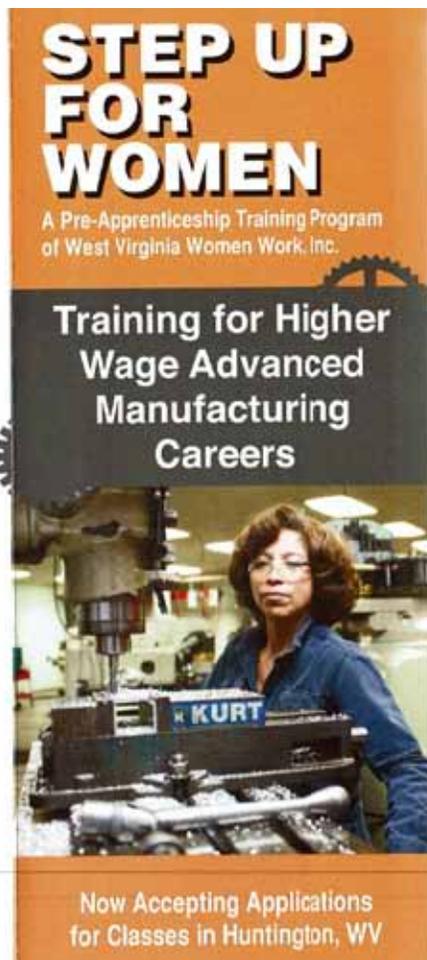




STRATEGIES FOR MEETING THE DEMAND FOR ADVANCED MANUFACTURING AND SHIPBUILDING WORKERS:

WOMEN-ONLY PRE-APPRENTICESHIP PROGRAMS IN MISSISSIPPI AND WEST VIRGINIA

Apprenticeships provide an opportunity to earn while learning and acquiring industry-recognized qualifications for well-paid jobs.



The average salary for someone who completed an apprenticeship is \$60,000 per year.¹ The hourly starting salary of an electrician (the most common apprenticeship) after completing an apprenticeship was \$23²; for a 40-hour week this translates to \$920, substantially higher than the median weekly earnings of \$836 for a worker with an Associate degree (of \$838 in 2017).³ Apprenticeships in advanced manufacturing and the trades offer pathways to good jobs with family-sustaining wages and benefits and are a proven and cost-effective model for employers seeking to ensure that they can meet their future need for skilled workers.⁴

Manufacturing companies are seeking a new generation of skilled workers to replace retirees and build the foundation for growth. A recent report by Deloitte and the National Institute for Manufacturing estimates that by 2025, 2 million vacancies may be unfilled, because employers are not able to hire workers with the right skills.⁵ Women represent a vast pool of potential new manufacturing employees, currently making up only three in ten manufacturing workers, despite the shortage of talent.⁶ In occupations with growing numbers of registered apprenticeships, for jobs such as machinist, welder, or aircraft technicians, women make up no more than one in twenty workers.⁷

Compared to many other jobs in the private sector that do not require a college education, manufacturing jobs pay higher hourly wages and are more likely to provide vital benefits such as health care, paid leave, and retirement benefits.⁸ Finding a full-time job with hourly earnings above the minimum wage can be a challenge in traditionally held female jobs in many parts of the country. Unlike many jobs in retail, caregiving, and leisure services, jobs in manufacturing are more likely to offer full-time work with predictable schedules. Tackling women's under-

"I want a job running a lathe: making something is amazing! All of us would like a lathe in our garage..."

Student of West Virginia Women Work Step Up for Women program

representation in manufacturing and improving access to good manufacturing jobs can help women achieve economic security for themselves and their families.

Yet, there are few existing efforts to encourage and train women to enter in-demand manufacturing jobs. Such initiatives can help introduce more women to jobs that have, in recent years, been predominantly held by men, and to break counterproductive gender stereotypes that stunt economic growth.

