

Building an Apprenticeship and Training System for Maintenance Occupations in the American Transit Industry

by

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ABSTRACT

Purpose: This article discusses the joint training and apprenticeship system emerging in maintenance occupations in the American transit industry, its challenges and strategies to overcome them. The article reports on early results, including efforts to develop a consensus national framework for apprenticeship and training in transit maintenance.

Findings: Training is an arena that both management and labour have common interests. Collaboration in training can foster partnership and improved labour-management relationships. Implementing technological innovations and organizational changes in workplace practices are facilitated by training and together with training demonstrate strong positive financial payoffs.

Research Limitations: The training and apprenticeship system discussed is not yet fully implemented.

Practical Implications: Several industries in America and other countries are facing similar shortages of skilled technicians due to technological and significant demographic changes.

Originality/Value of Paper: The paper reviews approaches taken to develop a national effort to promote quality and sustainability in the emerging training system for transit maintenance workers.

Key Words: Apprenticeship, Transit Industry, United States, Unions, Joint Sponsorship, Evaluation, Return on Investment

Classification of paper: Case study

Introduction

Facing a looming shortage of skilled workers due to the introduction of new technologies, an upcoming wave of retirements, and generally inadequate levels of training, the American transit industry has begun to address the challenge of expanding skill development on a joint, industry-wide basis. Progressive local transit unions and employers across the country are taking action to improve training of maintenance employees. They are collaborating further to develop a nationally networked joint training and apprenticeship system. The system envisioned is data-driven and striving for high performance. They are seeking lessons from established apprenticeship programs in transit as well as benchmarking practices in other industries. They are also developing metrics to measure the effectiveness of the system and to guide its development.

The new training system aims to benefit workers, employers and customers. Bus drivers and cleaners who previously had little opportunity to advance and improve their incomes now have access to a career ladder in maintenance work. Employers save monies through improved preventative maintenance along with reduced time and materials for maintenance and repair, and less need for spare transit vehicles. Customers and their communities gain more reliable transit services with fewer disruptive breakdowns and expanded bridges for community youth from school to career ladder opportunities with good pay and benefits.

The new training system builds upon the successes and accumulated experience of previously isolated existing local transit apprenticeship and training programs. The development of joint national training standards for maintenance occupations is also underway to help provide a supportive framework for transit training and apprenticeship. Pilot training and apprenticeship programs, initiated by new regional labor-management partnerships, are being established in localities across the country.

This article traces the development of this emerging training system to date, drawing lessons for building quality into apprenticeship.

Profile of the American Transit Industry

In 2001, five hundred and fifty-six (556) local public transit operators provided transit services in 408 urbanized areas of over 50,000 in population across the USA. An additional 1,215 organizations provided transit services in rural areas and 3,673 organizations provided specialized services to the elderly and to people with disabilities (Federal Transportation Administration, 2001). Unions represent approximately 90% of the industry's estimated 300,000 hourly workers. Several unions are involved in the industry; but the two most important are the Amalgamated Transit Union (ATU) and the Transit Workers Union (TWU). The International Brotherhood of Electrical Workers (IBEW) represents fewer transit maintenance workers, but has a significant share of the employees at some major agencies. Employers are organized in the American Public Transportation Association (APTA).

Transit systems in the United States are facing unprecedented challenges in obtaining the workforce skills needed to address pervasive technological changes, increasing retirements of skilled workers, and rapid industry growth. In 1998, the Rand Corporation investigated gaps in the skills of maintenance workers for the Transit Cooperative Research Program (Finegold, Robbins and Galway, 1998). Several other studies have raised major concerns about shortages of skilled workers for the future of the industry (McGlothlin Davis, Inc., 2002; and Committee on Future Surface Transportation Agency, 2003; TRB Special Report 275, 2001; and Community Transportation Center, 2007).

Changing technologies are driving the need for advanced training, especially applications of information technology and intelligent transportation systems to transit – including advanced electronic communications for bus and train operations and automated processes for fare collection, passenger counts, vehicle location, and next-stop

announcements. Digital electronics, computers and microprocessor-based systems are increasingly found in all aspects of transit. In addition, threats posed by global warming and other environmental concerns are accelerating changes in bus propulsion and other technologies and making transit a more environmentally attractive option for local transportation and community development.

At the same time, dramatic demographic challenges are hitting the industry. Transit is facing a huge wave of retirements, which will bring significant losses of experienced mechanics. Surveys show that nationwide 40 percent of skilled transit mechanics will be eligible to retire over the next eight years. Some agencies are facing retirement of up to 70 percent of their skilled maintenance workforce in the next five years (Unpublished survey results, Community Transportation Center, 2004; Center for Urban Transportation Research, 2000).

