

Framework for Development of Bridge Training Programs

Davis Jenkins
University of Illinois at Chicago

Gary Saganski
Henry Ford Community College

in partnership with the
NSF ATE Bridge Project Teams in Chicago and Detroit

Working Draft – June 1999

Overview

Adult tech prep bridge programs prepare educationally-disadvantaged adults for career-path employment as technicians and post-secondary technical education in advanced technology fields. They are designed to provide the foundation for career-long learning on-the-job and in formal technical training. The following is a conceptual framework intended to guide the development of bridge training programs.

This framework is being developed through a three-year project funded by the National Science Foundation's Advanced Technological Education program. The goal of the project, which is being carried out by teams in Chicago and Detroit, is to develop, pilot test and disseminate instructional materials for bridge training programs. In the process, we hope to enrich understanding of the foundation skills needed for career-path employment in technical fields, and of instructional methods that are effective in enabling poorly-educated adults to master these skills.

Although the project focuses on training for advanced technological education and employment in manufacturing, our aim is to produce program materials and guidelines that are applicable to bridge training for other fields as well. For more information on the Bridge to Advanced Technological Education and Employment project, see our web site at <http://www.uic.edu/cuppa/techbridge/>, or e-mail us at saganski@mail.henryford.cc.mi.us or davis@uic.edu.

Over the three years of the project, we will continue to test and refine this framework through our efforts to pilot bridge programs in Chicago and Detroit. We will also continue to study labor markets for technicians in manufacturing and other advanced technology fields, and to profile bridge program models being developed elsewhere.

This paper is organized into four sections: Need for Bridge Training, Bridge Program Structure and Sequence, Principles of Bridge Instruction, and Guidelines for Bridge Program Implementation.

Need for Bridge Training

Throughout the U.S., public education based on the traditional academic model is failing to provide effective basic training for employment in advanced technology fields. This, combined with rising skill requirements brought on by economic and technological forces, has led to labor market distress in many parts of the U.S.:

- Employers in manufacturing and other advanced technology industries are having great difficulty finding applicants qualified to fill well-paying skilled positions.
- Many employers in these same industries find that their current workforce is unable to keep up with advances in technology and business methods.
- Too many students seeking to enter post-secondary technical education through two-year colleges and apprenticeship programs lack the requisite basic skills.

The increasing pace of technological change means that, for employers, having a workforce capable of rapid learning has become essential to improving productivity and business performance. For workers, the ability to learn as technology changes has become the key to decent pay, job security and advancement.

On both the supply and demand sides, then, the need is for a more effective approach to training for employment in fast changing, learning-intensive work environments. The need for such training is especially acute among the many working adults who have not had a strong basic education, since, increasingly, the only jobs that pay wages sufficient to support a family and offer opportunities for advancement require strong basic skills and the ability to keep pace with technological change. Training in basic “technology learning skills” is needed to enable educationally disadvantaged adults to “bridge” the widening qualifications gap between low-wage, dead-end jobs and well-paying jobs with a future. At times like the present, when many industries in many parts of the country are facing severe shortages of skilled labor, providing bridges to career-path employment in technical fields for the unemployed and under-employed is as much a business need as a social one.

Bridge Program Structure and Sequence

The Chicago and Detroit project teams agree that bridge training must consist not of a single program, but of a series of programs, each providing preparation for successively higher levels of employment and education.

The need for multiple bridge levels stems from the nature of the supply and demand for skilled labor in manufacturing and other advanced technology fields. On the supply side, among the many adults who would seek employment as manufacturing technicians, there is considerable variation in the level of basic skills and “job readiness” (which is generally equivalent to readiness for education and training). Individuals with few basic skills and many barriers to employment will need multiple levels of support to advance over time to better paying jobs and the education and training needed to advance further. On the demand side, jobs at different levels of pay and responsibility obviously carry different sets of

qualifications. In manufacturing and other advanced technology sectors, the gap in qualifications between low-wage, dead-end jobs (i.e., unskilled jobs) and livable-wage jobs with a future (i.e., skilled jobs) continues to widen. Multiple levels of training and support may be needed to bridge this gap between low-wage and livable-wage jobs.¹