This brief describes how two women-only pre-apprenticeship programs, **West Virginia Women Work's Step Up for Women** and Moore Community House' **Women in Construction** program in Mississippi, are preparing women for career pathways that meet the needs of families as well as the demands of the manufacturing and shipbuilding industry. This report is based on site visits and interviews with program leaders, participants, employers, and other program partners.

Women-Only Pre-Apprenticeship Programs in Advanced Manufacturing: Program Overviews

West Virginia Women Work, Inc. (WVWW) was founded in 2000 to offer pre-apprenticeship programs for women

to enter the skilled trades. WVWW is applying its expertise gained by training women to enter nontraditional jobs in construction to manufacturing. In 2016, WVWW partnered with the Robert C. Byrd Institute (RCBI) **National Advanced Manufacturing Partnership** (NAMAP) Initiative, 'Apprenticeship Works!' Funded by a five-year grant from the U.S. Department of Labor NAMAP works with partners in 14 states to expand apprenticeship opportunities in advanced manufacturing. WVWW has worked with RCBI to design and deliver the **Step Up for Women Advanced Manufacturing Pre-Apprenticeship**, a 10 week training program to prepare women for entry-level manufacturing positions in machining, inspection and quality control, "Computer Numerical Control" (CNC) machining, and assembly. RCBI provides the technical training, WVWW is responsible for recruitment, case management, work readiness skills, and job development.

To date, five cohorts of women – 53 women - have completed the training, including four programs in Huntington, WV, and one in Bridgeport, WV. Of these 75 percent have been placed into jobs.⁹ Two thirds of students were unemployed before joining the program, and 97 percent had household incomes of less than \$25,000 per year.

Moore Community House Women in Construction (WinC) is located in Biloxi, MS and was founded in 2008, the aftermath of Hurricane Katrina, when many women lost their homes and jobs, and the need to rebuild the region provided opportunities for women with construction skills to enter jobs with family sustaining wages. WinC offers approximately five programs a year. Classes are taught full-time during the day and at least one program is offered in the evenings and on Saturday. Moore Community House also offers shorter upskilling

"I feel I am making history training for these jobs! The fact that this program is women-only means it is challenging - but not intimidating."

Student of Moore Community House Women in Construction program, Biloxi, MS

"I have an AA degree in business administration- it is hard to find anything that pays more than \$9 per hour, and nothing full-time."

Student of West Virginia Women Work Step Up for Women program

opportunities to its graduates. WinC programs prepare women for nontraditional jobs in construction and shipbuilding. Shipbuilding is an important sector in the region; through Huntington Ingalls Industries Inc. (Ingalls Shipbuilding)–the largest single employer in the region of approximately 11,600 workers–shipbuilding is also the largest sector for registered apprenticeships in the region, including trade apprenticeships as welders, electricians, pipefitters, and machinists.

Since Moore Community House WinC programs were first offered, 37 cohorts of more than 500 women have graduated. With the help of federal and state child care support grants (see also below), enrolment was recently increased from 60 to 180 women per year. Seventy five percent of students were unemployed, and the remain-

der underemployed before enrolling. Approximately 70 percent of graduates are employed; typically three or four women from each cohort find work in Ingalls or other shipbuilding related jobs.

Moore Community House works closely with Mississippi Gulf Coast Community College and other approved training providers to co-enroll and provide advanced training in the metal trades to women that have successfully completed the WinC program.

Both programs, Step Up and WinC, are free of charge to participants; participants typically have to cover their own living expenses while pursuing the training but can receive partial to full reimbursement for the costs of tools, work and safety gear, and transportation. WinC program participants receive full funding for child care for as long as 12 months (during training and the initial period of their employment).

The Need for Women-Only Training in Nontraditional Careers

Advanced manufacturing can offer rewarding careers to women and men. Yet stereotypes about gender and who is right for a job can be difficult to shift. This is true as much for potential women workers as it is for employers. Employer skepticism can make it difficult for women to find jobs in male technical fields without an intermediary to vouch for them and their skills. A WinC student recalls a typical experience while she was visiting a job fair and approached a utility company about posted job openings for linesmen. She was told that the company did not have any female linesmen, but that there were lots of open clerical positions.



