Multiple Pathways is now Linked Learning

This publication refers to the educational approach formerly known in California as “multiple pathways.” The approach is now called Linked Learning—a change made in 2010 by the field to more clearly convey the unique benefits that pathways offer. The name change does not affect the content of this publication since the core components and guiding principles of the approach remain the same.
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Authors:
Gary Hoachlander, ConnectEd President
Roman J. Stearns, ConnectEd Director for Policy Analysis and Development
Carol Studier, ConnectEd Director of Communications

ConnectEd’s mission is to support the development of multiple pathways by which California’s young people can complete high school, enroll in postsecondary education, attain a formal credential, and embark on lasting success in the world of work, civic affairs, and family life.

Created by The James Irvine Foundation in April 2006, ConnectEd: The California Center for College and Career works with educators, policymakers, industry, and other stakeholders in California to promote the development and implementation of multiple pathways to college and career.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>PAGE</th>
<th>ABOUT PATHWAYS: WHY THEY MATTER, HOW THEY WORK, HOW WE KNOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>A CALL FOR INNOVATION: THE STATE OF HIGH SCHOOL EDUCATION TODAY</td>
</tr>
<tr>
<td>5</td>
<td>THE BIG IDEA: MULTIPLE PATHWAYS TO SUCCESS</td>
</tr>
<tr>
<td>6</td>
<td>PATHWAYS DESIGN</td>
</tr>
<tr>
<td></td>
<td>GUIDING PRINCIPLES OF MULTIPLE PATHWAYS</td>
</tr>
<tr>
<td>8</td>
<td>CORE COMPONENTS THAT ENRICH PATHWAYS</td>
</tr>
<tr>
<td>10</td>
<td>PATHWAYS IN PRACTICE</td>
</tr>
<tr>
<td>11</td>
<td>PROVEN APPROACH: EVIDENCE THAT MULTIPLE PATHWAYS WORK</td>
</tr>
<tr>
<td></td>
<td>LEARNING IN CONTEXT: THE PROMISE OF PATHWAYS</td>
</tr>
<tr>
<td>12</td>
<td>HIGHER EARNING POWER</td>
</tr>
<tr>
<td>12</td>
<td>HIGHER ACADEMIC ACHIEVEMENT</td>
</tr>
<tr>
<td>13</td>
<td>HIGHER POSTSECONDARY PARTICIPATION</td>
</tr>
<tr>
<td>15</td>
<td>ADVANCING PATHWAYS: POLICY RECOMMENDATIONS FOR PATHWAYS IMPLEMENTATION</td>
</tr>
<tr>
<td>15</td>
<td>EXPANDING OPPORTUNITIES FOR IMPLEMENTATION</td>
</tr>
<tr>
<td>16</td>
<td>A POLICY AGENDA FOR MULTIPLE PATHWAYS</td>
</tr>
<tr>
<td>17</td>
<td>WHAT WILL IT TAKE? PATHWAYS DEVELOPMENT</td>
</tr>
<tr>
<td>18</td>
<td>PATHWAYS DESIGN AND CURRICULUM DEVELOPMENT</td>
</tr>
<tr>
<td>18</td>
<td>1 STATE ENDORSEMENT OF MULTIPLE PATHWAYS</td>
</tr>
<tr>
<td>20</td>
<td>2 CURRICULUM AND INSTRUCTION</td>
</tr>
<tr>
<td>22</td>
<td>3 WORK-BASED LEARNING</td>
</tr>
<tr>
<td>24</td>
<td>4 STUDENT SUPPORT SERVICES</td>
</tr>
<tr>
<td>25</td>
<td>5 TEACHER PREPARATION AND DEVELOPMENT</td>
</tr>
<tr>
<td>28</td>
<td>LEADERSHIP</td>
</tr>
<tr>
<td>28</td>
<td>6 REGIONAL IMPLEMENTATION</td>
</tr>
<tr>
<td>30</td>
<td>7 SCHEDULING AND INSTRUCTIONAL TIME</td>
</tr>
<tr>
<td>32</td>
<td>8 ALIGNMENT WITH POSTSECONDARY EDUCATION</td>
</tr>
<tr>
<td>34</td>
<td>9 STRONG LEADERSHIP</td>
</tr>
<tr>
<td>36</td>
<td>PROGRAM IMPACT</td>
</tr>
<tr>
<td>36</td>
<td>10 ASSESSMENT, ACCOUNTABILITY, AND EVALUATION</td>
</tr>
<tr>
<td>39</td>
<td>IT’S TIME FOR A NEW APPROACH</td>
</tr>
<tr>
<td>40</td>
<td>REFERENCES</td>
</tr>
</tbody>
</table>
Pathways are programs of high school study that connect learning in the classroom with real-world applications outside of school. They integrate rigorous academic instruction with a demanding technical curriculum and field-based learning—all set in the context of one of California’s 15 major industry sectors.

Growing evidence shows that pathways hold promise for reducing high school dropout rates, increasing academic achievement and learning, and increasing students’ earning power when they graduate. Equally compelling, studies show that students enrolled in pathways perform as well as their traditionally educated counterparts on key measures.

The Multiple Pathways Approach

- Prepares all students for success after high school
- Positions students to pursue a full range of postsecondary opportunities, including college degree and certificate programs, formal employment training, apprenticeship, or military service
- Challenges students with a rigorous college-preparatory curriculum that meets the eligibility requirements for application to California’s public colleges and universities
- Engages and motivates students by connecting challenging academics to demanding career and technical education
- Allows students to choose a context for learning that is interesting to them
- Supports students who need help to succeed in their program by providing supplemental instruction
- Informs students of what they need to accomplish to achieve their postsecondary and career goals
- Allows schools to adapt this approach to their local circumstances by choosing themes relevant to their communities
Advancing Pathways: Policy Recommendations

The multiple pathways approach holds significant promise for engaging California high school students and improving their ability to achieve their dreams. While hundreds of schools have already adopted the multiple pathways approach, much remains to be done to put more students on the path to success. Pathways must be designed around rigorous curricula that meet California’s standards for student achievement. Teachers must develop expertise in order to deliver high-quality learning opportunities using the pathways approach. Local and regional leaders must come together to offer multiple, relevant pathways in their communities. And key stakeholders must assess the value and success of pathways in application.

Ten major areas of focus will address needs and provide a policy framework for successfully expanding pathways in California’s schools:

1. **State Endorsement of Multiple Pathways**: persuading elected officials and educational leaders to recognize multiple pathways as a key strategy for preparing students for postsecondary and career success in California
2. **Curriculum and Instruction**: developing models for curriculum and instruction to provide schools with solid examples of the multiple pathways approach
3. **Work-Based Learning**: providing opportunities for high-quality learning based on real-world career applications to students in grades nine through 12
4. **Student Support Services**: bolstering existing in-school support services to help students master rigorous curriculum and map their college and career options
5. **Teacher Preparation and Development**: increasing the supply of teachers who can prepare students for both college and career, including developing supplemental credentials that certify teacher readiness for effective delivery of multiple pathways
6. **Regional Implementation**: supporting regional coalitions in planning and implementing multiple pathways programs that match area industries and circumstances
7. **Scheduling and Instructional Time**: ensuring widespread adoption of block scheduling, seven- and eight-period days, and other strategies for increasing the time available for students to complete multiple pathways
8. **Alignment with Postsecondary Education**: improving coordination between high schools and postsecondary institutions to advance student preparation and access to these institutions
9. **Strong Leadership**: providing information and assistance to principals, superintendents, board members, and other education leaders to ensure quality implementation of multiple pathways
10. **Assessment, Accountability, and Evaluation**: assessing student learning, incorporating new measures into the state’s accountability system, and evaluating the effectiveness of multiple pathways in action

This guide examines the multiple pathways approach and further develops this framework of recommendations—providing a policy agenda to help ensure that schools and districts have the support they need to offer pathways for many more young people in California.
ABOUT PATHWAYS
WHY THEY MATTER, HOW THEY WORK, HOW WE KNOW

A CALL FOR INNOVATION:
THE STATE OF HIGH SCHOOL EDUCATION TODAY

Virtually all stakeholders agree: California’s high schools are not working for the majority of students. About one-third of new ninth-graders drop out before graduating (California Department of Education, 2005–06). These students face a future of marginal, low-paying jobs or of eking out wages and living off the books in the underground economy.

