

TEACHER RECRUITMENT, PREPARATION, AND PROFESSIONAL DEVELOPMENT

INTRODUCTION

The development and expansion of multiple pathways in California requires that the teacher workforce—both across and within districts—possess a wide range of skills and competencies, particularly the ability to provide rigorous and challenging learning experiences and support along both academic and career trajectories. This chapter describes the key issues that need to be addressed to develop the teaching workforce that is needed for high-quality statewide implementation of multiple pathways.

California's Teacher Workforce

Trends in the Teacher Workforce

In its most recent report on California's teacher workforce, the Center for the Future of Teaching and Learning (CFTL) stated, "Although the state has significantly lowered the number of under-prepared teachers over the past several years, uncomfortable warning signs are appearing on the horizon regarding the continued supply of fully prepared teachers" (Guha, et al., 2008). Under-prepared teachers are defined as those who have not met all of the qualifications for the preliminary teaching credential. Because California has a large teaching workforce, the state will likely continue struggling to reduce the number of under-prepared teachers. The reports' key findings are summarized below:

- Student enrollment is projected to increase in the state's inland regions and in the elementary grades. Student enrollment is projected to be stable or decline along the coast of southern and northern California, and high school enrollment is projected to decline.
- Historically high retirements statewide are expected to contribute to a continued demand for teachers but will affect some northern counties more than others.
- Uncertain budget climates make it difficult for districts to determine staffing levels and can lead to large numbers of teachers receiving layoff notices, even though the notices may be rescinded later.
- Although districts are not always able to hire fully credentialed teachers for all of their positions, the population of under-prepared teachers across the state continues to decline.
- Under-prepared teachers are disproportionately concentrated in particular counties and regions, at the secondary level, and in special education.
- Under-prepared teachers are also concentrated in the states' lowest-performing schools. (Guha, et al., 2008)

The CFTL reports that ten counties with the highest student enrollments (including Los Angeles, San Bernardino and San Diego) employ the vast majority of under-prepared teachers, but the

smaller counties with high student poverty rates (including Imperial, Yuba, San Benito and Kings) have the highest percentages of under-prepared teachers in the state (Guha, et al., 2008).

REL West conducted a study of trends in teacher demand in California that aligned with CFTL's findings. The REL researchers examined current numbers of under-prepared teachers, projected enrollment-generated demands for teachers, and projected teacher retirement-generated demand at the county and regional levels. The study concluded that California's Central Valley (northern and southern San Joaquin Valley and upper and Sacramento Metropolitan Valley) and Inland Empire (Riverside and San Bernardino counties) will have some of the highest demand for new teachers over the next ten years (White & Fong, 2008).

These findings are particularly relevant for this report. As declining enrollment in high school impacts the demand for teachers, districts will be challenged to offer the courses, learning opportunities, and support necessary to meet the four components of the multiple pathways approach. Further, if the multiple pathways approach alleviates dropping out and improves student achievement, some of the districts that will need to most seriously consider implementation of multiple pathways are those that are disproportionately impacted by higher numbers of under-prepared teachers.

In addition, district administrators interviewed for this study indicated that hiring qualified CTE teachers is one of their biggest challenges with implementing multiple pathways. This challenge includes the difficulties of 1) hiring sufficient teachers who are qualified to teach in the CTE areas in which they are needed; 2) ensuring that both academic and CTE teachers are trained in work-based learning; and 3) ensuring that both academic and CTE teachers are cross-trained in curricular approaches that blend academic and career and technical education. In addition, the struggle to attract, hire, and retain teachers in small and rural districts could severely hinder implementation of multiple pathways.

Teacher Supply and Turnover

California faces a problem of teacher turnover and teacher supply, and it is important to understand these problems as they apply to implementing multiple pathways. Futernick (2007) noted:

If the state is not producing enough new teachers to keep pace with the number who are retiring, then it has a teacher *supply* problem. If, on the other hand, large numbers of teachers are leaving the profession before they retire, or are moving away from certain types of schools, the state has a teacher *turnover* problem.

He adds that while turnover does not reduce the overall supply of teachers, turnover creates vacancies that are *equally costly* to districts and schools in financial and educational terms.