Figure 1 illustrates the multi-tiered bridge program structure that the Chicago and Detroit teams have established for the NSF Bridge project. This structure is based on knowledge of the supply and demand for manufacturing technicians that we have acquired through:

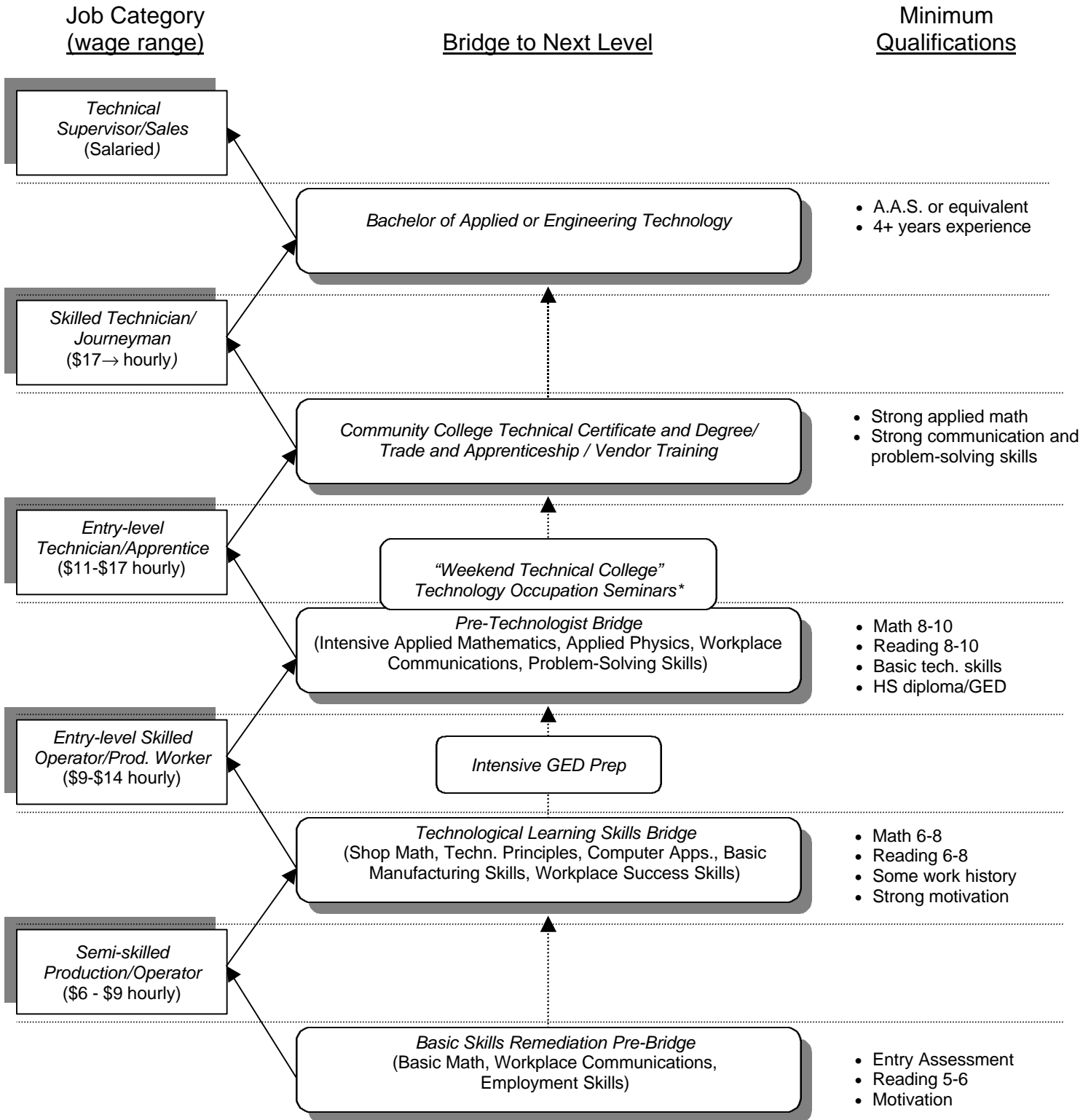
- On-going research on entry points and job ladders in manufacturing by the University of Illinois at Chicago and others;
- Review by faculty at Henry Ford Community College (HFCC) in Detroit and Richard J. Daley College in Chicago of the basic competencies needed for community college technical certificate and degree programs, trade and apprenticeship programs, and workplace-based technical training;
- Experience of the corporate training divisions of HFCC and Daley College in providing customized training for numerous manufacturing firms aimed at upgrading the skills and supporting the career advancement of their incumbent technical workforce;
- Assessments of the basic skills and other qualifications of educationally-disadvantaged adults who have applied to the Chicago Manufacturing Technology Bridge program and other adult literacy and job training programs for the disadvantaged;
- Review of the entrance requirements and outcomes of other adult tech prep bridge programs.²