Another third finish high school, but lack the academic and technical readiness to succeed in college or career. If they pursue postsecondary education, they often wind up spending long hours in remedial courses trying to learn the mathematics, reading, and writing skills they should have acquired in high school. If they seek employment, they quickly learn that their options are limited largely to low-skill, low-pay jobs with little prospect for advancement.

Only a third of high school students in California graduate on time and transition easily to postsecondary education and lasting career success (National Center for Public Policy and Higher Education, 2004).

By any standard, Californians cannot afford this situation. It represents significant human, social, and economic costs today—and an even bigger price for our future.

A range of good—but fragmented—ideas is available.

While there may be agreement on the problem, there is less consensus on what to do about it. Many remedies are proposed, including higher academic standards, reinvigorated career and technical education, universal college-preparatory curriculum, small schools and small learning communities, charter schools, better assessment, increased accountability, fiscal incentives, and other school finance reforms.

These ideas are for the most part well conceived. If wisely implemented, many hold promise for positive change. However, each is usually advanced in a piecemeal fashion—and comes up short of creating a big impact and truly making schools better.

It’s time for a different approach.

California needs a comprehensive, coherent strategy that allows industry, policymakers, educators, and community advocates to re-engage high school students in serious learning. Specifically, we need to help young people prepare to produce effectively in a rapidly changing economy; achieve educational, financial and personal goals; and participate in community life.

We need an approach that is simple and complete, built on our collective aspirations for lifelong learning, economic well-being, and civic engagement. And this approach must be versatile—it must recognize that California’s young people can pursue many different pathways to achieving their dreams and contributing to the success of this state.
THE BIG IDEA: MULTIPLE PATHWAYS TO SUCCESS

This goal is within California’s reach. It’s possible through the statewide application of a proven concept known as multiple pathways. Pathways are programs of academic and technical study that integrate classroom and real-world learning set in the context of one of California’s major industries. Students pursue a pathway over multiple years and graduate prepared for the full range of post-graduation options—which can include two- or four-year college, certification programs, apprenticeships, formal job training, or military service.

By offering multiple pathways, schools encourage students to select from a variety of themed programs in any of California’s 15 major industry sectors—fields such as finance and business; health science and medical technology; and arts, media, and entertainment.

The success of this approach is grounded in its relevancy and rigor. Pathways connect to actual needs in our state’s economy, and they help motivate young people to learn by answering the question, “Why do I need to learn this?” By combining a college-preparatory curriculum with an exceptional career and technical education, pathways lead to real-world success for our youth, and to a world-class labor force for our state.

The pathways approach is being implemented in school districts—both urban and rural—in all regions of the state. The results to date are striking, including higher graduation rates and higher earning power for students in pathways or similar programs.

While hundreds of schools have already adopted this approach in California, transitioning more high schools to multiple pathways is a challenging but attainable task. Not only is it possible to prepare students for both college and career, it is essential to do so if we are to reverse the widespread exodus from California’s high schools and put many more young people back on pathways to lasting success in further education, careers, and the civic affairs of our state.

PATHWAYS

A better model for California public education.

Pathways are poised to transform California’s high school education. Here’s why:

Students can see the relevance of what they are learning.
Pathways engage and motivate students by answering the question, “Why do I need to learn this?”

Students are prepared for both college and career—not just one or the other.
Pathways eliminate the tracking that has dominated high school education and help ensure that all students master the knowledge and skills needed for lasting success in the modern economy.

Students can pursue a wide range of options after high school.
Pathways integrate a rigorous academic curriculum with demanding technical and field-based components and prepare graduates for further education in California’s colleges and universities or for entry into apprenticeships, job training programs, or the military.

Students experience measurable gains in learning and earning power.
Pathways can improve student outcomes in measurable arenas, including academic achievement, high completion rates, and earning power after graduation.
It’s time to transform today’s education for tomorrow’s economy.

Multiple pathways have immediate relevance for young Californians and positive implications for the success of our state. Leaders in business, labor, public policy, education, and community development are invited to come together around multiple pathways and build a new agenda for high school improvement in California.

The sections that follow provide an analysis of the multiple pathways approach and benefits, offer supporting evidence for its adoption, and conclude with a framework for examining some of the critical policy issues surrounding the design, implementation, and expansion of multiple pathways in California.

PATHWAYS DESIGN

Pathways connect learning in the classroom with real-world application outside of school. Each pathway links rigorous academic instruction with technical knowledge and field experience—all organized around one of California’s major industry sectors.

The ability to provide students with a range of relevant content in a variety of ways is a hallmark of the pathways approach. And pathways can be offered through a number of high school delivery systems. Based on four guiding principles and four core components, the pathways approach maintains the integrity of a course of study that prepares students for postsecondary study and career, while offering communities the ability to center that education around themes that connect directly to their economies.

CALIFORNIA’S 15 MAJOR INDUSTRY SECTORS

- Agriculture and Natural Resources
- Arts, Media, and Entertainment
- Building and Environmental Design
- Education, Child Development, and Family Services
- Energy and Utilities
- Engineering
- Fashion Design, Manufacturing, and Production
- Finance and Business
- Health Science and Medical Technology
- Hospitality, Tourism, and Recreation
- Information Technology
- Manufacturing
- Marketing, Sales, and Service
- Public Services
- Transportation
Guiding principles of multiple pathways
Multiple pathways can be organized around any of California’s 15 major industry sectors. Each pathway is grounded in a set of four guiding principles.

1. **Pathways prepare students for postsecondary education and career.**
   A pathway is always about both objectives; it’s never a choice between one or the other. Here’s why: The probability of making a living wage in today’s economy without some form of postsecondary education is already low and will only diminish.

   In 2005, the average earnings for adults with a high school diploma were nearly $10,000 less than that of associate’s degree holders and more than $25,000 lower than the average earnings of those with a bachelor’s degree (MDRC, 2007). While the Bureau of Labor Statistics projects that the next 10 years will bring only a modest increase in the number of occupations requiring a bachelor’s degree (Mishel 2007; Barton 2006; Handel 2005), there is consensus that career success will increasingly depend on some postsecondary education and gaining a formal credential—a certificate, associate’s degree, bachelor’s degree, or higher level of achievement (National Center for Public Policy and Higher Education 2005; Prince and Jenkins 2005).

2. **Pathways connect academics to real-world applications.**
   Each pathway integrates challenging academics with a demanding career and technical curriculum. Pathways alter how core academic subjects are taught; they do not lower expectations about what is taught. Through the pathways approach, students are expected to achieve at high levels in mathematics, science, English, social studies, and foreign language. Students master these subjects through the power of applying knowledge in a real-world context—they learn by being presented with authentic problems and situations that are part of the modern workplace. By organizing pathways around real-world themes, students gain the opportunity to test their classroom learning in practical application and work-based experiences.

   Multiple pathways prepare all students for enrollment in postsecondary education by providing a rigorous academic core that meets eligibility requirements for admission to California’s public colleges and universities. Pathways increase the likelihood of success in community college and deliver the academics needed for apprenticeship and formal employment training for high-skill, high-wage occupations. Combined with challenging technical and work-based components of the curriculum, pathways help students master both theoretical and practical understanding of a discipline.

3. **Pathways lead to a full range of postsecondary opportunities.**
   Pathways can eliminate current practices that sort and track high school students in ways that limit their options after high school. Although not all students will enroll in four-year degree programs, they graduate prepared for a full range of opportunities: two- and four-year college, apprenticeship, formal employment training, and the military. Each pathway represents a broad theme that can appeal to and engage a student, regardless of his or her prior academic achievement and postsecondary aspirations. Students enrolled in pathways can waive their right to pursue the college-preparatory curriculum only if they understand that they are giving up certain options by doing so.

4. **Pathways improve student achievement.**
   Pathways are based on accountability. They are designed to produce higher levels of accomplishment in a number of measurable arenas, including performing at grade level on tests of academic achievement, demonstrated mastery of demanding technical knowledge and skill, high school completion, postsecondary transitions, and attainment of a formal postsecondary credential. They also contribute—in ways that most conventional academic and career and technical education curricula do not—to increased student proficiency in vital areas such as critical thinking, problem solving, media and information literacy, and collaboration. Finally, pathways make an immediate difference, helping young people gain higher earnings right after high school and giving these students a leg up in the labor market while they pursue postsecondary education.
Core components that enrich pathways
Because each pathway must offer students the opportunity to take the courses and perform to the levels of mastery required to pursue a variety of postsecondary options and employment, developing effective pathways curricula can pose a challenge. There is much less variation in the content high school students need to pursue different options than there is in the level of mastery required to succeed in one choice versus another. For example, while future carpenters, electricians, architects, and engineers will all need skills in algebra and construction technology, they will likely rely on differing degrees of mastery in these subjects. In a pathway organized around building and environmental design, both subjects are integral elements. The four components at the heart of pathways design ensure that curriculum remains balanced and rigorous, and they give students the support they need to be successful in their chosen program of study.