Transit employment is also growing faster than any other sector in the transportation industry. The US Bureau of Labor Statistics projects a 40.6 percent growth in employment between 2000 and 2010 for a total demand of 88,400 jobs in transit maintenance. Transit ridership has been trending upward since 1995, reversing a slow decline in prior decades. The 10 billion rides recorded in 2006 are the highest in 50 years. It is 30 percent higher than in 1995. Ever-worsening traffic congestion, rising fuel prices and growing environmental concerns are expected to drive further transit growth in the future (American Public Transportation Association, 2007).

In spite of these increased demands and developing skill shortages, an inadequate flow of new recruits is entering the industry. Transit maintenance jobs are not considered attractive by many of today's high school graduates. The general public has an inaccurate perception of transit as an old fashioned, low-tech industry; the highly technical nature of maintenance jobs in the industry is not appreciated. Problems in attracting recruits in some areas are exacerbated by lack of pay incentives, poorly developed career ladders, and unfavorable working conditions for new hires.

The industry is facing these unprecedented challenges with insufficient training capacity. Transit has a history of generally inadequate and often volatile funding available for training. Transit agencies in some areas have been reluctant to train for fear of investing in trained mechanics that they lose to other employers.

The federal government supports investment in physical capital but investment in human capital is largely neglected. Local transit agencies are allowed to use a portion of their federal capital funds for training – about \$32 million in FY 2002 (TRB Special Report 275, 2001). However, with approximately 360,000 transit agency employees in the United States, the total of these funds yielded an average of only \$89 per employee. If these transit employees earn an average \$30,000 per year, spending on training amounts to less than 0.3 percent of their annual salary.

By comparison, a 2001 survey of 1,488 employers by the American Society of Training and Development found that these companies spent an average of 2 percent of annual salaries on training. Leading companies spend even more: General Electric, 4.6 percent; US Robotics, 4.2 percent; Motorola, 4 percent. The Federal Highway Administration, in recognition of its workforce training needs, has set a goal of 3 percent of annual salaries.

Developing a national system to improve training capacity and quality in the transit industry presents complex economic and political challenges. The landscape includes several unions and is composed of multiple entities that value their independence. There is also a “silo mentality” that often unnecessarily separates bus, rail, and light rail operations from one another.

Apprenticeship: Part of the Solution?

With rapid technological changes and a looming skills shortage in the industry, some transit officials are increasingly looking to apprenticeship as an effective means of

producing the skilled maintenance workers the industry needs. The unique nature of the work performed in transit maintenance often prevents agencies from finding employees from other industries with the technical skills or knowledge required for such work. This has led transit agencies to seek more effective ways of developing their own training. The attraction of apprenticeship for transit lies in its long-term commitment to progressive skill acquisition through a combination of practical on-the-job training and classroom instruction. Apprenticeships are regarded as offering an advantage over shorter-term training in that they are able to produce highly skilled and well-rounded workers with solid theoretical and practical knowledge. Finding workers with characteristics is particularly important in transit maintenance, where the work is varied and often unpredictable. Training through apprenticeship offers an attractive career path to skilled craft status and a means to pass along skills through built-in mentoring from experienced workers nearing retirement. The long-term nature of the apprenticeship, using a dual learning approach combining classroom learning with learning on the job, produces craft workers who are broadly prepared and understand not only how to do work, but why they are doing it. These workers are flexible and can adapt to changes in the workplace.

While updating the skills of incumbent workers — especially in electronics — is important, apprenticeship is central to replacing the skilled maintenance workforce on the verge of retirement. Further, both needs can be fulfilled through a well-designed modular training program.

American Apprenticeship

By the standards of Germany or Switzerland where apprenticeship trains a majority of teenage youth, the American apprenticeship system is a small, low profile training scheme. In 2006, according to the US Department of Labor, there were 449,897 active registered apprentices in 29,273 active programs — or approximately 0.3 percent of total employment. Although more than 950 occupations are officially recognized as apprenticeable in the United States, the majority of registered apprentices continue to be

concentrated in a few occupations, mostly in the construction industry (US Department of Labor, 2007). The three trades with the largest numbers of apprentices are electrician, carpenter and plumber.

American apprenticeship persists in a few trades because it serves them well – and because the sponsors have devised institutional structures to support apprenticeship and maintain its funding.