"I am getting close to retirement–this type of work is what I have always wanted to do. At last I got a chance."

Student of Moore Community House Women in Construction program, Biloxi, MS

In addition to providing women with the skills required to make them competitive candidates for entry level positions in manufacturing, Step Up, WinC and other women-only pre-apprenticeship programs¹⁰ work with employers to ensure that their graduates are given a chance to work in their chosen fields.

Women are more likely than men to pursue training and education, but because of lower earnings in typically female fields, their post-education earnings are lower.¹¹ At WVWW, many women students have college degrees, and college debt. Julie Kuklinski, Director of WinC, explains, "Often students come to us with binders of credentials, amounting to ... another \$9 job. There is very little guidance on how to build credentials into a proper job. We train women for typically male jobs because the earnings in those jobs can keep them out of poverty."

"Often students come to us with binders of credentials, amounting to another \$9 job. There is very little guidance on how to build credentials in a good job with a living wage. We train women for traditionally male jobs because the earnings in these jobs can allow women to make good money with good benefits to support their families and keep them out of poverty."

Julie Kuklinski, Director of Moore Community House Women in Construction program

While many women in the WVWW programs come from 'manufacturing families' with fathers, uncles, brothers and other family members who work in manufacturing, there are so few women in these jobs that it could appear that women are not welcome. One woman graduate explained, "Until I read the Step Up program materials I thought that women were not allowed to do these type of jobs." She recently started a job as a CNC operator, earning \$14 an hour, with benefits. In her previous job in a call center, which she had lost when she joined the WVWW Step Up program, she had just earned \$9.50 an hour, after several years in the job.

A WinC participant describes why she appreciates the women-only instruction: "I feel I am making history by training for these jobs! [being in the women-only program means] it is a challenge, not intimidating." Another WinC participant explained, "I am getting close to retirement- this type of work is what I have always wanted to do, at last I got a chance."

Welcoming Women into Well-Paid Jobs: Outreach and Recruitment

Outreach is an important part of what the programs do to encourage women to consider careers in manufacturing and other technical careers where women are underrepresented. WinC and Step Up develop flyers and information materials which directly target women, reach out to job centers and other locations women may frequent, such as doctors' practices, hospitals, and shelters for survivors of domestic violence. Both programs also make their expertise on designing outreach materials available to companies and training providers interested in reaching out to women.¹² The programs do not glorify manufacturing work. WVWW's website for example includes

the following: "Advanced Manufacturing positions can be very physically and mentally challenging. They require long hours standing on concrete. Workers must sometimes lift 40 pounds. The machines themselves are loud and dangerous. An employee must be aware of their actions and surroundings at all times. The work can also be very repetitive, especially in an entry level position. Manufacturers may also have swing shifts, overtime, or 12 hour shifts."¹³ The goal is to recruit women who will choose manufacturing jobs knowingly, with the intention to make this their career.

One of the biggest barriers for women who inquire about the programs can be the need for a driver's license and access to reliable transportation; factories and work sites are often in the country side, and even when they are close to public transportation, may involve night work or early starts when buses don't run.

Both programs are increasingly using social media to advertise the programs. Melinda Perron, Program Coordinator at WVWW's Huntington Step Up site, has found Facebook ads to be a cost-effective way of getting information about the Step Up manufacturing program to women. Through Facebook, WVWW can target information about the program to women living locally.¹⁴ She estimates a cost of 10 cents per person reached, a very competitive rate compared to other media. WVWW's ads reflect what motivates women, such as earning high wages and making their children proud of them. Melinda Perron recounts that one of the most successful ads they used included the photo of a little girl in steel toed boots (see box). The ad was shared over 500 times on Facebook.



"We design our ads to target what may motivate women. The Facebook ad with this photo was shared over 500 times."

MELINDA PERRON

Program Coordinator, WVWW Step Up Huntington.