1. A challenging academic component prepares students for success—without remediation—in California’s community colleges and universities, as well as in apprenticeships and other postsecondary programs. Central to each pathway is instruction in essential subjects, typically spanning multiple years and always placed in the context of real-world application. Pathways design can feature innovative approaches to delivering college-preparatory subjects, replacing traditional learning with rigorous instruction that engages students in core subjects, including:
   - English—four years
   - Mathematics—three years, including algebra, geometry, and advanced algebra or statistics
   - Science—two years, including biology, chemistry, or physics
   - Social studies—three years, including American and world history, U.S. government, and economics
   - Foreign language—two years, emphasizing oral communication and cross-cultural understanding
   - Visual and performing arts—one year

2. A demanding technical component delivers concrete knowledge and skills through a cluster of four or more technical courses. The focus is on preparing youth for high-skill, high-wage employment by emphasizing industry-related knowledge and skills, as well as academic principles and authentic applications that bring learning to life.

In each pathway, courses are organized around a broad theme. What students learn in their academic classes is reinforced in technical classes and vice versa. This structure enables students (and teachers) to explore connections in depth—and ultimately deepens student understanding and makes learning more exciting and relevant. For example, learning about mitosis in a biology class will have greater meaning for students if they are given the chance to propagate plants at the cellular level in the tissue culture lab of their agriculture class.

The technical core emphasizes much of the occupation-specific instruction that has been the hallmark of strong career and technical education curricula, but it also connects this content to a broader foundation of industry-related knowledge and skill that is transferable across occupations and industry sectors. Additionally, the technical core stresses real-world application of selected academic concepts and skills that are particularly germane to a pathway’s industry focus.

3. A work-based learning component offers opportunities to learn through real-world experiences.

Students gain access to intensive internships, virtual apprenticeships, and school-based enterprises. These experiences complement classroom instruction and help sharpen students’ desire to increase knowledge and skills that are relevant to their career interests.

Work-based learning opportunities also help students relate what they are learning in the classroom to the real world. For example, studying the role of electricity in regulating the human heart is likely to have more meaning for a student who can work side-by-side with a hospital technician, administering and interpreting electrocardiograms. Producing a community magazine or newspaper can increase students’ engagement in the English curriculum as they learn about journalistic writing, editing, and presentation skills. Through these opportunities, students also learn other essential skills that employers claim high school graduates are lacking, such as communication, problem solving, teamwork, project planning, and critical thinking.
4. **Supplemental services** include counseling as well as additional instruction in reading, writing, and mathematics to support students in a challenging program of study.

These services help ensure that students performing below grade level when they enter high school receive the assistance they need to successfully complete a rigorous curriculum. In addition, these services help students to carefully map out their postsecondary plans, ensuring that they complete the necessary courses in time to apply to their desired postsecondary programs and work opportunities.

In the best application, each pathway spans grades nine to 12 and connects directly to postsecondary and career options.

Multiple pathways eliminate the problematic separation of mainstream academics from technical instruction. They offer a challenging vehicle that inspires students to learn, and give them access to education that is both rigorous and relevant.

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**PATHWAYS IN ACTION**

Each pathway offers an integrated approach to learning. The core academic courses systematically take advantage of the pathway’s theme to introduce authentic applications of essential academic knowledge.

**BUILDING AND ENVIRONMENTAL DESIGN**

**GEOMETRY** Students learn the concepts and skills needed to build roofs and frame walls that withstand gale-force winds.

**PRE-CALCULUS** Students study the role of mathematics in designing and building a seismically sound Bay Bridge.

**HISTORY** Students learn how the built environment reflects and shapes culture, politics, and the economy.

**ENGLISH** Students master technical reading and writing, and gain appreciation for relevant literature, such as Pulitzer Prize winner Tracy Kidder’s *House*, a compelling nonfiction account of building the American dream.

**TECHNICAL COURSES** Students learn occupation-specific skills—carpentry, electricity, and masonry—and study fundamental principles of engineering and design, project and site planning, construction management, and emerging technologies. They gain a foundation of industry knowledge and skills applicable to a wide range of career opportunities in the world of building and environmental design.

**WORK-BASED LEARNING** Ninth- and tenth-graders are connected to mentors in fields such as architecture, construction, or interior design. High school juniors and seniors engage in more intensive internships, working alongside professionals who assess their work against industry standards. They also participate in school-based enterprises such as home building, design services, or community environmental projects.

**SUPPLEMENTAL SERVICES** Additional support, especially instruction in reading and mathematics, helps students master high levels of academic and technical knowledge. Like the core academic classes, supplemental courses take advantage of the pathway’s theme to give meaning to the academic content.
PATHWAYS IN PRACTICE

Today, multiple pathways are hardly the norm in California’s high schools. Yet they are emerging as a fresh, comprehensive, and practical solution to our statewide need to transform education.

Through pathways, students are connecting their core academic classes to challenging career and technical instruction. It’s happening in places like Construction Technology Academy at Kearny High School Education Complex, High Tech High School in San Diego, Health Careers Academy at Palmdale High School, Health Professions High School in Sacramento, Manufacturing Production Technology Academy at Laguna Creek High School, Life Academy of Health and Bioscience in Oakland, and Media Academy at Grover Cleveland High School in Los Angeles.

Today in California, 290 partnership academies are organized around a major state industry sector, and another approximately 300 career academies are in operation. Regional Occupational Centers and Programs (ROCPs) play an important part in many of these academies. In many other high schools, ROCPs are experimenting with innovative approaches to integrate academic and technical education.

While students in these schools are expected to enroll in an industry-focused pathway, they are not expected to pursue a career in that area after high school—although many may choose to do so. The themes are broad enough that each exposes students to material relevant to dozens of careers. Additionally, for students who enter high school with a strong sense of what they want to do after graduation, multiple pathways offer an excellent opportunity to explore those interests in depth. Should any student determine over time that another focus is more attractive, he or she may switch to another pathway.

To this end, students should have a choice of pathways, which could be focused on industry themes, or organized around other kinds of themes such as international affairs, social justice, or leadership, as well as the more traditional college-preparatory offerings.

The pathways approach is comprehensive and flexible, allowing wide-scale adoption across a continuum of high school delivery systems. Large, comprehensive high schools can offer programs in multiple sectors, allowing students to enroll in the one that interests them most. For example, one school might offer an agriculture and natural resources pathway, a hospitality and tourism pathway, and an engineering and design pathway. Students and teachers in this school would split into three groups, with each focused on one pathway. These groups could operate as small learning communities or career academies within the larger high school.

Smaller schools, which may have too few teachers to provide pathways in more than one area, can offer one program and might coordinate with nearby schools to allow students a choice of pathways. Magnet, alternative, and charter schools often offer a single pathway focus. Still another option is for schools to help each student develop an individualized pathway tailored to his or her specific interests.

The great promise of multiple pathways is the ability to finally make learning real and exciting for the thousands of students who are bored with conventional high school curricula. Whether they aspire to become doctors or medical technicians, architects or carpenters, all students hunger for the answer to a simple question: “Why do I need to learn this?”
In 1916, John Dewey wrote in *Democracy and Education*, “Education through occupations… combines within itself more of the factors conducive to learning than any other method.”

For many students—perhaps even most—real-world, work-related application brings meaning and understanding to even the most complex academic subjects. Nevertheless, in the decades that followed John Dewey’s seminal work, American high schools were slow to embrace the idea that connecting academics to authentic, work-related applications holds the key to making high-level learning attainable for more young people. Instead, high schools rigidly separated college-preparatory academics from vocational education, which emphasized rather narrow, occupation-specific skill preparation geared toward entry-level jobs requiring little more than a high school diploma.

The reasons for this separation are many and complex, and only in the past 15 or 20 years have researchers and policymakers begun seriously to re-entertain Dewey’s dictum. While support is growing for the promise of multiple pathways, consensus is still evolving.