American apprenticeship remains a privately sponsored and privately financed system of employment-based postsecondary training that serves young adults, a majority of whom enter training in their mid to late 20s. Even though the legal minimum age of American apprentices is 16 years old, only about 5 percent of starting apprentices are younger than 19 years old. The government, either through the U.S. Department of Labor or state apprenticeship agencies in 27 states, promotes apprenticeship, provides technical assistance to establish and develop apprenticeship programs, sets and enforces standards for registration of apprenticeship, and registers and monitors apprenticeship programs. Only training programs that meet federal regulatory standards and any applicable state requirements can be registered (US Department of Labor 1977, 1978).

There is little government funding involved in American apprenticeship. Registration costs amount to only about \$110 per apprentice. The Office of Apprenticeship at the US Department of Labor has limited funds for financing a few new initiatives in apprenticeship. In addition, some states partially finance the delivery of related instruction. In some localities, preparatory programs for disadvantaged workers or persons under-represented in apprenticeship are conducted with public funding.

Registration of apprenticeship programs is voluntary and incentives to register are minimal. Registration confers some status on the programs, the sponsor and the apprentices. But apprenticeship agencies have little leverage to enforce standards; they can only refuse to register programs or take away their registration. As a result, achieving

quality in American apprenticeship beyond minimum standards comes from self-regulation and initiative by the sponsors.

The best-established construction trades have organized national entities to assure quality and to promote continuous improvements in the training (Glover and Bilginsoy, 2005). These organizations are typically national joint apprenticeship and training committees or national training funds. The national entities set standards, develop curriculum, train instructors, and undertake other activities to promote and support quality training among local programs.

Most registered apprenticeship programs are time-based, although competency-based programs, or hybrids of competency-based and time-based programs have been approved. Apprentices are paid according to a progressively increasing schedule of wages as their skills improve. The term of time-based apprenticeships range from one to six years, but three or four years is the most common. Apprentices are expected to complete 2000 hours of supervised on-the-job training and at least 144 hours of related in-class instruction per year. Apprentices usually participate in related instruction on an unpaid basis. The most common pattern is to conduct classes after the workday a couple of evenings per week from fall through spring in the sponsor's training facilities or in community or technical colleges. However, block training in various forms is becoming more popular. Classes are normally taught by advanced journey-level skilled workers or supervisors who also work with the trade.

American apprenticeship programs are sponsored either unilaterally by employers alone or jointly by unions and employers. In joint programs, apprenticeship is often organized under terms of the collective bargaining agreement that specify the training wages, apprentice-worker ratios, and financing of apprenticeship. Training is commonly financed from a dedicated training trust fund into which employers contribute a few cents per every hour of labour hired. The local Joint Apprenticeship and Training Committee (JATC), composed of representatives of unions and employers in equal numbers,

administers the training program and use of the dedicated training fund, and makes decisions concerning program requirements, curriculum, and admissions, and monitors the performance and advancement of apprentices.

Unilateral or non-joint programs can be sponsored by a single employer or by an employer association. In contrast to the joint programs, participation is fully voluntary in these programs and no institutional structure comparable to the collective bargaining agreement exists, to assign the rights and responsibilities and to enforce the apprenticeship contract. Traditionally the strongest and most durable programs have been jointly operated apprenticeship programs.

Apprenticeship in Transit Maintenance

As components of its inventory of the training capacities of transit systems across the country, the Transportation Center has been examining and documenting the wide range of existing training and apprenticeships. A survey of agencies in selected major urban areas identified fifteen agencies with self-described apprenticeship programs in various stages of development exhibiting a wide range of quality and approaches (Community Transportation Center, 2007). Most transit apprenticeship programs were jointly administered through employer-union partnerships. Many programs were registered with state apprenticeship agencies or the US Department of Labor.

The isolation and independence of individual transit agencies has led to a great deal of local variation among transit apprenticeships. Transit agencies train workers based on the specific needs, equipment, organizational structure, and idiosyncratic culture of their agency. The result is that the term *transit apprenticeship* can refer to a variety of programs with often widely dissimilar aims and practices.

For example, due to differences in job classifications from agency to agency, a recent graduate of an apprenticeship program with the title *bus mechanic* might have a very

different level of competency and technical knowledge when compared to a recent graduate of another agency's program with the same title. Furthermore, apprenticeship programs for similar occupations often emphasized different aspects of training. While some programs prepare apprentices for very specialized occupations, others, particularly those at smaller agencies, offered a more general curriculum. Some programs devoted a substantial amount of time to classroom instruction, whereas others required very little. The duration of apprenticeship varied greatly from agency to agency — with some lasting only one year and others as long as four or five. In short, there is a great deal of divergence in what is understood by the term *apprenticeship* in the transit industry. There are currently no common standards.