The CFTL reported that California's budget crisis and the resulting preliminary layoff notices and negative media attention left teachers with concerns about job security, causing many experienced teachers to leave the state to teach elsewhere and new teachers to look for out-of-state jobs and leave after completing their in-state training programs. Further, the CFTL reported

that California's budget crisis made the state a very attractive recruiting place for other states experiencing increased demand for teachers (Guha, et al., 2008).

Issues of both teacher supply and teacher turnover have been raised with respect to career and technical education teachers specifically. The challenges that exist in recruiting and retaining skilled teachers who have industry knowledge and technological expertise include:

- The low pay compared to the private sector
- An inadequate supply of qualified teachers
- An inadequate supply of credentialing programs
- An extensive credentialing process that deters professionals from other fields becoming teachers (WestEd, 2006)

These themes related to teacher supply were echoed in responses from administrators and teacher educators interviewed for this study. Common concerns included:

- The difficulties of acquiring a teaching credential in California
- The difficulties of finding qualified CTE teachers to teach the CTE courses
- The difficulties of professionals acquiring CTE credentials in California
- The differences between the pay scales of teaching and other professions
- The differences between the pay scales of school districts
- The need for greater flexibility with credentialing requirements

According to the CFTL, between 2001-02 and 2005-06, the most recent years for which data are available, the number of teachers enrolled in teacher preparation programs steadily declined. While the decline is largely due to decreased enrollment in multiple-subject credential programs, the numbers of single-subject credential candidates (those most frequently used for teaching at the secondary level) have remained relatively flat. The numbers for CTE teachers are even more dramatic. As recently as 2002, California had 42 university CTE teacher preparation programs in place. By 2009, these programs have dwindled to 15 university CTE teacher preparation programs: 5 agriculture, 2 business, 1 health careers, 5 home economics, and 2 industrial technology education programs. Agriculture education is the only sector with a sizeable number of students; all others have a "handful" of students.¹

The difficulties in retaining faculty for part-time positions and the pressures for CTE teachers to be retained to keep pace with industry trends were also significant challenges to the availability of skilled CTE faculty in California (WestEd, 2006). The differences between the pay scales of school districts and the need for greater flexibility with credentialing requirements make it difficult to attract and retain qualified teachers. These challenges may impair districts' ability to find and hire the teachers needed to implement multiple pathways.

¹ Email communication with Lloyd McCabe, Policy Consultant, Office of the Director, Secondary, Career, and Adult Learning Division, California Department of Education. August 26, 2009.

Special Concern: Science, Technology, Engineering, and Mathematics (STEM) Teaching Workforce

A discussion of the teaching workforce as it applies to multiple pathways must include attention to the severe shortage of STEM-discipline teachers. The teacher shortage is symptomatic of the overall erosion of quality in mathematics and science education in California and across the country. The science and mathematics pipeline from elementary through postsecondary levels has decreased dramatically in recent years. The California Council on Science and Technology (CCST) and the CFTL document that during the next decade, the demand for new science and mathematics teachers is expected to rise to over 33,000 people.

Margaret Gaston has noted three keys to improving the STEM teacher workforce in California:

1. Create an adequate supply of STEM teachers, ensuring that students who make it through the pipeline and enter the teaching profession remain in California.
2. Ensure that teachers have the subject matter content knowledge and pedagogical skills to teach science and mathematics well.
3. Distribute fully prepared, veteran, and accomplished STEM teachers evenly across schools and districts.

Additional ideas for actions that states can take to recruit STEM teachers include:

1. Gather and analyze data to design and implement recruitment initiatives.
2. Build strong and sustainable relationships with institutions of higher education.
3. Develop differentiated pay systems and create financial incentives.
4. Provide prospective teachers adequate information about teaching opportunities.
5. Develop multiple entry points into teaching for nontraditional mathematics and science teacher candidates.
6. Provide high-quality induction and professional development experiences. (McGraner, 2009)

The CFTL and CCST launched the California Teacher Advisory Council in 2005. The council is modeled after a national program that convenes teachers, policymakers, business and industry representatives, researchers, and representatives of postsecondary institutions to consider systemwide approaches to improving the STEM workforce. Two themes emerged: the need for improved assessments of science and mathematics teaching and learning in the K-12 system, and the need for professional development to encourage inquiry-based learning. (CCST, 2009)

The Mathematics, Engineering, Science Achievement (MESA)

(<http://www.ucop.edu/mesa/home.html>) program engages thousands of educationally disadvantaged students so they excel in math and science and graduate with math-based degrees. Many MESA students get exposed to teaching while tutoring younger MESA participants. According to MESA Executive Director Oscar Porter, “The majority of our students will still go directly to the industry workplace, but it is important they see teaching as another career option as they complete a STEM degree.”