"Until I read the Step Up program materials I thought that women were not allowed to do these type of jobs [in manufacturing]. After a couple of temporary jobs, I was just hired for a job paying \$14 per hour with benefits. I am excited, and so are my teenage kids. "

Graduate of West Virginia Women Work Step Up for Women program



You can never start outreach early enough: A WinC student is investing in WinC wear for her granddaughter, whose mother, too, is a WinC graduate.

“We offer pathways to well- paid jobs in manufacturing and construction. Child care makes that opportunity available to women who otherwise would not be able to take advantage of these opportunities.”

CAROL BURNETT

Director of Moore Community House

Program graduates are one of the most effective mouth pieces for women in the trades. WinC’s recent class included the mother of a graduate (see box). WinC graduates often participate in WinC’s outreach, visiting high schools and other events where women gather.

WinC and WVWW are a regular presence at regional job fairs; this serves the dual purpose of communicating to women job seekers that trades and technical careers are for them, and to communicate to employers with vacancies that women, particularly WinC and Step Up graduates, are great candidates for those jobs.

Opening Nontraditional Job Training to Mothers of Young Children through Child Care

Many of the participants in the advanced manufacturing programs are mothers, and providing for their children and making them proud is an important motivation for many women entering the programs. Close to half of WVWW Step Up participants, and the majority of participants of WinC programs are single mothers. The high cost and scarcity of quality child care means that few mothers of preschool children are able to attend the training. Another obstacle comes from the mismatch of working hours and school, child care, and Head Start opening times. According to WVWW’s Melinda Perron, child care breakdown is the most common cause for women to drop out of the program.

With the help of child care specific grant funding, Moore Community House has recently been able to remove the child care barrier for its participants.¹⁵ As a result, the number of students with young children in WinC programs has increased dramatically. Moore Community House is one of 14 organizations nationally awarded a Strengthening Working Families grant from the U.S. Department of Labor.¹⁶ The grant, and additional funding from state of Mississippi, allows the program to provide child care and additional supports to mothers during their training and for the first few months of their job. Prior to the new funding, women with young

children were approximately 50 percent of students. Since 2016, their share of all students has increased to 71 percent, and their numbers from 30 (of 60) to 127 (of 180) students. Carol Burnett, Director of Moore Community House, describes the motivation behind the grant funded program: “We offer pathways to well- paid jobs in manufacturing and construction. Child care makes that opportunity available to women who otherwise would not be able to take advantage of these opportunities.”

Moore Community House was founded almost 100 years ago to provide child care to women working in the factories on the Gulf Coast.¹⁷ It still provides child care through an Early Head Start center; several of WinC program students and graduates receive child care through the center. The grants also allow Moore Community House to systematically address the child care needs of student parents by offering financial assistance for the cost of child care, paid directly to a licensed facility of the mother’s choice. In addition, the program works closely with the mother to help her find and choose a facility that fits her and her children’s needs and schedules.

Building Technical and Workplace Skills

Both programs offer a blended curriculum of hands on technical skills, blueprint reading and measurement, and manufacturing/construction math, and work readiness and job search skills. Leaders of both programs report that building soft skills- particularly related to working in a male-dominated industry- and confidence can be as important as the technical components. Both programs work closely with industry partners to ensure that their students have relevant skills.

TECHNICAL INSTRUCTION:

Step Up for Women program participants spend two thirds of their time on technical skills, and one third on work readiness. Instruction takes place at RCBI centers, which are set up for providing exposure to different manufacturing equipment and production processes. Women learn the basics of operating lathes and mills, setting up CNC machines, and inspection and quality



The participation of mothers of young children has increased dramatically in WinC programs since comprehensive child care supports have become available.

“Often our students have lots of relevant experience to highlight, such as building a porch, or repairing their car, or having been a very reliable worker at a previous job- but we really need to work with them to recognize these achievements.”