The Challenges of Joint Apprenticeship Programs

Despite such diversity, joint apprenticeships in the transit industry face similar challenges. One challenge involves addressing worker seniority. As in many work environments, seniority often carries advantages for transit maintenance workers: priority in bidding for work assignments and overtime, higher wages, increased mobility, and other benefits. Because most transit apprenticeships aim to train workers into highly skilled journey-level positions, recent graduates of apprenticeship programs may start work in job classifications that are above those of more senior workers. In such a situation, workers with more years on the job may find their bidding ability limited or may carry resentment toward recent graduates earning equal or greater pay. These types of problems are particularly acute for agencies integrating a new apprenticeship program into an existing workplace.

Likewise, seniority practices need to address complications that can arise in moving incumbent workers into apprenticeships. At many agencies, seniority is a factor in bidding for apprenticeship positions. For example, a senior bus mechanic interested in changing careers by entering a rail signal maintainer apprenticeship will typically be given bidding priority over more junior applicants or applicants from outside of the

agency. Potential problems also emerge in addressing this worker's seniority status upon completing the apprenticeship. If the worker's seniority with the agency carries over to the rail department, the worker could enjoy the benefits of his/her seniority with the agency (e.g., a higher wage, first draw of work assignments) despite being the least experienced in the department. Furthermore, senior workers with priority in apprenticeship bidding may matriculate into an apprenticeship only to complete the program and immediately bid into another. Or worse, senior employees could retire soon after completing their apprenticeships. If this issue goes unaddressed, the worker would be under no obligation to work in the department or agency and the agency would lose its investment in the worker's training.

Transit apprenticeships must also address the problem of sustainability. While there are several long-standing and well-established apprenticeship programs in the industry, many have been short-lived. The exact reasons for such failures are varied and often have as much to do with external factors as with the quality of the program. In many cases, failure can be traced back to a shortfall in funding or a breakdown in the labor-management relationship at the local level.

The joint nature of transit apprenticeships generally makes them more durable and effective than programs unilaterally sponsored unilaterally by the employer, but joint programs are vulnerable to the wrangling of sour labor-management relations at the local level. Administering an apprenticeship program often involves handling policies regarding hiring practices, seniority, recruitment, wages, and testing – perennial issues of contention between labor and management. During times of conflict, issues external to the apprenticeship program can find their way into the meeting room. In such cases, the program may be delayed or 'taken hostage' as part of outside discussions or a party may lose or relinquish ownership in the program. In other cases, what is formally a joint program may be taken over by one of the parties, while the other assumes a passive or coerced role in the partnership. The sensitivity of some labor-management partnerships

to such organizational vagaries has caused many apprenticeship programs to stumble or in some cases, fail.

One standard already emerging in the transit industry is that labor and management must each help build — and then respect — a “wall of separation” between training or apprenticeship programs and the broader context of labor-management relations. A national framework spelling out expectations for the industry as a whole, developed through labor-management consensus, should help move local practice over time in a more stable, practicable direction.

Successful Apprenticeship Practices

Cases studies of the best-established transit apprenticeship program reveal practices worth replicating in other localities. There exists a substantial body of accumulated experience with apprenticeship and training on which to build a national system. Two examples are presented here.

TriMet and ATU 757. Since the early 1980s, the transit agency serving three counties in the Portland, Oregon metropolitan area (TriMet) and Amalgamated Transit Union (ATU) Local 757 have jointly operated successful apprenticeship programs for occupations at their agency. The partnership’s program in bus maintenance offers a particularly successful model. Faced with the lack of relevant training available outside of the agency, the program’s joint committee decided to develop a comprehensive training program internally. This involved hiring a full-time apprenticeship coordinator, creating agency-specific curriculums and courseware, and building training models for classroom use, among other things. Over time, TriMet and ATU 757 have developed a wholly self-sufficient and effective apprenticeship program for bus maintenance occupations at their agency.

Along the way, the TriMet-ATU 757 partnership developed several innovative practices. For example, after operating the program for several years, the partnership decided that all new maintenance hires should be placed in the entry-level position of “service worker.” Once employed, after passing an aptitude test and interview, service workers become eligible to bid on the basis of seniority into apprenticeship openings. By selecting exclusively from internal candidates in the service worker pool, the partnership helps ensure that all entrants to the program are familiar with the agency and committed to a career there. Moreover, by drawing primarily from an entry-level position, the partnership is able to develop their workers from the ground up.

