. The opportunity to get a “jump start” on required coursework is offered in maritime and transportation (logistics) job clusters by students taking dual enrollment (DE) classes for credit during high school as offered through the regional community college. By completing community college coursework toward industry certification (College Career Studies Certificates) the SMART Center is communicating ways for high school students nationwide to more quickly earn both industry certification and/or an associate’s degree which may motivate next steps towards earning a four year degree.

ENTRY POINT: “RE-CAREERING” ADULTS COMING TO THE INDUSTRY THROUGH COMMUNITY COLLEGE

The number of students enrolling in postsecondary degree-granting institutions increased 43% over the 14 year period from 1995 – 2009. However the enrollment rate is expected to slow down dramatically and grow by only 13% to 23 million over the 11 year period from 2009 -2020. The age group showing the highest projected postsecondary enrollment rate is 25-34 year olds (21%) followed by “re-careering” age adults age 35 and older (16%). Students age 18-24 are only expected to increase in postsecondary school enrollment by 9% during the same time period.

In discussions with industry partners the SMART Center identified a need to not only increase awareness about job opportunities within the maritime and transportation industry but also provide initial craft training for community college students. Partners asked for education providers to be able to complete hands-on, skilled training coupled with theory in a mobile or transportable classroom focusing on one of the top focus-group identified industry workforce need: marine electricians. To meet that need the SMART Center staff and five regional community colleges are working closely with Maritime industry partner Huntington Ingalls Industries (Newport News Shipbuilding) to create a process and
model program by which to implement a “portable Lab/Mock-up in a Box.”

The model for working with industry and education to implement portable SMART Maritime Training (CONEX box) classroom will give students an immersive experience into what work in the industry is like for marine electricians. The portable classroom will be modified for training purposes by outfitting it with lighting, electrical control panels, etc. The container’s size and structure will simulate the real work environment marine electricians experience aboard ships and students will use the same tools and materials used on the job in a “mock-up” classroom. For example: CONEX Box classroom experience students will learn critically-needed job skills to include:

- the basics of installing, testing, and repairing electrical wiring, fixtures and equipment according to code
- how to use electrical testing devices
- how to identify and properly use hand and power tools
- how to inspect electrical systems and diagnose the source of electrical system malfunctions

The portable, mobile training classroom approach is cost-effective. This model is bringing together key industry and education players, regardless of “borders”, to provide training “where it is needed”, and provides a replicable model for industry and ATE centers nationwide. Instead of attempting to build out simulated work environments in multiple locations the high-tech, hands-on classroom will be via a tractor trailer and transported and activated for students learning at partner community colleges and potentially at high schools. The SMART Center’s initial industry partner in the portable (CONEX box) classroom project is Huntington Ingalls Industries (HII). HII is assisting the Center’s leadership in identifying the specific industry need (in this case, students with hands-on marine electrical training). HII/NNS marine electricians will build and outfit the portable training classrooms. The SMART Center will provide the professional development through a 40 hour “Train the Trainer” course, followed by 80 hours of monitoring and teaching topic experience on the shipyard. The SMART Center will retain master scheduling for the portable classrooms as well as track all student completions with longitudinal success tracking (training to job and to retaining in maritime workforce).
The SMART Center intends to develop this model for development and implementation to share with other regions, NSF ATE Centers, and industries, where by the community college and industry partnership “innovation to careers” model may provide a shorter workforce development opportunity and solution.

Ultimately the SMART Center’s goal with tracking the development and implementation, followed by successes and challenges will provide value in developing a model to be shared with industry and education. The portable maritime training model (CONEX box lab) will be evaluated for program successes with plans to expand to include additional industry partners and regions, enabling us to replicate this model with other NSF ATE Centers and community college partners nationwide.

ENTRY POINT: MILITARY MEMBERS TRANSITIONING TO MARITIME CAREERS (“MILITARY TO MARITIME CAREER PATHWAYS”)

Activity duty military service members looking to transition out of the military present a natural pool of well-qualified, skilled, and knowledgeable potential employees for the maritime and transportation industry. Currently active military personnel looking to separate from service learn about civilian career opportunities through Transition Assistance Program (TAP) classes offered at military installations. However there is not enough awareness at the TAP level about civilian opportunities in the maritime and transportation industry which would be a natural fit for separating service members.