The bridge program structure includes a sequence of at least three main bridge program levels (as well as some optional courses) leading to entry-level skilled positions and post-secondary technical education. These are:

Basic Skills Remediation "Pre-Bridge" - "Pre-Bridge" programs are designed to prepare participants to secure semi-skilled jobs and enter Technological Learning Skills Bridge programs. Pre-Bridge programs help participants improve English communication and other basic skills in the context of preparing for entry-level employment or job advancement. They combine instruction in communication, math

¹ For an in-depth discussion see Davis Jenkins, "Beyond Welfare-to-Work: Bridging the Low-Wage - Livable-Wage Employment Gap," Great Cities Institute, University of Illinois at Chicago, January 1999. A copy can be downloaded from the project's web site at <http://www.uic.edu/cuppa/techbridge/>.

² Profiles of other bridge programs can be found on the project's web site.



*Sample seminars include: ISO Documentation (Quality Management); Intro. to PLCs (Electrical/Electronic Maintenance); Preventive Maintenance (Mechanical Maintenance); Solid Modeling (Drafting and Design); CNC overview (Machining)

Figure 1: Bridges to Advanced Technological Employment in Manufacturing

and other basic skills with job training. They are appropriate for adults with limited English or other basic skills deficiencies.

Technological Learning Skills (TLS) Bridge – TLS Bridge programs are designed to prepare for entry-level skilled positions and for Pre-Technologist Bridge programs. They stress skills that provide a foundation for learning throughout a career in advanced technology. A TLS Bridge for manufacturing would include instruction in: applied mathematics, workplace communication, applied physics, industrial computer applications, blueprint reading, basic machine operation, and workplace success skills. These programs are appropriate for adults testing at the 6th-8th grade level in math and reading who have at least some stable work history and demonstrated motivation.

Intensive GED Prep Program – These programs are designed to prepare students to pass the GED in as little time as possible. They use diagnostic assessments to identify each student's weaknesses on the GED, and provide intensive tutoring and computer-assisted instruction to help the student master those sections of the test. Heavy emphasis is placed on honing test-taking skills, which are useful not only for the GED but for college placement exams and employer screening tests (given by most manufacturers offering better-paying, entry-level skilled positions). Intensive GED Prep programs are appropriate for adults who lack a high school diploma but have completed a TLS Bridge or are otherwise qualified for entry-level skilled operator positions.

Pre-Technologist Bridge – These programs are designed to prepare for community college advanced technical certificate/degree programs and for skilled trade apprenticeships and technical training in the workplace. They go into greater depth in the applied technical fundamentals covered initially by the Technological Learning Skills Bridge. They are appropriate for those who are employed in skilled operator positions and whose math and reading skills are at the 8th grade level or higher.