Another innovative practice of the TriMet-ATU 757 bus program is its partnerships with local community colleges. Through these partnerships, apprentices enrolled in the bus maintenance program can simultaneously advance in their apprenticeship and receive credit towards a college associate’s degree. Because apprentices in the bus program often earn a large share of course credit during their apprenticeship, many decide to finish the requirements for the degree. Additionally, apprentices interested in taking related courses beyond what is required for their apprenticeship can petition the Joint Apprenticeship Committee for reimbursement.

AC Transit and ATU 192. In California, the Alameda-Contra Costa County Transit District and Amalgamated Transit Union (ATU) Local 192 in Oakland have developed successful joint apprenticeship programs in bus and facilities maintenance. A large part of the success of these programs has come from their commitment to high quality training materials. At the inception of the bus apprenticeship program in 1989, members of the Joint Apprenticeship Committee worked with experienced mechanics and the agency’s training department to assemble curricula, course outlines, and relevant courseware. The materials were later consolidated into standardized, module-specific notebooks and transferred to the agency’s internal computer network, where they were made accessible to all members of the workforce. By creating a standardized system for managing course materials, the partnership has simplified the process of updating its instruction to reflect

advances in technology, fleet composition, and other changes to the agency's work. Moreover, it has given apprentices, instructors, and incumbent workers open access to an organized and well-maintained library of training information.

AC Transit and its workers have also benefited from investments in advanced training tools. Through partnerships with equipment manufacturers and engineers, the AC Transit training department has developed several effective training simulators (e.g., model engines, hydraulic lifts, mock pneumatic and electrical systems, etc.). Because transit maintenance jobs are often unpredictable and uneven in occurrence, apprentices may not be afforded sufficient exposure to certain types of work. Though no substitute for actual on-the-job training, simulators such as those at AC Transit help avoid this problem by creating a controlled environment in which the instructor is able to create scenarios that might not be readily available on the actual shop floor. At AC Transit, this independence from the uncertainties of the workflow has resulted in a more balanced training regime and a skilled workforce with competencies in a number of areas.

As previously illustrated, there are notable exceptions to the general pattern of lagging training capacity and quality. In addition to the two programs previously described, Los Angeles Metro in California; King County Metro in Seattle, Washington; Utah Transit in Salt Lake City and others all offer elements of successful models for the industry. Also, progress is afoot in the industry. Forward-thinking local leaders in several areas have started to respond to the challenges of skill shortages. New York City, which has the largest transit system in the country, recently started a joint apprenticeship program. Miami, Florida has a new joint training program that does not yet include apprenticeships.

Creating Regional Partnerships to Sponsor Apprenticeship and Training

Smaller transit agencies often do not have sufficient scale of maintenance operations to provide training internally. The formation of regional partnerships provides employees at

smaller agencies access to training facilities and instruction. Regional institutions also foster and support training that is more likely to be sustained. Such regional arrangements are less likely to depend on the interest of one or two progressive leaders. Further, regional partnerships are both efficient and effective. Expensive training facilities do not have to be unnecessarily duplicated. Joining forces also gives transit agencies greater leverage in dealing with community colleges to offer relevant courses or to use curricula related to transit maintenance. It also makes more likely that minimum class sizes requirements will be met. For all of these reasons, the regional approach is simply more efficient through economies of scale in training.

Emerging Regional Pilot Programs

Several regional joint partnerships are sponsoring pilot programs for transit training and apprenticeship. Examples include upstate New York; in Salt Lake City, Utah; Sacramento in Northern California; and in Pennsylvania. Some of these pilot programs are being conducted with funding provided by the US Department of Labor's Office of Apprenticeship. The chief objectives of these pilot programs have been to build career ladders and to improve training capacity and quality in maintenance occupations — including transit bus mechanics, rail vehicle mechanics, rail signal maintainers, rail track maintainers, elevator/escalator technicians, and facilities equipment maintainers.

The Community Transportation Center has provided support to local leaders of management and labor organizations, encouraging and enabling their progressive efforts toward improving training and labor-management collaboration. The Center was founded as a nonprofit organization in April 2001 with a mission to improve training in the transportation on a joint labor-management basis. Its Board of Trustees represents key players in the transit industry, including equal numbers of management and labor leaders. The Center works with management and labor organizations to develop and support standards, models and systems for transit training and career ladder programs in public transit and other key transportation sectors.