Probably the most recent and comprehensive assessment of the research debates—philosophical, theoretical, and empirical—surrounding academic and career preparation in American high schools is made by Jeanne Oakes and her colleagues at University of California at Los Angeles. They conclude that while all the evidence is not yet in, there is a strong case for making multiple pathways a major focus of high school reform (Oakes and Saunders 2006). In addition, a number of other studies offer evidence that multiple pathways, when well-designed and implemented, can produce substantial learning benefits for many of California’s high school students. Some of the key findings are summarized below.

**Learning in context: the promise of pathways**
Some of the more convincing findings supporting multiple pathways began emerging in the 1980s from work in learning theory and cognitive science. Research shows that many people learn better and faster, and retain information longer, when they are taught concepts in context.

One study focused on young soldiers who lacked basic literary skills when they entered the military. One group was taught to read in the context of their daily tasks, while others participated in a traditional literacy program. The study found that those who were taught to read in the context of tasks not only increased their competency in those tasks but also improved their general reading skills—all in a relatively short time period. In fact, the gains in general reading skills were equal to or greater than those produced by the conventional literacy program, while gains in job-related reading exceeded the traditional program by a factor of four or five (Sticht 2002; Sticht et al. 1987).

Called “functional-context education,” these techniques have been successfully used to teach literacy and other skills in nonmilitary adult education programs. In 2002, the U.S. Department of Education’s What Works Clearinghouse, which screens and identifies high-quality research, recognized functional-context education as an effective approach (Fletcher 2006).

Another prominent study offered strong evidence that integrated academic and technical curriculum leads to higher test scores if implemented well. In this research, career and technical education (CTE) teachers were paired with mathematics teachers who identified the mathematical content embedded in the CTE teachers’ subjects and developed lesson plans to teach the math within the occupational context (Stone et al. 2006). The 57 CTE teachers who helped develop the math-enhanced lessons were randomly assigned to classrooms and delivered the curriculum for about 10 percent of class time over the course of one year; 74 CTE teachers not participating in such development taught other classrooms with traditional instruction.
The almost 3,000 enrolled students were given math pre-tests and were tested again a year later. Those taught the integrated curriculum significantly outscored the control group on two tests of math ability (Stone et al. 2006).

Other research on the effectiveness of career academies and other forms of career and technical education also provides strong evidence of the benefits of pathways. While more research should be done, the findings suggest that teaching integrated curricula can improve student outcomes in specific, measurable areas.

**Higher earning power**

An integrated curriculum combined with work-based learning and career guidance can lead to higher wages after high school. Employing rigorous experimental design and random assignment, an MDRC study examined the outcomes of 1,700 students enrolled in career academies that offered the multiple pathways approach to predominantly minority students. The study showed that four years after graduation from high school, career academy graduates were earning more than their traditionally educated counterparts. While this was true for both men and women, the result was statistically significant for academy males, who earned 18 percent ($10,000) more over the four-year period after high school (Kemple and Scott-Clayton 2004).

The study could not isolate the precise causes of these higher earnings. The wage gains could reflect mastery of general industry knowledge and skill, an increased ability to apply academic knowledge and skill, greater proficiency in problem solving, development of networking and teamwork skills, or other learning not measured by conventional standardized achievement tests. Nevertheless, the earning gains enjoyed by academy students suggest that additional learning was occurring in academy programs, which was sufficiently valued by employers to warrant higher wages.

This study found further that academy students did neither better nor worse than comparable high school students on academic achievement as measured by standardized tests. Nor was the academy students’ postsecondary attainment compromised. Since these career academies were not yet teaching core academics any differently from the way courses were taught in traditional high school classes, these results are not surprising. It remains to be seen whether more contextualized or problem-based approaches to academic instruction can produce higher academic gains and better rates of postsecondary persistence and attainment.

**Higher academic achievement**

Other research on career academies is also promising—indicating increases in graduation rates, exit exam passing rates, and the number of students eligible for state colleges. In a study conducted collaboratively by ConnectEd: The California Center for College and Career, and the Career Academy Support Network at the University of California at Berkeley, researchers found that students in California’s partnership academies were much more likely to complete the 15 academic courses (the a–g requirements) needed to be eligible for admission to California’s public colleges and universities. The study found that 50 percent of graduating seniors in partnership academies had completed the a–g requirements, compared to only 39 percent of graduates statewide (Bradby et al. 2007).

Similarly, academy students were much more likely to pass the California High School Exit Exam (CAHSEE). For example, 71 percent of African American students in academies passed the math portion of the CAHSEE in 2005, compared with 55 percent of all African American high school students in the state.
Graduation rates were also better, with 96 percent of academy seniors graduating compared to only 87 percent of high school seniors statewide (Bradby et al. 2007). (Data were unavailable for the study to calculate graduation rates from entry in ninth grade to graduation.) While it is possible that selection effects—that students enrolled in the academies were more motivated or better prepared to begin with—account for some of the outcome, it seems unlikely that this could explain such a large difference.

Even without an integrated curriculum, students simply taking both academic and technical courses may have lower dropout rates and better achievement gains than comparison groups of students. A study examining data on more than 4,000 students found that those in California’s ROCPs improved their grade point averages more than comparison students enrolled in non-CTE programs. ROCP students were as likely to enroll in postsecondary education and to earn higher wages. Significantly, these students were lower achieving and of lower socioeconomic status than the comparison group (Mitchell 2006).

In addition, in data analyses from the National Education Longitudinal Study, which has monitored student achievement data and other factors for over a decade, researchers found that the risk of dropping out was four times higher when students took no CTE courses than when they completed three such courses for every four academic courses. Participation in CTE courses had an even more positive effect for the lowest achieving students (Mitchell 2006, citing Neumark 2004).

**Higher postsecondary participation**

Finally, postsecondary participation rates may be higher for those enrolled in multiple pathways programs. Three other studies of career academies followed students beyond high school. Two found higher rates of postsecondary participation among academy students compared with their peers, while one found no difference (Stern and Stearns 2007, p. 12). Research on school-to-work programs in the 1990s also frequently found high rates of postsecondary participation among graduates (Kazis 2005, p. 15).

Although these particular studies of career academies did control for various student background differences, their methods do not rule out the possibility that there was something about the students in the academies, rather than the programs themselves that explains these encouraging results.

Research to date suggests that the approach of integrating challenging academic and technical curricula in the context of real-world application can produce many benefits for students, especially those who traditionally have not done well in conventional high school programs. Like most research in education, the findings are not always conclusive, and the field needs additional exploration—especially more studies employing experimental design that can eliminate the potential effects of students “self-selecting” to participate in career academies and other types of multiple pathways programs.

Nevertheless, there is substantial evidence of positive outcomes for students. Perhaps just as compelling, none of the studies indicates lower performance in key areas by students in pathways compared to students in other high school programs. “Do no harm” is of paramount importance in any school improvement proposal. Pathways initiatives implemented so far respect this caution, while also producing tangible benefits for many students.
THE MULTIPLE PATHWAYS APPROACH...

- **Prepares all students for success after high school**—regardless of their preparation prior to entering high school.

- **Is appropriate for any student regardless of postsecondary goals.** Students graduate prepared to pursue a full range of options: two-year and four-year colleges, technical colleges, apprenticeships, formal employer training programs, or education through the military.

- **Challenges students by providing a rigorous college-preparatory curriculum,** which specifically meets the eligibility requirements for application to California’s public colleges and universities.

- **Engages students by making school relevant.** By integrating academic and technical curricula, offering work-based learning opportunities, and setting learning in the context of real-world application, students are able to see academic principles in action.

- **Allows students to select a context for learning that interests them** by offering a choice of pathways. One school may offer programs in three industry sectors, or, if it can only offer one sector, it may coordinate with other local schools to provide access to other pathways.

- **Supports students who need help to succeed in their programs** by providing academic assistance to master a challenging curriculum.

- **Ensures students have a plan for the future** by informing them of what they need to do in high school to achieve their postsecondary goals and helping them develop an action plan to get there.

- **Is flexible enough to allow schools to adapt it to their local context,** selecting theme(s) and developing or adopting curriculum relevant to their communities.
The multiple pathways approach holds significant promise for engaging California high school students and improving their ability to achieve their dreams. While hundreds of schools have already adopted the multiple pathways approach, much remains to be done to put more students on the path to success. Pathways must be designed around rigorous curricula that meet California's standards for student achievement. Teachers must develop expertise in order to deliver high-quality learning opportunities using the pathways approach. Local and regional leadership must come together to offer multiple, relevant pathways in their communities. Key stakeholders must assess the value and success of pathways in application.