There is also a widespread lack of understanding within the military about how military-acquired competencies and certification could cross over into maritime transportation industry work. For example if a Navy sailor demonstrated proficiency as an engine specialist he or she should be able to learn through TAP classes and other post-military employment outplacement sources and connections that a similar position in the civilian maritime and transportation industry would be a natural fit. Likewise if a U.S. Army soldier was a logistics or project manager they should know that there are natural opportunities for employment requiring the same skill set on the port side of the industry.

The SMART Center is working with the new Military and Veterans Education center to build “crosswalks” from competencies in the military to equivalent or
similar job opportunities in the maritime transportation industry. This approach will be similar to the model currently done well with the “Troops to Energy Jobs” initiative. The goal is to create the maritime and transportation industry's leading repository of information and materials about job opportunities for veterans as well as work closely with military outplacement services to help soon-to-be veterans:

• learn about potential career opportunities within the maritime and transportation industry related to their current and/or past military experience
• transfer military experience into earned credit at a participating community college if additional education is required
• identify the courses, training, and certifications that may be necessary for service members to transition from the military to the maritime and transportation industry
• connect with other veterans who have made the transition into the maritime transportation industry for mentoring and networking opportunities
• accumulate nationally-recognized portable credentials

In addition to active duty members of the military, graduating midshipmen from merchant marine academies such as the United States Merchant Marine Academy (USMMA) in King’s Point, New York, and other maritime academies, representing an excellent pool of future workers for the maritime and transportation industry. Graduating midshipmen have knowledge, training, and experience in marine transportation or marine engineering. Both fields have direct relation to maritime and transportation industry jobs. Students majoring in marine transportation studies need to know how their studies in ship navigation, cargo handling, and navigation rules correlate to real-life jobs in the industry such as deckhands and mates. Likewise, midshipmen with training in marine engineering need to be made aware of civilian career opportunities within the maritime industry such as deck engineers.

Unlike graduates from other military academies, USMMA graduate can fulfill their post-academic military service obligation by simply submitting proof that they are currently working in a MARAD-approved occupation. One option for meeting their military service occupation is employment within the maritime industry for at least five years following graduation; currently one-third of USMMA graduates choose this career pathway. The SMART Center seeks to
assist in increasing that number through broader communications and dissemination of clearer career pathways. Specific certifications related to merchant marine academy education paths assist graduate midshipmen understand how their acquired competencies relate to a full-time position within the maritime and transportation industry.

Another military-related career pathway under study is expansion of the NAVSEA-based course competencies to employ just-in-time training by pairing web-based instruction with hands-on trainers. The SMART Center is working with industry partners (AMSEC, BAE Systems) to teach classroom with hands-on lab experiences in multiple coastal regions. For example, an instructor in Norfolk, Virginia can do webinar classroom work with a group of students in California and Florida, where students can then get hands-on training at a structured, replicable lab through a local community college.

**Conclusion**

The maritime and transportation industry must aggressively pursue new, and innovative ways to identify, engage, educate, and train prospective workers to meet the industry’s swift projected growth rate. The SMART Center, in its role as a National Science Foundation (NSF) ATE Center, is the neutral catalyst to work with and build lasting relationships with industry leaders and educators to formalize efficient pathways from multiple labor market entry points into full-time maritime and transportation industry employment. By equipping future students and workers with the skill sets and educational background needed from as early as middle school, industry employers will be able to attract more highly-qualified and experienced workers, thereby lowering their employee acquisition and training costs, increasing their workforce retention rates, and expanding and sustaining our nation’s maritime and transportation industry capabilities and global competitiveness.
Southeast Maritime Transportation (SMART) Center, one of 40 Advanced Technology Education (ATE) Centers funded by the National Science Foundation, endeavors to strengthen the skills of technicians through community college leadership with universities, secondary schools, businesses and industry. DUE 1003068

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