LAKIESHA HINES

*Program Coordinator,
WVWW Step Up Bridgeport*



Hands-on instruction at the RCBI training center in Huntington as part of West Virginia Women Work Step Up for Women program.

control. The technical skills are taught by RCBI instructors. A WVWW Step Up graduate shares her enthusiasm, “I want a job running a lathe: making something is amazing! All of us would like a lathe in our garage...” WVWW Executive Director Kristina Szczyrbak explains, “What women need from the program is a basic familiarity with manufacturing principles and the machines that are being used. Here in West Virginia, every manufacturing shop has its own customized machines; employers know that any new employee will need training on their machines: they are looking for a general familiarity rather than very detailed skills.”

The WinC program provides general industry training for the skilled craft trades, such as electricians, welders, pipe

layers, carpenters, and painters, trades which are also commonly found in shipbuilding and advanced manufacturing. Women receive hands-on training at Moore Community House’s custom-built training facility. Most instructors are women, providing role models for working in these trades.

The curriculum at both programs is informed by national tests such as the Workers Key Assessment Test and the Test of Adult Basic Education (TABE). At WVWW, students test at various stages of the program, to gain familiarity and have concrete proof of their progress. This preparation pays off. According to Marty Scott, human resources supervisor at Vertiv, a global critical power, cooling and equipment company with a subsidiary in Ohio across the

“We make sure that our students have industry recognized certificates – given the skeptical environment that women often face in these male dominated jobs, industry-recognized certificates can help them open doors.”

SIMONE AGEE

Program Manager, Moore Community House Women in Construction Program Biloxi, MS

“I feel empowered. I found a skill I can use. Like I can do anything. Sometimes just wearing the steel toe boots makes me feel more confident.”

Student of West Virginia Women Work Step Up for Women program

border from West Virginia, “We use the Work Keys Assessment as part of our basic selection procedures. The Step Up graduates performed very well on these tests.” Passing OSHA 10 (a basic health and safety certificate often demanded in construction) is part of the graduation requirement. “We make sure that our students have industry recognized certificates – given the skeptical environment that women often face in these male dominated jobs, industry-recognized certificates can help them open doors,” says Simone Agee, WinC Program Manager, instructor, and herself a graduate of the program.

WORKPLACE VISITS AND JOB SHADOWING:

Field trips to employers provide women with a realistic impression of the working environment in different trades. These trips help women to decide which particular trade interests them and also allows them to build relationships with potential employers. To graduate, Step Up students must organize at least one day of job shadowing for themselves; while WVWW staff are available to

help, the student has to research companies and make calls to ask about opportunities.

WORK READINESS SKILLS:

Work readiness skills include standard components such as job search, resume writing, interviewing skills, and appreciation of employer expectations- such as being on time, ensuring that back up is available when child care or transportation arrangements fall through, and being fully focused at work. Everyone has to do interview practice and learns to talk about themselves, the industry or job they are applying for, and the reasons for wanting to work in the field.

Work readiness training also focuses on building women’s confidence and self-assurance for working in a male-dominated field. “It is amazing how difficult this task is for many women,” reflects Lakiesha Hines, Program Coordinator at WVWW’s Step Up site in Bridgeport. “We work with them to build their self-confidence. Often, they have lots of relevant experience to highlight, such as building a porch, or repairing their car, or having been a very reliable worker at a previous job- but we really need to work with them to recognize these achievements.” A graduate of the Step Up program- who recently started a full-time job earning \$11 hour after her last job in a store earning \$8.75 hour for just 10 hours per week- describes the effect of the training, “The Step Up Program helped me to change my way of thinking. I thought I can only do this one specific job. But they showed me that I have all these other experiences that I can use.”

CASE MANAGEMENT:

Participants of both programs receive comprehensive





case management and are helped to access services from other agencies where relevant. All Step Up students receive one-on-one interview sessions to help them plan their future. Graduates receive supports until they have found a job, including weekly check-in sessions to help them stay on track with job search. Every WinC student who has young children is also provided with a personal case manager to help her access good child care and manage the intersecting demands of training, work, and looking after her children.