EXPANDING OPPORTUNITIES FOR IMPLEMENTATION

What can the state do to expand the implementation of multiple pathways in schools across California?

Build on an existing foundation
California already has many of the components in place. A significant number of schools, including almost 600 career pathways and partnership academies, are already using the multiple pathways approach; some have been employing it for decades. None of these schools is perfect, and there is variability in the depth and quality of their implementation efforts. Nevertheless, the experience and lessons learned from these schools provide guidance for others interested in adopting the approach and developing their own programs.

In addition, the state has already identified industry sectors (see box on page 6) that schools can use or adapt in developing pathways programs, corresponding academic and technical standards, and curriculum framework. Through the work of ConnectEd and others, sample curricula that integrate academic and technical content and meet these standards are becoming available for schools to adopt should they choose.

Finally, the basic components are in place for building a sound system of accountability and evidence-based school improvement. The California Standards Tests (CST) make it possible to establish clear goals for student performance in the core academic subjects; the California High School Exit Exam (CAHSEE) provides an indicator of basic proficiency in mathematics and English; and the evolving California Longitudinal Pupil Achievement Data System (CALPADS) will give policymakers, schools and interested stakeholders the tools to measure a range of important student outcomes, including grade-to-grade transition and high school completion. A variety of other systems can help monitor postsecondary persistence, degree attainment, and links to employment and earnings information.

These basic building blocks provide a strong start for making high-quality multiple pathways available to significantly more young people in California. There are notable opportunities to expand the implementation of pathways and to reach more students across the state. At present, California's partnership academies serve only two percent of all high school students statewide and are not available in 23 of the state’s 58 counties. Similarly, in far too many of the state’s high schools, both rural and urban, students do not have access to the high-quality academic and career and technical classes that are critical components of multiple pathways offerings.

Expanding access to these opportunities depends on making a strong commitment to pathways in state education policy and on following through with major improvements in supporting multiple pathways design, teacher development, strong leadership, and evaluation of program impact.
A policy agenda for multiple pathways
Policymakers can expand multiple pathways by encouraging local adoption of the pathways approach: removing regulatory barriers, creating incentives, and providing funding and other vehicles for change.

More specifically, developing a coherent state policy agenda will help ensure that schools and districts receive the support needed to serve more students with multiple pathways.

The following section elaborates on these policy issues, outlining specific recommendations that can help California use multiple pathways to prepare more students for both college and career, not just one or the other.

ConnectEd: The California Center for College and Career is committed to working with policymakers and other stakeholders in education, industry, and the community to develop the more detailed policies and supporting tools that will make access to multiple pathways a reality throughout the state.

The time is right to encourage expansion of multiple pathways for more students in California high schools.
A 10-item framework, related within four categories of need, provides a pathways policy agenda for California.

PATHWAYS DESIGN AND CURRICULUM DEVELOPMENT

1. **State Endorsement of Multiple Pathways**: persuading elected officials and educational leaders to recognize multiple pathways as a key strategy for preparing students for postsecondary and career success in California.

2. **Curriculum and Instruction**: developing models for curriculum and instruction to provide schools with solid examples of the multiple pathways approach.

3. **Work-Based Learning**: providing opportunities for high-quality learning based on real-world career applications to students in grades nine through 12.

4. **Student Support Services**: bolstering existing in-school support services to help students master rigorous curriculum and map their college and career options.

TEACHER DEVELOPMENT

5. **Teacher Preparation and Development**: increasing the supply of teachers who can prepare students for both college and career, including developing supplemental credentials that certify teacher readiness for effective delivery of multiple pathways.

LEADERSHIP

6. **Regional Implementation**: supporting regional coalitions in planning and implementing multiple pathways programs that match area industries and circumstances.

7. **Scheduling and Instructional Time**: ensuring widespread adoption of block scheduling, seven- and eight-period days, and other strategies for increasing the time available for students to complete multiple pathways.

8. **Alignment with Postsecondary Education**: improving coordination between high schools and postsecondary institutions to advance student preparation and access to these institutions.

9. **Strong Leadership**: providing information and assistance to principals, superintendents, board members, and other education leaders to ensure quality implementation of multiple pathways.

PROGRAM IMPACT

10. **Assessment, Accountability, and Evaluation**: assessing student learning, incorporating new measures into the state's accountability system, and evaluating the effectiveness of multiple pathways in action.
PATHWAYS DESIGN AND CURRICULUM DEVELOPMENT
Strong design and curriculum development are critical to the success of the pathways approach.

POLICY AREA

State Endorsement of Multiple Pathways

Develop state policy and finance systems to promote the adoption of multiple pathways in California high schools.

The multiple pathways approach combines many reform efforts including standards-based curricula, project-based learning, and school-to-career elements, and presents them in one comprehensive framework. Pilot projects, innovative regional occupational programs, the growing number of themed small schools, career pathways, partnership academies, and charter and magnet schools using the multiple pathways approach provide substantial evidence on best practices and on what works.

RECOMMENDATION

Ensure high-quality implementation of pathways.

How: Establish a common definition of multiple pathways and its key components and incorporate this definition into the California Education Code. This first step will establish a universal understanding of multiple pathways and how they can be implemented, and it will help guide funding designated for high school reform.

Pathways should be defined as comprehensive, multi-year programs of academic and technical study that prepare high school students for the full range of postsecondary options and productive careers. Programs should contain: (1) an academic core that meets eligibility requirements for California’s public colleges and universities; (2) a technical core aligned with the needs of California’s major industries; (3) a sequence of coordinated, high-quality work-based learning opportunities; and (4) academic and career-planning support services, especially supplemental instruction in reading, writing, and mathematics.
1.2 Systematize implementation of high-quality programs.

**How:** Use the state’s 15 industry sectors as an organizing framework for multiple pathways to provide an accessible, standardized structure for integrating curricula around a pathway focus.

These industry sectors are already the foundation for the state’s content standards and the framework for career and technical education. Employed more broadly to structure the academic coursework, work-based learning, and supplemental services that are part of each pathway, the themes can help define programs of study, guide curriculum development, and promote integration of curriculum and instructional practices.

1.3 Promote expansion and improvement of multiple pathways programs.

**How:** Develop resources and tools to assist schools and districts with implementing pathways.

Resources such as information about model programs and practices; rubrics to guide the design, implementation, and evaluation of pathways; and data management tools and assessment instruments can encourage high-quality implementation of pathways in schools across the state.

Removing barriers to creative solutions, promoting sharing of best practices between schools and sectors, allowing more flexible spending, and consolidating and streamlining reporting requirements can also support the success of local and regional pathways implementations.
POLICY AREA

Curriculum and Instruction

Develop model curricula and augment the curriculum frameworks to provide schools with guidance in transitioning to multiple pathways.

Schools adopting multiple pathways will need tools to assist both academic and technical teachers in transitioning from conventional teaching strategies to practices that prepare students for both postsecondary education and career. The state should augment existing tools such as curriculum frameworks and provide new ones such as model curricula to support school-level adoption of multiple pathway programs and to help provide consistent quality across the state.

RECOMMENDATION

Assist schools in developing rigorous integrated curricula that prepare pathways students for postsecondary success.

How: For each of the 15 industry themes, create models that are aligned with standards for application to postsecondary education and training programs.

In multiple pathways, academic courses incorporate real-world problems and, likewise, technical courses help students see how academic content is applied in authentic, industry-related situations. Often, CTE and academic teachers teach in isolation from one another with little opportunity for joint planning time, curriculum integration, team teaching, or other connections between courses. Both need specific illustrations of what quality integrated curricula should look like. Although teachers should be free to adapt models and create their own curricula, it is both unrealistic and inefficient to expect curriculum development to occur solely at the local level.

The California Department of Education should reconvene the Superintendent's Advisory Group for California CTE Standards and Frameworks to develop model curricula that showcase integrated, standards-aligned academic and technical material for each of the 15 industry themes. This group should include faculty from one or more of the state's postsecondary systems (including, wherever appropriate, faculty representing formal apprenticeship programs) to increase the likelihood that the curriculum will meet requirements for success in postsecondary education.
Model curricula should be developed for each of the 58 career areas within the 15 industry clusters to demonstrate how the approach applies in each career area. Recognizing that curriculum development is time- and labor-intensive, the appointed taskforce should first review examples of integrated curricular materials developed by national industry or professional groups, other states, and groups within California with the goal of adopting or adapting existing curricula. The taskforce should establish priorities for curriculum development among the 15 sectors and 58 career areas.