Weekend Technical College, Technology Occupation Seminars - These seminars, which are designed to complement Pre-Technologist Bridge training, are appropriate for individuals who are seeking to become skilled technicians or journeymen and who are qualified for community college technical certificate/degree or skilled trade apprenticeship programs. These seminars expose students to the technology of various technical career streams. Topics for manufacturing technology seminars might include, for example: QS9000 Documentation (quality management), Introduction to PLCs (electrical/electronic maintenance), Preventative Maintenance (mechanical maintenance), Solid Modeling (drafting and design) and CNC Overview (machining).

Apprenticeship Test Prep Courses – Appropriate for individuals with work experience and at least 8th grade math and reading who are seeking to pass entrance examinations for skilled trade apprenticeship programs. These courses focus on basic skills review and test taking skills and practice.

One aim of the NSF Bridge project is to better understand the different bridge program levels. We want to know not only what program content and methods will prepare participants to secure particular types of jobs, but what are the minimum qualifications for

each bridge level. The content and entry requirements for different bridge program levels will vary depending upon the field in question, geographic location and other factors. For example, because of the restructuring of the automobile industry in the Detroit area over the past several years, entry-level skilled manufacturing jobs in Detroit generally have higher qualifications than do such jobs in Chicago. As a result, bridge programs in Detroit will have to be more intensive, and possibly include more levels, to prepare educationally disadvantaged individuals for career-path technician positions in manufacturing.

Principles of Bridge Instruction

The partners in the NSF Bridge project have established a set of principles to guide teaching in bridge programs. These principles are based on the partners' extensive experience in providing training for employment in advanced technology fields and serving the learning needs of poorly educated adults. They apply state-of-the-art practice in advanced technological education to the preparation of low-skilled adults for career-path employment in advanced technology fields. In applying these principles, the aim is as much to cultivate students' ability to learn as it is to impart basic knowledge and skills.

- 1) Bridge programs should provide the foundation for career-long learning in advanced technology fields. Hence, they should emphasize the fundamentals of applied mathematics, principles of science and technology and workplace communication.
- 2) Instruction in these fundamentals should be integrated into the teaching of technical topics whenever possible.
- 3) Bridge training should equip students with basic "learning tools" such as problem solving, note taking, sketching and drawing, reading for comprehension, using computer-based learning aids and presenting ideas orally and in writing.
- 4) Bridge training should also familiarize students with the basic principles of how advanced technology businesses operate, and prepare them for the culture and expectations of the advanced technology workplace.
- 5) Bridge instruction should emphasize learning by doing in order to build students' competence and confidence in their ability to learn.
- 6) Bridge instruction should be organized around problems and situations that resemble those encountered in the advanced technology workplace in order to simulate for students the learning environment and demands of the workplace: goal- and problem-focused, team-oriented, and technology-reliant.
- 7) Bridge programs should provide opportunities for structured learning in advanced technology workplaces through field trips, job shadowing and internships.
- 8) Bridge curricula should be defined in terms of competencies, with clear objectives and standards of what students should be able to do to demonstrate mastery.

Mastery of particular competencies (with the confidence and self-esteem this inspires) is more important than coverage of subject matter.

- 9) Bridge students should keep journals to encourage writing and reflection. Students should also develop portfolios of their work to demonstrate mastery of competencies, document their capabilities for employers, and build pride in their achievements.
- 10) Diagnostic assessments should be given at the outset to all students and used to adapt instruction to the needs of each student.
- 11) The bridge instructor should play the role of learning coach rather than purveyor of knowledge and skills. This creates a learning environment that resembles that of the workplace and respects and capitalizes on the extensive knowledge and experience that adult learners bring with them.
- 12) Team teaching should be used where appropriate—for example, to pair faculty with expertise in learning skills development with those expert in teaching technical know-how.

In piloting bridge program curricula over three years, the partners in the NSF Bridge project will test and refine these principles. The project teams will use the results of the pilots to develop a guide to bridge instruction as well as materials for training instructors for bridge programs.