Credentialing Relief to Build the Teaching Workforce

Concerns with the overall decline in California's teacher workforce have led to a number of provisions to streamline and ease the credentialing process. Senate Bill 1186 (Scott) provides an exemption from the California Basic Educational Skills Test (CBEST) to individuals whose scores on the CSU Early Assessment Program were sufficient to waive their CSU placement test requirements in English and mathematics.

Senate Bill 1209 (Scott), passed in 2006, contained the following provisions:

- Streamlining testing requirements for prospective teacher candidates
- Making it easier for teachers credentialed outside of California to earn a California credential
- Providing alternatives to the CBEST
- Calling for a review of several exams to evaluate the feasibility of reducing the number of exams candidates are required to pass

Additional legislation to ease the CTE credentialing requirements includes SB 1104 (Scott), which modifies the requirements for the preliminary and professional clear CTE credentials, making it easier for career professionals to become teachers. Senate Bill 52 (Scott) changed the vocational education credential. Senate Bill 57 (Scott) waived the requirements for completion of a program of professional preparation for persons with at least six years of full-time teaching experience in an accredited private school in the subject and level of the credential being sought. The Designated Subjects Credential includes the CTE (formerly the vocational education) credential, among others. Under the new standards, those seeking a Designated Subjects CTE Credential must have at least a high school diploma and three years (reduced from five) of recent industry experience. The CCTC was also required to establish a list of authorized subjects for the Designated Subjects CTE Credential that reflects the 15 industry sectors identified in the CTE model curriculum standards. The new standards are currently in place, and all programs must begin to transition to the new requirements. Programs using the old standards may not accept new candidates after August 2010.

There are two key differences between credentialing requirements for those seeking a Single Subject or Multiple Subjects Credential and those seeking a Designated Subjects CTE Credential. The Single and Multiple Subjects Credentials require at least a BA degree and participation in an induction program. Those seeking a Designated Subjects CTE Credential need a high school diploma, with no requirement (and no prohibition) to participate in an induction program. These differences contribute to the divide that exists between "academic" teachers and "career technical" teachers. In *Actions States Can Take to Place a Highly Qualified Career/Technical Teacher in Every Classroom*, the authors write:

States should expect all career/technical teachers to meet the same academic standards as other teachers prior to earning a professional certification. A solid academic foundation is essential if career/technical teachers are to develop learning experiences that prepare students for continued learning at work and in educational settings. This would include meeting the same standards on academic exams required of other teachers and either

having or acquiring a bachelor's degree within five years. Preparation systems need to include Web-based learning opportunities and ways to translate occupational credentials into credit toward a bachelor's degree. (Bottoms & McNally, 2005).

In addition to legislation that eases the credentialing requirement, nontraditional teacher preparation programs are important and can prepare teachers to work effectively in multiple pathways.

Recruitment and Retention of Teachers for Pathways

Recruitment and low compensation are challenges to recruiting and employing qualified teachers, particularly for CTE classes and pathway programs. Recruitment is largely left to local school districts. However, the state can take actions to support districts with recruiting and retaining qualified staff. Recent changes in California's credentialing requirements have made it easier for out-of-state teachers to obtain credentials to teach in California, but the state can do more. The states can become proactive to increase the availability of qualified teachers by developing a recruitment approach that identifies potential candidates from high school and community college students, career changers, and retirees from the military and other sectors. (Bottoms & McNally, 2005)

Several ideas for states to address teacher recruitment include:

- Create programs that promote the profession to high school and college students or community members, such as programs in Illinois; Aurora, Colorado; and the Prezell R. Robinson Scholars Program available only in low-wealth systems in North Carolina that have difficulty recruiting qualified teachers.
- Establish outreach programs for college students and experienced professionals with expertise in mathematics, science, and foreign languages, such as the Uteach Natural Sciences Program at the University of Texas at Austin.
- Use website videos, ad campaigns, and statewide conferences to promote the teaching profession. (Hayes & Behrstock, 2009)