Empower teachers to design curricula and assessments that integrate academic content with real-world applications, and prepare teachers to successfully implement the pathways approach.

**How:** Supplement the existing core academic curriculum frameworks and create professional development approaches for teacher preparation.

While model curricula will give schools and districts examples of lessons in particular pathways, curriculum frameworks will demonstrate how teachers can create their own lessons to take advantage of a pathway’s industry focus.

The state already provides a curriculum framework for each subject (English, mathematics, social studies, and science), including curriculum design guidelines; information on instructional materials and practices; sample lessons and examples of high-quality, standards-based problems; information on assessment development; and resources for professional development. And, in keeping with the multiple pathways approach, CTE frameworks show how to incorporate academic concepts into technical lessons. However, the State Board of Education and its Curriculum Commission need to supplement the academic curriculum frameworks to more explicitly show teachers how the core academic disciplines are applied in industry-based problems.

Augmented frameworks could also include guidance on project- and problem-based learning, lists of instructional materials that support real-world application of their disciplines, examples of authentic assessments, strategies for utilizing local industry partners to help students develop real-world skills, opportunities for professional development that will continue to build teachers’ abilities to promote applied learning, and other information that helps bring to life the key elements of the multiple pathways approach.
Work-based learning opportunities, if they exist at all for high school students, vary widely in quality across the state. Convening stakeholders and developing policies to expand implementation of high-quality programs will help provide better learning opportunities for more students.

Help districts understand how to implement strong work-based learning programs.

How: Develop and disseminate criteria for high-quality work-based learning.

Specific criteria which define work-based learning and appropriate standards for different grade levels are sorely needed. For example, while work-based learning may consist of mentoring or job-shadowing opportunities in ninth and 10th grades, by 11th and 12th grades it should assume more intensive and demanding forms such as paid internships, school-based enterprises, or virtual apprenticeships. Whatever form it takes, work-based learning should systematically reinforce both academic and technical content, requiring curriculum coordination and active involvement by classroom teachers. Work-based learning should also be assessed with input from educators and industry partners.

To make work-based learning a component of pathways that contributes significantly to student achievement, the state should (1) define appropriate activities, (2) develop clear program and learning standards, (3) offer specific examples, and (4) develop tools and resources that schools and their business partners can use to guide effective implementation.
Remove barriers to expanding work-based learning opportunities for students.

**How:** Identify the challenges to implementing work-based learning programs and address issues such as liability, transportation, supervision, and scheduling.

In collaboration with local educators and industry partners, the state should undertake an assessment of the major barriers to large-scale expansion of work-based learning. Challenges frequently cited by schools that offer work-based learning programs include:

- establishment and maintenance of industry partnerships
- development of sufficient numbers of work-based learning opportunities
- concerns about liability, supervision, scheduling, and transportation
- confusion between work-based learning (where supplementing classroom instruction is the priority) and youth employment (where performing menial tasks unrelated to school may occur)

Policies removing identified barriers will help more schools implement quality programs.

Expand work-based learning opportunities for students.

**How:** Convene state-level groups of influential business, labor, civic, and other key leaders representing each of the 15 industry sectors to advocate for regional and local development of industry-school partnerships.

Business and industry participation is essential to expand work-based learning opportunities. To help with recruitment, the state could engage industry and business stakeholders in discussions around work-based learning and encourage them to offer opportunities and promote the idea to their local colleagues in other businesses.
Establish expansion of work-based learning as a high priority for funding.

**How:** Convene state-level, industry-focused advisory committees to identify and target specific funding sources.

Currently, there are no sources of funding explicitly devoted to supporting work-based learning or related elements such as program personnel, curriculum planning that connects classroom and work-based learning, transportation, worksite instruction and supervision, and paid internships.

Through state-level, industry-focused advisory committees, the state should examine opportunities for targeting selected federal and state resources toward the expansion of work-based learning opportunities for students. Possible sources of funding include the Carl Perkins Act and the Workforce Investment Act, as well as state resources delivered through Regional Occupational Programs, California Partnership Academies, and other CTE/Workforce Development-related initiatives.

### RECOMMENDATION

3.4

**Student Support Services**

Bolster support services to help students master rigorous curricula and map their college and career pathways.

Multiple pathways set high expectations for students, offering a curriculum that may be more rigorous than that previously experienced by students. They encourage every student to pursue a challenging postsecondary and career opportunity after high school graduation. For students to meet these expectations, many will need access to support services offered outside the classroom.
Enable students to succeed in multiple pathways that expect them to master high levels of academic and technical content.

**How:** Redesign supplemental instruction offerings—especially in reading, writing, and mathematics—to utilize applied learning strategies.

Multiple pathways are designed to help students achieve at high levels, both academically and technically. The academic core consists of courses in mathematics, science, English, history and social studies, foreign language, and visual and performing arts that are essential if a student is to succeed in community college or be eligible for admission to California’s public colleges and universities. Unfortunately, a large percentage of young people in California arrive in high school without sufficient skills in reading, writing, and mathematics to succeed in such a program of study. Unless students receive intensive additional instruction early on, encouraging them to enroll in a pathway is simply setting them up to fail.

Expanding multiple pathways depends on providing students opportunities—in the summer prior to entering ninth grade, as well as during and after school once in high school—to receive supplemental instruction in reading, writing, and mathematics. This supplemental instruction should be an integral part of a student’s chosen pathway, using the pathway's industry theme to create a context for this supplemental learning. Students who previously were unable to achieve to the expected levels in these core subjects are not likely to master the material if delivery simply repeats the curriculum using the same instructional practices.

The state should undertake the design and implementation of a major initiative in supplemental instruction for entering and continuing high school students and, as appropriate, use applied learning strategies that have proven effective with underachieving students.

Help more students become eligible for admission and successful in degree attainment without remediation at the state’s public colleges and universities, and give them a leg up in other postsecondary options, the labor market, and longer term success in an industry pathway.

**How:** Increase the capacity of counselors to help high school students plan and map specific programs of study that will meet eligibility requirements for postsecondary opportunities.

Even with recent legislation providing funding for more counselors in California, workloads in most high schools still reduce this role to offering only the most cursory assessment and advice. Most counselors focus their time advising students on the course sequences required for admission to selective four-year colleges along with some personal and social counseling. Little attention is paid to career counseling, let alone the alignment of education and training opportunities that would lead to the desired careers. The state should undertake a major re-examination of the role of counseling in high schools, with special attention to the kinds of counseling services needed to help students map successful pathways to both postsecondary education and careers.
Help students meet their goals for completing the academic and CTE courses needed for lasting success in careers and in the state’s postsecondary institutions.

**How:** Disseminate to students, parents, and school staff information about the full range of postsecondary options, and the progress of individual students toward meeting entry requirements.

The state could play a major role in developing and delivering better tools to inform students, parents, teachers, counselors, and administrators about preparation needed for postsecondary education and career, and student progress toward those goals. Existing materials outlining the admission requirements and expectations of the state’s major public postsecondary systems should be enhanced to include information on other postsecondary options. The state should also ensure that all students and their parents are aware of these materials. In addition, the state could deliver timely, detailed information on individual students’ progress toward meeting these requirements.

**TEACHER DEVELOPMENT**
Delivering the demanding academic and technical courses that make up the pathways approach requires qualified teachers.

**POLICY AREA**

Increase the supply and augment the capacity of teachers who can prepare students for both college and career.

Building a cadre of teachers who understand the benefits of integrating academic and technical curricula and have mastered the instructional approaches needed to do so is critical to the implementation of multiple pathways. While technical teachers often have more experience in project-based or cross-disciplinary learning, they often lack advanced academic knowledge and may have had little experience integrating academics into their technical coursework. On the other hand, academic teachers often have limited knowledge of technical fields and may lack experience in helping their students employ academic content in industry applications.
Prepare teachers to develop and deliver curricula that mutually reinforce academic and technical content and provide authentic applications in the pathway’s industry focus.

**How:** Develop guidelines for teacher qualifications and include training on instructional approaches for delivering integrated curricula in teacher preparation and development programs.