Job Development and Employer Partnerships

Job development – ensuring employers are aware of the

program, are willing to give program graduates a chance, and share particular skills needs and requirements with the programs- is a core part of the work of both WVWW and Moore Community House. Broadening companies' perceptions of the ideal candidate is another important part of the work. "Companies often want to hire someone straight out of school. But a woman in her thirties also still has 20 to 30 years of work ahead of her and the maturity-and determination- to stick with the training," says Kristina Szczymbak, Executive Director, WVWW. In the manufacturing environment of West Virginia, job development means working with staffing agencies as much as with manufacturing firms. Most companies have outsourced hiring to intermediaries; workers can

"The Step Up Program helped me to change my way of thinking. I thought I can only do this one specific job. They showed me that I have all these other experiences that I can use."

Graduate of West Virginia Women Work Step Up for Women program who recently started a full-time job in manufacturing for \$11 per hour; her previous job was in a grocery store, for 10 hours per week at \$8.75 per hour.

expect to spend three to six months as an agency employee before advancing to direct employment. WWWW works with staffing agencies as well as with employers, and makes sure that graduates are also aware of these practices.

Vertiv, a global critical power, cooling and equipment company employing 400 people at their Ironton, Ohio facility across the border from West Virginia, has hosted WWWW Step Up students for a two-day job shadowing. Hosting Step Up students provides an opportunity to Vertiv to show potential recruits what modern manufacturing looks like. Marty Scott, HR supervisor at Vertiv, is very enthusiastic about the Step Up students: "Safety is paramount to us. Everyone had their safety glasses, everyone had steel toe boots- they look like they are ready to work. In 20 years of giving facility tours, I have never had a group this enthusiastic and eager for employment." Marty Scott notes that Step Up students differentiate themselves from other potential job applicants without prior manufacturing specific work experience because they have learned basic aspects of manufacturing in their program. During the shadowing, supervising staff of individual students noted how quick they were to pick up on issues. Vertiv expects to provide training to new entry level employees and may hire people with no previous manufacturing experience; the fact that Step Up students already have exposure to some basic manufacturing skills, such as blue print reading for example,

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KRISTINA SZCZYRBAK
Executive Director, West Virginia Women Work

"In 20 years of giving facility tours, I have never had a group this enthusiastic and eager for employment."

MARTY SCOTT
HR Supervisor at Vertiv, Ohio

makes them a potentially safer bet to hire than someone coming straight out of a service job. Vertiv has hired three of the women graduates as a machine operator (a higher skilled position), and has interviewed other Step Up graduates; while there currently are no more positions, Marty Scott has kept the details of women's applicants in case of future vacancies.

Huntingdon Ingalls Industries, Inc. (Ingalls Shipbuilding) has worked closely with WinC since WinC started operations. The company will interview any interested WinC graduate (as long as they have also gained some additional welding skills), and the shipbuilder is a frequent host of the site trips organized during the WinC's programs. Gary Mercer, apprenticeship program manager at Ingalls Shipbuilding, explains: "When a graduate from WinC comes to us we know what we are getting: a person who has all the required technical skills but also has solid work practices that make a good employee – those essential soft skills."

The shipbuilder employs 11,600 people on the Gulf Coast; over half of the jobs are craft positions, and 6,000 of them are in apprentice-able occupations. Ingalls Shipbuilding has 15 apprenticeship programs, mostly lasting four years, and all but one are joint with unions. Typically, 300- 400 new apprentices are hired each year; registered apprentices start with an hourly wage of \$19.80, plus benefits. Acceptances to apprenticeships are highly competitive, with over 7000 applications from across the country annually. Applicants are tested, everyone who passes the test is interviewed, and ranked accordingly. Gender diversity is an important goal of Ingalls'