In addition, California, along with every state, must address the inequitable distribution of highly qualified teachers, which is largely an issue of retaining teachers who are already in service. *Thinking Systemically: Steps for States to Improve Equity in the Distribution of Teachers* includes recommendations for states to improve teacher retention to redistribute highly qualified teachers:

- Create incentives (monetary and non-monetary) to attract and retain teachers and school leaders in hard-to-staff schools.
- Redesign job responsibilities to parallel compensation, including job-sharing and part-time positions for retired or semi-retired teachers willing to teach in hard-to-staff schools or shortage subject areas.
- Increase the local supply of teachers.
- Improve new teacher induction and professional development to increase teacher qualifications and enhance teacher quality.

- Redesign teacher professional development and school schedules so learning opportunities are job-embedded, collaborative, data-driven, and focused on student instructional needs.
- Consider compensation reform—reward factors related to contribution and effectiveness.
- Ensure a fair and reliable teacher evaluation system. (National Comprehensive Center for Teacher Quality, 2009)

Teacher Data Systems

Efficient and accurate systems to assess changes in the teacher workforce, distribute highly qualified teachers equitably, and reform teacher compensation structures and plans will require data about teachers. California needs systems to manage, retrieve, and analyze data on students, teachers, and administrators. Further, the state will need training for staff to verify and use the data.

The California Longitudinal Pupil Achievement Data System (CALPADS) includes statewide assessment data, enrollment data, teacher assignment data, and other elements required to meet federal NCLB reporting requirements. The California Longitudinal Teacher Integrated Data Education System (CALTIDES) provides data for monitoring teacher assignments as required by the Highly Qualified Teacher provisions of NCLB.

CALPADS will include student demographic, program participation, grade-level, enrollment, course enrollment and completion, discipline, and statewide assessment data. CALPADS will also include teacher assignment data, and will be linked to teacher credential and authorization data in CALTIDES that is from the CCTC. The student-level, longitudinal data in CALPADS will facilitate program evaluation, assessment of student achievement over time, the calculation of more accurate dropout and graduation rates, the efficient creation of reports to meet state and federal reporting requirements, and the ability to create ad hoc reports and respond to questions. CALPADS provides local educational agencies (LEAs) access to longitudinal data and reports on their own students, and immediate access to information on new students.

Pre-Service Teacher Education/Preparation Programs

Successful multiple pathways implementation will require teachers working hand-in-hand with administrators and counselors to provide instruction, guidance, and support to students in academic and CTE courses, and with work-based learning. Except where there is a reference to specific *content* that either academic or CTE teachers may need, the following discussion makes no distinction between academic and CTE teachers, since most components of high-quality preparation, professional development, and support apply to all educators.

Teacher Preparation Programs

Teacher educators are considering ways to improve teacher preparation programs. Susie Whittington described seven important themes for a new model of teacher preparation:

1. Teacher educators must serve as role models, modeling the knowledge, skills, and dispositions of a competent and compassionate teacher.
2. Teacher preparation programs should be implemented and evaluated based on knowledge about what teachers need to know to be effective that is consistent throughout the nation.
3. Teacher preparation programs need to shift from colleges to clinical learning.
4. Teacher educators should conduct collaborative planning and teaching to model integration and improve articulation across teacher preparation courses and experiences.
5. Teacher preparation programs should form two-way partnerships.
6. Technical, pedagogical, and professional knowledge needs to be integrated with technical and general education courses.
7. Teacher educators need to create collaborative teaching and planning teams across departments and colleges. (Whittington, 2005)

Another consideration for improving teacher education programs is to bridge the divide that currently exists between what academic and CTE teachers need to know. Jeannie Oakes writes, “Prospective CTE teachers in Multiple Pathways programs need pre-service academic preparation in mathematics, technology, science, language arts and social sciences. Similarly, prospective academic teachers in Multiple Pathways programs need pre-service preparation in the relationship between academics and their application in the world of work. Teachers who complete conventional pre-service programs are very unlikely to have the expanded competencies needed in Multiple Pathways schools” (Oakes, n.d.).