- Develop and disseminate guidelines for what teachers should know and what they should be able to do in implementing an integrated academic and technical curriculum.
- Invest in professional development that helps academic and CTE teachers share expertise to develop integrated curricula and improved instructional approaches.
- Encourage teacher preparation programs to incorporate appropriate training into credentialing programs. For example, charge the California Commission for Teacher Credentialing (CTC) with modifying its accreditation requirements for relevant credentialing programs to include strategies for integrating academic and technical curricula.
- Provide incentives for prospective and current teachers to complete dual certification in an academic and CTE discipline.

Teacher preparation and development programs should provide tools for teaching in a multiple pathways program. State guidelines on what academic and technical teachers should know and be able to do to instruct students in pathways could guide training efforts, and programs could include curriculum integration, joint planning and team teaching, project- or problem-based learning, work-based learning, authentic assessment, and other strategies related to effective delivery of pathway programs. The California Department of Education and the California Commission for Teacher Credentialing could join with industry representatives and postsecondary faculty to outline criteria for teacher training.

Credentia ling programs could encourage adoption of these criteria by changing accreditation requirements or providing incentives. To accommodate this need, the state could increase the number of professional development days available to districts that commit to adopting multiple pathways.

The state might also offer collaborative opportunities for academic and technical teachers to develop integrated curricula either to be disseminated at the state level or used within their districts. It could offer incentives for employers to create summer externships that facilitate teachers’ understanding of how academic knowledge is applied in the workplace. Finally, the state might develop listservs, moderated blogs, or electronic bulletin boards for teachers to share successes and challenges, to share model curricula, or to coordinate regionally.
RECOMMENDATION

5.2

Recognize the qualifications of teachers who have completed additional training for teaching in an industry-focused, comprehensive pathway.

How: Charge the California Department of Education and the California Commission for Teacher Credentialing with determining the desirability and feasibility of adding a supplemental designation to teaching credentials for training in pathways instruction.

If deemed desirable and feasible, the state could add a supplemental designation to teacher credentials for those who have gained an understanding of how to develop and deliver curriculum that integrates academic and technical concepts focused on an industry-themed pathway. The designation would serve as an incentive to teachers wanting to instruct in pathway programs and would help schools hiring new teachers to determine who has received training in developing and delivering such a curriculum. Teachers could pursue the supplemental designation through a credentialing program or professional development courses completed while teaching.

LEADERSHIP

Leadership support and participation at all levels—including school and community leaders, leaders in business, and leaders in public policy—are instrumental in expanding opportunities for pathways.

POLICY AREA

6

Regional Implementation

Maximize quality implementation of multiple pathways programs across the state through regional coordination and support.

As a general rule, providing a single pathway with a full complement of themed academic and technical courses requires 250 to 300 students. Although each local school should decide how best to implement multiple pathways for its particular students, it is not possible for any one school to offer students a pathway in each of the 15 industry themes. Maximizing the number of options available to high school students, therefore, depends on coordinating the location of specific pathways within and across school districts and even counties where there are fewer schools and smaller numbers of high school students.
Help guide implementation of multiple pathways in schools and provide access to more students across the state.

**How:** Provide incentives to new or existing regional coalitions that include representatives from secondary and postsecondary education, business, industry, and the community.

While each local school will decide how to implement multiple pathways for its particular students, regional coalitions can provide leadership in coordinating school programs within a geographic area. Effective regional partnerships can help ensure that students across the state have access to various career pathways of interest (currently some regions offer none) and that those pathways align with the region's college and career opportunities. These partnerships can also maximize use of human and fiscal resources in a region and avoid excessive duplication of effort. Over time, the coalitions can help ensure that programs maintain quality and relevance.

Coalitions should include local high school representatives, regional occupational programs, colleges and universities, labor unions and industry associations, and other key stakeholder groups. Existing coordinating structures, such as regional P–16 councils, workforce investment boards, county offices of education, chambers of commerce, and others may play active roles in developing and implementing coalition plans.

Help regional coalitions develop strategic plans for implementing multiple pathways in their respective regions

**How:** Provide relevant resources and tools for regional coalitions.

The state can support regional coalitions in the development of strategic plans for expanding and improving multiple pathways programs by providing relevant resources. Tools and information that can help schools adopt pathways relevant to their communities might include: needs assessments, rubrics to evaluate program quality, research studies, model program profiles, best practices, and labor projections or other information on industry needs and offerings.
Support the reorganization of school schedules to enable students to take the full complement of academic and technical courses needed to prepare them for both postsecondary education and careers.

To ensure that students can take all the courses needed to complete a pathway, schools may need to add sections of certain courses and adjust the traditional six-period day. Schools also need to provide a qualified instructor for each of these course sections to help ensure that students have an opportunity to succeed in courses offering the demanding curricula.

Encourage schools to make more time available for students to complete all pathways courses.

**How:** Provide technical assistance and professional development to schools desiring to adopt block scheduling, seven- and eight-period days, and other scheduling strategies that are more flexible than the standard six-period day.

A multiple pathways approach demands more flexibility in course-taking options and time use than the standard six-period day allows. Although not impossible, it is difficult for students to pursue both the college-preparatory academic core and a technical sequence within the traditional school schedule (University of California Office of the President). For students who are behind academically and need supplemental coursework or remediation classes in English and/or math, this challenge can become insurmountable. Also, work-based and project-based learning, labs, and fieldwork in technical and academic courses often require more time than traditional 50- or 55-minute high school classes make available.

Many types of flexible schedules are in use by schools around the state including four-by-four block scheduling and eight-period days. These schedules enable students to take 32 courses over a four-year high school career, whereas the traditional six-period day schedule allows for only 24 courses. It is unlikely that one “best schedule” will be, or should be, adopted. Some schools and districts are experimenting with extended school days and years. All of these options create challenges for those who attempt to implement them.

Some common barriers to changing the traditional schedule include among others: (1) perceived or real increases in staffing costs, (2) a testing schedule (for state-mandated assessments) that may not align with the timing of course completion, (3) conflicts with the interscholastic sports schedule, and (4) inflexibility in union contracts. State policies that help mitigate these kinds of obstacles would make it easier for schools to increase instructional time and/or use time more flexibly to implement multiple pathways.
Offer students access to both college-preparatory and technical courses taught by qualified teachers.

How: Ensure that a sufficient number of course sections are available for all students participating in multiple pathways and create incentives to place qualified teachers at schools with the greatest need.

For multiple pathways to achieve the objective of preparing students for both college and career, not one or the other, students must have access to both college-preparatory and technical courses. In 2004–05, only 45 percent of the state’s comprehensive high schools offered enough a–g courses for all students to take them, and more than a quarter of a–g courses offered in California high schools were taught by under-qualified teachers (Oakes et al. 2006). The statistics are more dramatic for schools serving large populations of African American and Hispanic students. Although data are not as readily available, schools also lack qualified teachers to offer ample technical courses.
ALIGNMENT WITH POSTSECONDARY EDUCATION

In the past, tracking set up students to pursue either college or employment after high school. Many agree that this practice has disproportionately disadvantaged Hispanic, African American, and low-income students. If the goal is to end tracking and prepare students for both college and career, K–12 and postsecondary institutions must be engaged to align their philosophies and requirements, and set clear expectations about college- and career-readiness for high school students.

Incorporate integrated academic and technical coursework into admissions eligibility criteria for California's public colleges.

**How:** Encourage approval of selected CTE courses under the a–g classifications that determine eligibility and examine the extent to which CTE courses might be recognized in admissions processes.

To prepare students for a range of postsecondary options, pathways should be designed to allow completion of the 15 a–g courses required to be eligible for application to California's public colleges and universities. CTE courses are less often given a–g approval because university systems require a full year of academic study. For example, an auto mechanics class that incorporates some physics principles would not qualify if it was not designed around a comprehensive physics curriculum. This does not mean the course is of lower quality or is not useful—it simply means the course does not include a full-year curriculum for a core academic subject.

Even so, nearly 20 percent of the more than 24,000 CTE courses in the state have gained a–g approval as of October 2007 (California Department of Education 2007). CTE courses that also satisfy an academic course requirement make it easier for students to complete a comprehensive pathway, especially in schools operating on a traditional six-period day. With that in mind, schools should be encouraged to design and seek a–g approval for CTE courses when reasonable.

Perhaps more important, our public universities need to take a leadership role in promoting the value of demanding CTE courses, including both their academic value and their ability to develop essential competencies such as teamwork, use of technology, and resource and project management, that are essential both in higher education and the workplace. To better serve students and the universities, learning institutions could adapt their admissions materials and criteria to recognize the value of CTE coursework and work-based learning.
Facilitate smooth transitions from high school to community college.