As part of its mission to build broader community support for public transit, the Center works with transit authorities and their unions to create outreach and training programs to bring new workers, particularly individuals from disadvantaged backgrounds, into good jobs with stable careers in mass transit. By upgrading the skills of current workers and providing training for members of the broader community to enter transit careers, the Transportation Center helps transit employers create long-term strategic approaches to their workforce needs.

From its inception, the Center has focused on improving training because training offers a natural foundation for mutually beneficial labor-management partnerships. A large part of this work involves collecting information on existing apprenticeship and training programs and from this information, sharing of best practices with the industry. The Center also encourages regional and statewide partnerships to link large and small transit systems, in order to enhance stability and longevity and build sustainable training institutions. It has obtained grants to enable the development of common national training standards for transit maintenance occupations. And as illustrated in the following section, it monitors and evaluates the results of these initiatives.

From Short Term Training to Apprenticeship in Pennsylvania

The evolution of the Keystone Partnership in Pennsylvania is an instructive example. The Keystone partnership started in Philadelphia in the winter of 2001 and quickly expanded to become a statewide program. The Community Transportation Center has closely monitored and documented the implementation of the Keystone Transit Career Ladder Partnership in Pennsylvania in a series of reports. Through January 2007, Keystone had provided over 5,000 training opportunities to more than 2,000 Pennsylvania transit employees in bus, rail and facilities maintenance in Port Authority in Pittsburgh, Southeast Pennsylvania Transit Authority (SEPTA) in Philadelphia and in over thirty smaller transit agencies across Pennsylvania. The process of development has been data driven, beginning with a skills gap survey of incumbent maintenance employees.

Training ranged from one-day refresher courses to 200 hours of intensive modular classroom instruction followed by 60 days of structured on-the-Job (OJT) training for employees in the queue for promotion. Technical areas covered by recent Keystone courses include basic electrical work and advanced electronics, computer circuit board repair, heating, ventilation, and air conditioning (HVAC), fare box, welding/brazing, hydraulics/pneumatics, underground fault locating and relay calibration. The program also offers high school and community college courses linked through a Tech Prep program for entry-level maintenance employees interested in becoming mechanics as well as internships and job shadowing opportunities to attract high school and vocational school students to enter the transit world.

Building on and furthering strong labor-management partnership, Keystone has made it possible for a record number of mechanics to upgrade their skills and move up the transit career ladder in an industry facing dramatic technological change and skill shortages.

For employees and their supervisors, this partnership-based, data-driven customized approach to training on a statewide scale has:

- Increased skills and produced significant promotions in filling maintenance vacancies.
- Led to quantifiable improvements in employee knowledge.
- Been embraced by employees and supervisors, as documented in training satisfaction surveys.

For transit systems, the training and changes in technology and maintenance procedures that the training enabled have led to significant improvements in efficiency and cost savings. They have:

- Improved equipment reliability and achieved longer mean distance between failures of vehicles
- Reduced unnecessary replacement of parts and improved labor efficiency
- Reduced need for high level of spare buses

- Enabled implementation of innovative maintenance practices and new transit technologies
- Resulted in major maintenance cost savings and fleet procurement savings of between \$6,356,977 and \$14,219,887, and a high return on training investment

Detailed findings on a variety of qualitative and quantitative measures may be found in the Keystone case study reports (Community Transportation Center, various years).

Though it is too early to address benefits of transit apprenticeship, analysis to date of the various forms of incumbent worker training through Keystone provide strong evidence on the effectiveness of the data-driven labor-management cooperative training process that may be emulated as a model for future local apprenticeship programs.

Furthermore, many of the qualitative and quantitative measures used in the existing case studies, such as mean distance between failures and reduced unnecessary replacement of parts will also be applied to assess the effectiveness of transit apprenticeship programs.

Having gained confidence and trust through working together on shorter term training, the Southeastern Pennsylvania Transportation Authority (SEPTA) and Transport Workers Union (TWU) Local 234 have agreed to develop apprenticeship programs in thirteen occupations. Labor and management established a joint apprenticeship committee, composed of equal representatives from both sides, to formulate the policies of the program. This type of groundbreaking work would not have been possible without a solid foundation created by several years of successful Keystone partnership training. Before undertaking the development of the program, both sides agreed to defer discussion of potentially difficult contractual issues – seniority, wage progression, etc. – to the collective bargaining process. This allowed the joint committee to advance work on key policies of the program while avoiding the delays of prolonged negotiations.