The California SB 2042 (Alpert), standards for teacher preparation, prescribe what teachers are to know and be able to do, and they have no specific provisions for preparing teachers to work in multiple pathways. This preparation requires additional emphases not found in the typical teacher education programs. All teacher educators who teach courses need to understand what multiple pathways mean in their subject areas.

Skills and Competencies Addressed in Teacher Preparation for Multiple Pathways

Oakes explains that teachers in pathways need to have competencies in four domains: knowledge, pedagogy, professional skills, and foundational comprehension. Teachers need knowledge of the academic concepts that underlie work in industries, intellectual skills to solve problems in the real world, and how to work in a community of practice. They also need pedagogical skills that include how to engage students in project-based and cooperative learning, building on students’ prior knowledge and skills, and using multiple assessment measures and ways for students to demonstrate their competencies. Teachers must have appropriate professional skills that equip them to work in pathway settings, including how to collaborate with other teachers and industry partners (Oakes, n.d.)

The SB 2042 standards include teacher preparation expectations (TPEs), and the profession reinforces these standards. However, according to teacher educators, these standards do not address all of the necessary competencies for pathway teachers.

For example, San Diego State University is partnering with ConnectEd in developing a preparation program for teachers in multiple pathways. They have identified “core proficiencies”

that teachers typically do not receive in teacher preparation programs. Working with pre-baccalaureate students, the San Diego program adds a “multiple pathways lens” to the California Single Subject Credential. The core proficiencies for this “multiple pathways lens” are divided into: content knowledge, curricula design, practice pedagogy, and philosophy.

The core proficiencies match the TPEs, but also include proficiencies that go beyond the TPEs, making up those skills that teachers need for pathways.

Teacher Preparation Expectations and Core Multiple Pathways Competencies

Philosophy

-- Teachers will understand, appreciate, and operationalize the following in their professional practice:

- Equity (TPEs 4, 5, 6, & 7)
- Diversity (TPEs 7 & 11)
- Intra-disciplinary and inter-disciplinary cooperation and collaboration*
- Innovation*
- Industry and postsecondary education partnerships*
- Focus on learning vs. focus on teaching (TPEs 2, 3, 4, 5, & 8)
- Willingness and ability to assume leadership roles (TPE 12)
- Importance of a personalized learning environment where each student is known well by adults and his or her learning needs are known and supported (TPEs 8 & 11)
- Ongoing professional learning, including industry specific orientation (TPE 13)

Core Areas of Proficiency

-- Teachers will demonstrate the following *content knowledge* related to:

- Disciplinary academic standards (TPEs 1 & 9)
- CTE standards (structure, goals)*
- Information management and technology*
- Collaborative classroom structure and operations*
- Work-based learning approaches*

Career exposure and development*

-- Teachers will be able to *design curricula* that:

- Reflect interdisciplinary/integrated problem- and project-based structure and content*
- Meet the California “a-g” requirements with respect to course structure and content (TPEs 1 & 9)
- Address state academic and CTE standards (TPEs 1 & 9)
- Incorporate skills from the Secretary's Commission on Achieving Necessary Skills (SCANS) Report*

-- Teachers will *practice pedagogy* that:

- Incorporates industry-based applications*
- Reflects a student-centered teaching approach (TPE 2, 4, 5, 6, 7, & 8)
- Emphasizes integrated problem/project-based learning*
- Includes differentiated instruction (TPEs 4, 5, 6, & 7)
- Demonstrates a research-based instructional model*
- Utilizes information provided by formative and summative assessments (TPEs 3 & 8) (San Diego State University & ConnectEd, 2009)

* The additional areas of competence that San Diego State has identified for multiple pathways teachers.

The schools of education at San Diego State University, Fresno State, Sacramento State, and CSU San Francisco, and ConnectEd have formed a network of teacher preparation institutions to prepare teachers to work in pathways. The program is not establishing a new multiple pathways credential program; it is adding a “multiple pathways lens” to the state-approved Single Subject Credential. A key feature of the program is that student teachers will be placed in pathways schools and programs for their practicum.