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GARY MERCER

*Apprenticeship Program Manager,
Huntington Ingalls Industries Inc.
(Ingalls Shipbuilding)*

apprenticeship programs, and approximately one in five apprentices are women (compared to less than one in twenty apprentices in similar apprenticeships nationally). Ingalls first had an all-female welding crew during the 1940s; its current focus on gender diversity in apprenticeships goes back to the late 1990s when the ship builder took advantage of newly available technical assistance under the WANTO grant program.¹⁸

The average age of Ingalls’ apprentices is around 30, ranging in age from 19 to 63 years old. The 63-year old is a WinC graduate. Gary Mercer explains, “She is likely to be here for ten years- that is plenty of time for us to get a return on our investment in her training.” Indeed, he notes, compared to someone who is straight out of high school, applicants who are a little older are often a better investment, with better work skills, more focus in



Students, staff, and family members at Moore Community House Women in Construction program.

class, and more determination to stay and make a career at Ingalls.

The majority of Ingalls' workers are hired to craft positions as 'helper-apprentices': they must pass the assessment test, but without ranking in the top tier. A helper apprenticeship also lasts several years, provides wage increases every six months in recognition of on-the-job learning, and includes off-the-job classroom training to journey out. However, while classes are provided for free, they have to be completed in the employee's own time, and are voluntary. The hourly starting wage for a helper apprentice is around \$16, plus benefits. Welding experience is a basic requirement; any WinC graduate with a welding certificate is at least guaranteed an interview at Ingalls.

Conclusion: Creating a Diverse Pipeline for Manufacturing and Shipbuilding

WVWW and Moore Community House are showing that women are interested in jobs in manufacturing and shipbuilding, that they are capable of doing the work, and that they make good workers with the skills sought after by employers in these sectors. While most women are not placed into actual apprenticeships- apprenticeships in manufacturing are still much less common than in construction, and are less well established in the regions where WVWW and Moore Community House are located than in other parts of the country- the programs are placing women into jobs with hourly earnings well above the minimum wage for 40 hours a week, and typi-

cally some prospects for progression. By creating pathways for women to gain skills and certification in typically male fields, providing them with role models and building their confidence in themselves and their ability to perform technical jobs in a predominantly male environment, and by offering supports that acknowledge their individual and family needs, the programs provide models for breaking the cycle of poverty for women, particularly single mothers, while helping the industry fill its need for well trained workers.

ENDNOTES

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2. Based on an analysis of the U.S. Department of Labor Office of Apprenticeship's Registered Apprenticeship Partners Information Management Data System (RAPIDS) database from 2008-2017; Angela Hanks, Annie McGrew, and Daniella Zessoules. 2018. "The Apprenticeship Wage and Participation Gap." Washington, DC: Center for American Progress <<https://cdn.americanprogress.org/content/uploads/2018/07/10122156/ApprenticeshipWageGap-brief1.pdf>> accessed August 24, 2018).