Of additional benefit to the partnership has been the creation of department-specific subcommittees to manage the development of apprenticeship training content. These Departmental Joint Apprenticeship Committees (DJACs), composed of expert senior workers and supervisors drawn from labor and management, are charged with the task of

devising training modules based on their knowledge of the jobs performed on the shop floor. The development of these DJACs has allowed the JAC to continue work on the program's policy framework while simultaneously building department-specific training content for apprenticeship. In this way, SEPTA and TWU 234 hope to expedite the creation of the program by moving towards the completion of apprenticeship training.

Like the JAC, membership in the DJACs is split evenly among representatives from SEPTA and TWU 234. By extending the partnership model to the DJACs, labour and management have affirmed their commitment to the cooperative process. Participants report that the benefits of the partnership model have carried over to other facets of labor-management relations at the agency (Community Transportation Center, 2007).

Developing National Skill Standards for Transit Maintenance Occupations

As an initial step towards creating a national framework for transit maintenance training and apprenticeship, the industry has begun a process to achieve consensus on national training standards for transit maintenance occupations. A task force comprised of representatives from labor and management in agencies across the country has been established to investigate and develop training standards for bus maintenance occupations. A companion joint task force has been organized for rail vehicle technicians, rail signals maintainers, rail facilities maintainers and transit elevator-escalator mechanics. The joint bus maintenance standards group anticipates completing the development of national training standards by the end of 2007. The second task force is scheduled to complete and validate its standards by the first half of 2008. Forums on Internet Websites encourage the participation of others with industry expertise. Good standards clearly define what workers should know and be able to do. Standards facilitate the development of coherent instruction systems, including curricula, course syllabi, assessments, and instructor training.

In conjunction with this work, the industry has formed a National Joint Steering Committee for Transit Apprenticeship to coordinate the development of national apprenticeship standards in the industry. With equal representation from labor and management, the members of this ten person committee come from some of the most successful joint apprenticeship programs in North America: AC Transit, Chicago Transit, Sacramento Regional Transit and San Diego Transit and Trolley in California, SEPTA, TriMet, Utah Transit, Washington Metro in the District of Columbia, as well as Calgary Transit in Alberta, Canada. This work is supported by national leaders in labor, management, the non-profit sector, and the US Department of Labor.

In spring 2007, the first meeting of this group was held in Nashville, Tennessee in conjunction with the American Public Transportation Association's National Bus and Paratransit Conference. During the meeting, members discussed the benefits of a federally registered national system of apprenticeship for transit maintenance and briefly surveyed the difficulties involved in moving towards standardization in such a heterogeneous industry. Following this meeting, committee members began collaborating on a draft version of a national apprenticeship standards document. Members of the committee agreed that the central goal of this collaboration should be to create a national system of standards that is: (1) mutually beneficial to labor, management, and the industry as a whole; (2) capable of embracing diverse practices in the industry; and (3) oriented towards encouraging continued improvements in training. The group plans to meet two to three times a year until it can resolve these issues.

Conclusions and Lessons learned

In summary, faced with challenges posed by technological and demographic changes, and growth, the American transit industry has adopted five strategies to improve the capacity and quality of training in transit maintenance:

- (1) Identifying and promoting successful training practices across the country, including outreach efforts to bring new workers into the industry;
- (2) Organizing regional partnerships to support training on a sustainable basis;
- (3) Sponsoring new pilot joint apprenticeship and training approaches and programs;
- (4) Carefully monitoring and measuring the results, including the costs and benefits; and
- (5) Developing a national framework for apprenticeship and training, including skill standards for transit maintenance occupations.

American transit labor leaders and management are discovering that training is an investment where their interests converge. Creating a high performance transit industry in the future depends on developing further innovative approaches to labor-management cooperation. Training offers an early opportunity for labor and management to partner in developing a well-trained maintenance workforce with important performance and service outcomes for transit agencies and the public they serve.

Labor and management have common interests in fostering training. Effective training and strong labor-management partnerships reinforce each other. The system works best when issues of conflict are separated and left to collective bargaining. Apprenticeship needs to be operated as part of a broader system of training that includes continuous training of incumbent workers. Continuous training for incumbent workers is an essential companion ingredient in building an excellent apprenticeship system. Because most of the time spent in apprenticeships is on-the-job learning from fellow workers, the quality of apprenticeship training is heavily determined by the competence of the incumbent workforce.

Measuring the effectiveness of training is especially important in a data-driven system. Demonstrating results is critical to raise adequate funding for apprenticeship and training. Achieving consensus on the appropriate metrics of success, and investing in the collection and analysis of the data are key elements in this process.