The San Joaquin Teachers College is also preparing teachers to work in pathways. This program works with teachers who already have BA degrees and are interested in a Single Subject or Multiple Subjects Credential. It is focusing on the following:

- Change theory and how it applies to the context of multiple pathways
- CTE and California grades 7 through 12 academic content standards
- Models of integrating CTE and academic curriculum
- Articles from the “Multiple Perspectives on Multiple Pathways” series (Oakes & Saunders [Eds.], 2008)
- Developing partnerships with business and industry and writing grants
- Characteristics of effective leadership
- Equity and access for all students
- Visiting local academy programs
- Reviewing the SCANS skills –skills needed for employment
- Action research

PROFESSIONAL DEVELOPMENT IN PATHWAYS

A number of reports have described the characteristics of professional development that will promote teachers’ ability to implement the four components of multiple pathways. The term “multiple” is meaningful because multiple avenues are needed to provide teachers the opportunities to learn the competencies and skills to teach effectively in pathways. Three primary categories of professional development: induction programs, ongoing professional development, and externships.

Induction Programs

New teacher induction programs are addressed first because they provide a “bridging function” between pre-service teacher preparation and in-service professional development for novice teachers. The teaching profession has been described as the only profession in which novices are completely left to “sink or swim” in their first year(s) of service (Lortie, 1975). Over the years, recognition of how this lack of support for beginning teachers fails both teachers and students has led to efforts to provide substantive support for teachers and to eliminate the isolation that new teachers face.

The BTSA program is California’s state-funded program to support the professional development of newly credentialed, beginning teachers. California established standards to guide the design and implementation of teacher induction programs, including the *Induction Program*

Standards, (June 2008); the *Preconditions for Approved Induction Programs*, adopted in August 2008; and the *Updated Common Standards*, (November 2008). According to *Education Code* 44259(c) districts, county offices, and postsecondary institutions may offer induction programs, but these programs must meet the quality standards. It should be noted that BTSA programs are now subject to Tier III categorical flexibility, and funding for BTSA programs may be used by districts for other purposes not related to the development of newly credentialed, beginning teachers.

All California teachers seeking the clear Single Subject and Multiple Subjects Credentials are required to participate in a teacher induction program. BTSA provides the primary means for teachers to meet this requirement. However, teachers earning the Designated Subjects credential, such as the CTE credential, are not required to participate in an induction program. A 2007 BTSA evaluation report made no mention of including CTE teachers in the BTSA program.

The lack of support for beginning CTE teachers was noted in the CCTC report to the Legislature and the Governor on CTE in response to SB 52. The CCTC recommended some major changes to the CTE program framework:

Historically, no formal supervision or support has been required for new CTE teachers. The draft standards define and require a support model consistent with both student teaching supervision and new teacher support to ensure that candidates have multiple opportunities for critical feedback on their practice and mentoring from a skilled colleague...This support model has proven effective for other new teachers, and it is imperative that CTE teachers receive similar support and supervision (CCTC, 2008).

In *Actions States Can Take to Place a Highly Qualified Career/Technical Teacher in Every Classroom*, the authors state that every CTE credential candidate should “complete a multiyear induction system that includes orientation, continuum of professional development, teacher study groups, mentoring with a master teacher, and opportunities to observe and model effective teaching practices” (Bottoms & McNally, 2005). They characterize a strong CTE teacher induction program as one that includes:

- Initial induction of at least five days prior to the start of school
- Administrative support to participate in planned professional development over two years
- Frequent opportunities for networking and support through professional learning communities
- Mentoring by a trained teacher
- Opportunities to model effective teaching practices and receive feedback
- Frequent visits to other classrooms to observe effective teaching practices

The New Teacher Center at UC Santa Cruz is recognized for its innovative and effective programs of support for new teachers. It suggests quality induction has the following components:

- Program vision seeking to promote the highest quality of instruction possible; creating new professional expectations, setting high standards, and creating the supports that teachers need to reach those levels of accomplishment
- District priority on teacher learning, with adequate time and resources for new teacher learning and mentor development, policies that protect new teachers during induction, and teacher development that is central to education reform
- Quality mentoring with carefully selected mentors, and support for the mentors and be able to mentor new teachers effectively
- Standards of professional practice that are essential to both the novice teacher and the mentor
- Teacher learning that is in the classroom context and allows time for observation, collaborative lesson design, modeling, reflection, analysis of student work, goal setting, and assessment against professional standards (Moir & Gless, 2001)

Ongoing/In-service Professional Development

Student achievement does not significantly improve when improvement efforts neglect to provide teachers the support they need to teach effectively in new environments. (Bernstein, et al., 2008; American Institutes for Research & SRI International, 2006). Explicit attention to the professional development of teachers is absolutely necessary. Implementation of the four key components of a pathway represents a significantly different way of providing secondary schooling for students. As such, the staff working in pathways must be prepared to work differently from those who work in traditional high schools. Saunders stated:

When they enter teaching, few teachers expect to work in the innovative structures that characterize Multiple Pathways. Neither traditional academic or CTE pedagogies are up to that challenge, and teachers must learn new ways of integrating academic and vocational knowledge (Saunders & Chrisman, 2008).