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3. Based on U.S. Bureau of Labor Statistics. 2018. "Employment Projections: Unemployment Rates and Earnings by Educational Attainment, 2017." <<https://www.bls.gov/emp/chart-unemployment-earnings-education.htm>>; the actual full-time weekly earnings for electricians in 2017 were \$979 <<https://www.bls.gov/cps/cpsaat39.htm>>; however, these data are not limited to electricians with completed apprenticeships, and include all workers, not just those who recently completed an apprenticeship.
4. Susan Helper, Ryan Noonan, Jessica Nicholson, and David Langdon. 2016. *The Benefits and Costs of Apprenticeships: A Business Perspective*. U.S. Office of Economics and Statistics: Office of the Chief Economist <<https://www.esa.gov/sites/default/files/the-benefits-and-costs-of-apprenticeships-a-business-perspective.pdf>> (accessed August 24, 2018).
5. According to *The skills gap in U.S. manufacturing 2015 and beyond* report by Deloitte and the Manufacturing Institute, between 2015 and 2025 2.7 million manufacturing workers will turn 64, the age at which the majority of workers in the industry retire; these are 22 percent of all workers manufacturing. A further 700,000 jobs will be needed to meet projected growth. The report estimates that it will be difficult to fill up to 2 million projected vacancies because of a lack of skilled workers.
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7. U.S. Bureau of Labor Statistics. 2018. "Table 11. Employed Person by Detailed Occupation, sex, race, and Hispanic or Latino Ethnicity"; Current Population Survey Household data Annual Averages. www.bls.gov; see also Ariane Hegewisch, Marc Bendick, Barbara Gault, and Heidi Hartmann. 2016. *Pathways to Equity: Narrowing the Wage Gap by Improving Women's Access to Good Middle Skill Jobs* Washington, DC: Institute for Women's Policy Research <www.womenandgood-jobs.org>.
8. Lawrence Mishel. 2018. "Yes, manufacturing still provides a pay advantage, but staffing firm outsourcing is eroding it." Washington, DC: Economic Policy Institute <<https://www.epi.org/publication/manufacturing-still-provides-a-pay-advantage-but-outsourcing-is-eroding-it/>> (accessed August 24, 2018).
9. At the time of writing, two programs were still in progress, with the second Bridgeport cohort set to graduate in September 2018, and the 5th Huntington cohort by the end of August. Five training programs are set to be delivered under a three-year subgrantee award through Robert C. Byrd Institute's American Apprenticeship Initiative (AAI) grant from the U.S. Department of Labor; two cohorts are set to be completed under the support by a 2017 WANTO grant to WVWW from the U.S. Department of Labor Women's Bureau <<https://www.dol.gov/wb/media/wantogrants.htm>>.
10. See [National Center for Women's Equity in Apprenticeship and Employment at Chicago Women in the Trades'](#) briefing paper on *Women- Only Pre-Apprenticeship Programs: Meeting Skills Needs and Creating Pathways to Good Jobs for Women*.
11. See Anthony Carnevale, Nicole Smith, and Artem Ghulish. 2018. *Women Can't Win: Despite Making Educational Gains and Pursuing High-Wage Majors, Women Still Earn Less than Men*. Washington, DC: Georgetown University Center on Education and the Workforce" <<https://cew.georgetown.edu/cew-reports/genderwagegap/>> and Ariane Hegewisch, Marc Bendick, Barbara Gault, and Heidi Hartmann. 2016. *Pathways to Equity: Narrowing the Wage Gap by Improving Women's Access to Good Middle-Skill Jobs* Washington, DC: Institute for Women's Policy Research <www.goodjobsforwomen.org>.
12. See <http://womensequityinitiative.org/recruiting-women/>
13. See <https://wvwomenwork.org/stepupamp>
14. See for example <https://www.facebook.com/stepupamp>

15. See also Melissa Johnson and Katie Spiker. 2018. "Broadening the Apprenticeship Pipeline: Pre-employment Training and Affordable Childcare are Key to Access and Retention in Work-Based Learning Programs." Briefing paper. Washington DC: National Skills Coalition. <<https://www.nationalskillscoalition.org/resources/publications/file/Broadening-the-Apprenticeship-Pipeline_web.pdf> (accessed August 24, 2018).
16. See "U.S. Department of Labor announces \$54M in Grants to Improve Access to Skills Training and Quality, Affordable Child Care for Women." News Release, 2016, June 14, U.S. Department of Labor at < <https://www.dol.gov/newsroom/releases/eta/eta20160614>>.
17. See 'The History of Moore Community House' at <https://www.moorecommunityhouse.org/history>
18. Presentation by Mark Scott, Ingalls Shipbuilding, at 2016 "Voices for Opportunity and Economic Mobility: A Jobs for the Future Summit" panel presentation on 'Supporting Women's Economic Mobility.' The Women in Apprenticeship and Nontraditional Occupations (WANTO) grants were introduced in 1993; they are awarded by the U.S. Department of Labor's Women's Bureau; see <https://www.dol.gov/wb/media/wantogrants.htm>.