Early results, based on careful monitoring of the pilot Keystone training program in Pennsylvania, demonstrate that training is a good investment. At SEPTA in Philadelphia, preliminary analysis shows that total returns associated with improvements in their bus fleet, technologies and bus maintenance training and related organizational strategies resulted in savings of \$6 to \$14 million over a four-year period.

Training is an enabler for many technology improvements and innovations in maintenance policies and practices. For example, if an agency wants to adopt a more aggressive program of preventive maintenance, its workers need strong diagnosis skills to make it effective. As a result, rather than simply reacting to operator complaints, mechanics are able to identify problems in advance and make the needed changes. A trained workforce with a solid base of skills makes fewer mistakes, is more flexible, and adapts to changes more quickly.

The design of any new national training system needs to be rigorous yet flexible. It must be rigorous with “stretch goals” to promote high quality in transit maintenance training, and sufficiently flexible to accommodate the special needs of local regions.

References

American Public Transportation Association (2007) “Public Transportation Ridership Statistics.” Available at: <http://www.apta.com/research/stats/ridership/#A3> Accessed 27 May 27, 2007

Center for Urban Transportation Research, University of South Florida (2000) “Where are the Next Generation of Transit Mechanics Coming From?”

<http://www.nctr.usf.edu/pdf/FutureTechs.pdf>

Community Transportation Center Available at :

www.transportcenter.org/Keystone/index.html Accessed at 27 May 27, 2007.

- [*Pennsylvania Transit on the High Road*](#) (2003)
- [*Keystone: Making a Difference in Pennsylvania Transit - Keystone Case Study Interim Report on Worker and Supervisor Satisfaction Surveys*](#) (2004)
- [*Measuring Up, Volume 1- Keystone Training Improves Skills, Maintenance Efficiency, and Reliability*](#) (2005)
- [*Measuring Up: Interim Report*](#) Assessing the Costs and Benefits of Training in the Keystone Transit Career Ladder Partnership (2006)
- [*Transit Partnership Training: Metrics of Success*](#) (2006).
- [*Measuring Up, Volume II*](#) (2007).

Community Transportation Center (2007) “People Make the Hardware Work: Transit Experts Call for Labor-Management Training Partnerships.” Silver Spring, Maryland.

Available at:

<http://www.transportcenter.org/Keystone/PeopleMakeTheHardwareWork.pdf> Accessed 28 May 2007.

Federal Transportation Administration (2001) Available at:
www.fta.dot.gov/publications/reports/other_reports/publications_134.html Accessed
May 25, 2007.

Finegold, David, Marc Robbins and Lionel Galway (1998) *Closing the Knowledge Gap for Transit Maintenance Employees: A Systems Approach*. Washington, D.C.: Transit Cooperative Research Program, Transportation Research Board, National Research Council. Available at: http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_29.pdf
Accessed 27 May 2007.

Glover, Robert W. and Cihan Bilginsoy. (2005) “Registered apprenticeship training in the US construction industry,” *Education+Training*. Vol. 47, Nos.4-5, pp. 337-349.

Marshall, Ray and Brian Turner (2007) “Toward a High Performance Transit Industry.” Paper prepared for the Community Transportation Center, April 25, 2007.

McGlothlin Davis, Inc. (2002) TCRP Report 77: *Managing Transit’s Workforce in the New Millennium*. Available at: http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_77.pdf
Accessed 27 May 2007.

Transportation Research Board Special Report 275 (2001) *The Workforce Challenge: Recruiting, Training and Retaining Qualified Workers for Transportation and Transit Agencies*. Available at http://www.nap.edu/catalog.php?record_id=10764#toc Accessed
27 May 2007.

US Department of Labor (2007) Employment and Training Administration, Office of Apprenticeship, “List of Occupations Officially Recognized as Apprenticeable by the Office of Apprenticeship.” Bulletin 2007-07. January 17, 2007. Available at
<http://www.doleta.gov/OA/bul07/Bulletin-2007-07-1.swf> Accessed 27 May 2007

US Department of Labor (1978), “Equal Opportunity in Apprenticeship Programs” Code of Federal Regulations, Title 29, Chapter 1, Part 30. Available at:

http://www.dol.gov/dol/allcfr/Title_29/Part_30/29CFR30.1.htm. Accessed 27 May 2007.

US Department of Labor (1977) “ Labor Standards for the Registration of Apprenticeship Programs.” *Code of Federal Regulations, Title 29, Chapter 1, Part 29, available at*

http://www.dol.gov/dol/allcfr/ETA/Title_29/Part_29/29CFR29.1.htm Accessed 27 May 25, 2007.