Guidelines for Bridge Program Implementation

At this point, based on the preliminary experience of the project partners in piloting bridge programs, and on the lessons of other similar efforts elsewhere, there are at least four elements that seem to be necessary for successful Bridge program implementation (in addition to the instructional principles outlined above). These are:

- Strong connections to employers offering jobs with career potential;
- Extensive case management and support for participants;
- Strong community ties;
- Partnerships.

Strong connections to employers and jobs – It should go without saying that the hallmark of effective bridge programs is that they enable participants to secure good jobs in advanced technology fields. The connection to jobs comes through active involvement of employers in bridge training. Ideally, employers are involved in all aspects of bridge program development, from design, to implementation, to on-going evaluation and improvement. Employers define the standards for bridge training, give feedback on curricula, help identify instructors with industry experience, donate equipment and offer paid internships to bridge students and full-time jobs to bridge graduates. The most effective programs seek to build long-term relationships with employers with the aim of learning about their changing labor force needs and being prepared to serve those needs as they arise. One strategy that is especially effective in keeping employer ties strong is to provide customized training for incumbent employees of partner companies in addition to training of prospective hires. Many employers that are seeking to adopt new technologies and management practices will find that their current employees need bridge training.

Extensive case management and support – Effective instruction is an essential part of preparing low-skilled individuals for livable-wage jobs in advanced technology fields; but training by itself is not sufficient. Just as necessary to the success of bridge programs is extensive case management and support for program participants. Such services are needed to help participants overcome the barriers they face to employment in skilled jobs. These services include assessment, counseling, and assistance with childcare, transportation, drug treatment and other health services. The most effective bridge programs provide follow-up support and encouragement to program graduates even after they complete training and have been placed in a job. Thus they help to ensure that graduates not only stay on the job but advance up the career ladder.

Strong community ties – Strong community connections are essential for recruiting bridge program participants and for providing the wide range of necessary support services. Community-based organizations (CBOs) are often more effective in recruitment and case management of disadvantaged individuals than are community colleges or other training providers. CBOs provide a comfortable “home base” for bridge program participants. They are also accustomed to referring clients to other organizations and agencies for services they themselves do not offer.

Community-business partnerships – Few organizations can provide the full range of training and support services needed to make bridge programs work. As a result, bridge programs often operate through a partnership of organizations. Because of their strong ties to employers and jobs, on the one hand, and to the community, on the other hand, effective bridge programs are built on “community-business partnerships.” Sometimes intermediary organizations are needed to bring together the various bridge program partners and coordinate their efforts.

The following table outlines the roles of organizations that are often involved in bridge program partnerships.

Table 1: Bridge Program Partner Roles

Organization	Roles
Employers	<ul style="list-style-type: none"> ▪ Program review ▪ Hosting of field trips ▪ Paid internships for qualified students ▪ Student practicum examinations ▪ Jobs for graduates
Community colleges	<ul style="list-style-type: none"> ▪ Curriculum development ▪ Instruction ▪ Job placement assistance ▪ Recruitment into college-level technical training ▪ Instructor training
Community-based organizations	<ul style="list-style-type: none"> ▪ Student recruitment and screening ▪ Assessment and counseling ▪ Case management ▪ Referral to social services ▪ Community sites for instruction ▪ Job and college placement assistance ▪ Follow-up support for retention and advancement
Universities	<ul style="list-style-type: none"> ▪ Labor market analysis ▪ Curriculum development ▪ Learning tools development ▪ Program evaluation ▪ Program planning and coordination (intermediary)
Industry Associations	<ul style="list-style-type: none"> ▪ Employer referrals ▪ Program planning and coordination (intermediary) ▪ Program marketing and promotion

Over the course of the NSF project, we will seek to deepen our understanding of what makes for a successful bridge program. We will incorporate the lessons learned into a bridge program implementation guide designed for organizations seeking to start or strengthen adult tech prep bridge training. To stay apprised of our progress on the NSF ATE Bridge project, see our web site. We are eager to learn from similar efforts elsewhere, so please contact us.