The impact of the teaching workforce on implementation of high-quality instructional programs should not be underestimated. Coherence, collaboration, and supportive professional environments are key factors that promote high-quality implementation of multiple pathways. Academic and CTE teachers should learn and grow together. Teachers and industry partners should share professional development experiences to foster the collaboration that is necessary for implementing pathways. Teacher induction programs must include novice and master teachers, experts on various content areas, and industry partners interacting to reflect on new and traditional practice (Saunders & Chrisman, 2008).

In addition, pathway teachers need opportunities to learn in the workplace to stay current on industry skill requirements *and* effective instructional strategies (WestEd, 2006). Opportunities to learn in the workplace are usually described as teacher externships.

Externships

Since one of the essential components of a pathway is the provision of work-based learning for students, teachers who will facilitate the work-based learning must be knowledgeable of the

occupation or industry associated with the learning experience. For those teachers who do not have industry experience, teacher externships are valuable (Stasz & Stern, 1998; ConnectEd, 2008; WestEd, 2006). Saunders notes:

Multiple Pathways teachers also need opportunities for learning and support outside of school-based professional development activities. Alternative learning sites allow teachers to understand the application of academic knowledge in workplaces and other settings, as well as to understand the full range of career settings, as well as to understand the full range of career possibilities in various industries and institutions. This understanding occurs both in the context of their out-of-school learning experiences and as teachers engage one another in making meaning out of their experiences in these alternative sites of learning. (Saunders & Chrisman, 2008)

Alameda Unified School District has a teacher externship program, which provides guidelines for both teachers and employers. The program connects “the classroom to the world of work through the broad curricular eyes of educators from participating high schools” (Alameda Unified School District, 2002). The district program represents a partnership between employers and teachers. Teachers are given first-hand workplace experience to prepare them to plan instruction that is applicable to the workplace. Participating employers are expected to share with educators what they expect in employees, and employers have direct input into the curriculum. They are also encouraged to serve as mentors, speakers, and participants in the Principal for a Day program.

In Alameda, teachers spend five days in the company related to their fields of instruction. They are required to develop a classroom project that includes such things as job shadowing, field study, or service in the company for students. The teachers present their lesson plans and projects describing how they will apply in the classroom what they have learned during their externship.

Often teachers have little to no knowledge of industry and lack understanding of how the culture of industry differs from schools and how industry operates differently from schools. In addition, teachers may lack the understanding of how to integrate academic and technical skills in teaching their students. Externships are a key, but not the sole strategy, for helping teachers to develop the competencies to better integrate academic and technical content.

The Industry Initiatives for Science and Math Education (IISME) is another example of teacher externships. IISME is a consortium of companies, research laboratories, and government organizations in the San Francisco Bay Area that provides summer fellowships to teachers within their workplaces, and each teacher is provided a mentor. In addition, supports are provided to teachers during the year to help transfer of what is learned in the summer to the classroom. Eighty-seven Bay Area institutions have provided 900 mentors to 512 teachers from 252 schools since 1985. (National Academy of Sciences, 2005a)

The IISME program is part of the Scientific Work Experience Programs for Teachers Network. The programs are independent of each other, but share a goal of providing hands-on immersion

experiences to science, math, and technology teachers to improve the quality of education in those disciplines. (National Academy of Sciences, 2005b)

CONCLUSION

Successful implementation of multiple pathways will require sufficient numbers of CTE teachers and teachers in the academic disciplines. Recent efforts to improve the teacher credentialing process are important steps in increasing the number of teachers who are available to work in pathways. Moreover, innovations in teacher preparation programs, expanded induction programs, and professional development that supports the integration of CTE and academic courses—including direct experience in industry—are all necessary steps that must be continued.

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