**How:** *Encourage improved communication regarding requirements and the transfer of college credit for dual or concurrent enrollment coursework.*

- Require California community colleges to communicate clearly to high school counselors, students, and their parents the level of academic preparation that is expected for enrollment in entry-level, credit-bearing college courses that lead to a certificate or degree.
- Improve the system allowing high school students who complete college-level courses to earn college credit so that credit will be accepted at any of the state’s 109 community colleges. Make the course standards available to high school teachers.
- Reduce or eliminate policy barriers that restrict concurrent enrollment of high school students in community college courses.

Upon arriving on college campuses and taking the placement exams, many students are surprised to learn that they are under-prepared and must take remedial courses first. This costs students time and money in achieving their goals. Community colleges need to help high school students understand what material they must have mastered to enroll in college-level courses. To address the same issue on their campuses, California State University developed an enhanced segment to the California Standards Tests—the results of which give high school juniors information on whether they meet minimum standards.

Dual or concurrent enrollment courses can also help clarify expectations and prepare students to succeed in college. High school students take college-level courses either at their high schools or at college campuses and are challenged to complete college-level work, use more sophisticated equipment, and interact with a more mature student body. Community colleges could streamline transitions and promote dual-enrollment courses through regional or statewide agreements ensuring transferability of credits and clarifying qualified courses.
Improving student eligibility for postsecondary opportunities such as apprenticeships, training programs, military training, and private technical schools.

How: Ensure that high school programs align course offerings with and make students aware of requirements for entrance into these institutions and programs.

While the two- and four-year colleges typically receive the most attention when discussing postsecondary opportunities, the multiple pathways approach gives equal status to a range of other postsecondary programs such as apprenticeships, employer training programs, training through the military, and private technical schools. The state needs to develop stronger ties so that these systems are included on taskforces and in convenings to develop multiple pathways in the state. What are these institutions? What are their entrance requirements? How can students determine if they will be prepared to enroll in these postsecondary courses without remediation? Answers to these questions need to be incorporated into state systems.

POLICY AREA

Strong Leadership

Build the capacity of principals, superintendents, and state and other leaders to advocate for pathways expansion.

For the multiple pathways approach to be widely implemented, local and state leadership must be able to articulate the vision, understand the benefits and nuances of the approach, motivate others to embrace it, and put in place the support mechanisms needed to help schools adopt it. Professional development and administrator training programs can help leaders to adapt or adopt high-quality multiple pathways programs.
Equip school administrators to transition their schools to pathways.

**How:** Provide professional development opportunities covering topics such as flexible scheduling options, legal responsibilities related to work-based learning opportunities for students, and managing change (including engaging stakeholders, securing resources, and building partnerships with industry and community).

Principals will need guidance in adapting school practices to implement a multiple pathways program and communicating a new vision to parents and teachers. Basic structures such as the school schedule may need altering (see Policy Area 7) so that participating students can complete all needed courses. School and district leadership need to understand transportation issues for students traveling to work-based learning opportunities and legal issues associated with working on job sites. They also need to understand the types of professional development that will most benefit teachers (such as learning to integrate academic and technical concepts) and counselors (such as mapping career plans, and academic and technical course schedules). Given the changes in teacher and counselor roles, principals may also need new criteria for evaluating performance.

Recognize the qualifications of school administrators who are skilled in leading and managing schools with multiple pathways programs.

**How:** Assess the desirability and feasibility of adding a supplement to credentials indicating principals’ and assistant principals’ formal preparation in pathways program management.

Offering administrators the option to obtain a supplemental credential could encourage more administrators (through professional development) and administrator candidates (through preparation programs) to pursue training in implementing multiple pathways programs. Those having completed a required set of coursework focused on managing schools that have implemented pathways would likely be better prepared to lead such schools. The credential supplement would also provide districts with more information on administrators’ ability levels when hiring them to lead schools with pathways programs.
Affirm that participation in multiple pathways leads to high levels of accomplishment.

**How:** Establish state standards to measure the success of pathways in achieving performance at grade level in core academic subjects, mastery of industry-defined knowledge and skills, high school completion, postsecondary transition, postsecondary persistence, attainment of a formal credential, employment, and earnings.

Well-implemented multiple pathways programs should produce positive outcomes. The state can assist with this by establishing high expectations for those participating in the approach and affirm those expectations through policy. Policy can clearly outline which measures the state will use to monitor performance. At the very least, tools and systems to measure mastery of industry-defined knowledge and skills are needed since state career and technical assessments do not currently exist.

Possible approaches include enhancing the California Standards Tests with complex problems based on real-world scenarios or augmenting the tests with technical questions created for each of the 15 industry clusters; requiring portfolio assessments, exhibitions, or performance assessments where students must complete a hands-on task related to a work environment; or recognizing industry certification as an indicator of success.
Measure the full range of intended outcomes of multiple pathways.

**How:** Determine whether current data systems can effectively monitor projected outcomes, and fund further data system development where needed.

To measure the full range of intended outcomes of multiple pathways, the state will need to improve and augment its data collection systems. The California Longitudinal Pupil Achievement Data System (CALPADS), once completed, will improve the state’s ability to monitor student achievement data over time, and CTE assessments will need to be developed and added to CALPADS.

Postsecondary systems monitor persistence and degree or certificate attainment, but they do not follow students in all postsecondary paths. For example, options such as apprenticeships, formal training programs, military service, and other programs would need to be included in measuring the success of pathways. Employment and earnings information could be linked to secondary and postsecondary systems to monitor career placements and success.

Include accountability measures in pathways evaluation.

**How:** Determine how and when the state should incorporate the intended outcomes of multiple pathways into state accountability measures.

While existing high schools that have adopted multiple pathways are currently held to the same standards of accountability as other high schools in the state, the current system does not take into account the full range of multiple pathways outcomes outlined in Recommendation 10.1. When more comprehensive monitoring of outcomes through updated data systems is possible, the state should include other indicators of success.
Determine how to adjust support and requirements for continued success with multiple pathways.

**How:** Evaluate outcomes and implementation of the multiple pathways approach.

To guide future decisions about multiple pathways, the approach’s implementation and effectiveness should be evaluated. Are programs offered of high quality? Are academic and technical instructors effectively integrating their curricula so that lessons are both rigorous and relevant? Are the work-based learning opportunities of high quality as defined by state criteria? Are high school programs articulated to postsecondary education and career opportunities in the region? With the level of program quality in mind, an evaluation can determine whether and which programs are producing positive student outcomes.

By monitoring whether those aims are being met and if other unintended benefits or consequences are emerging, the state can better determine how to adjust its support and requirements accordingly—including identifying where resources are best applied to improve implementation. Research studies that randomly select students to participate in a multiple pathways program would also help reveal useful findings.
IT’S TIME FOR A NEW APPROACH

California is poised and ready for the multiple pathways approach. Stakeholders both within and outside of the education sector are backing the integration of college preparation and technical programs. The governor, superintendent of public instruction, Legislative Analyst’s Office, state legislature, and California School Boards Association have made public statements supporting such an approach. Many organizations within the state have signed an agreement to support multiple pathways. And California is not alone. Nationally, momentum is also building around the approach. The National Governors Association (2007), National Association of Secondary School Principals (2004), and American Youth Policy Forum (Brand 2003), among others, are promoting multiple pathways as a promising high school improvement strategy.

While current or suggested reforms have touched the edges of improving high schools, few have addressed the critical component of curriculum. Some approaches have proposed either a more rigorous or a more relevant curriculum, but few have offered both pieces as an integrated solution accessible to vast numbers of schools. The multiple pathways approach influences what goes on inside the classroom and prepares students for both college and careers. It incorporates many useful improvement strategies that are already implemented and builds upon them to create a more comprehensive approach that any high school can adopt to improve outcomes.

Waiting any longer to support such an approach may mean failing a generation of students who will leave high school without a diploma or the preparation to succeed in college and careers. Multiple pathways would give more students a reason to achieve and persist in school—and the tools required to transition to further education, productive employment, and good citizenship.
REFERENCES


Transforming today’s education for tomorrow’s economy

ConnectEd’s mission is to support the development of multiple pathways by which California’s young people can complete high school, enroll in postsecondary education, attain a formal credential, and embark on lasting success in the world of work, civic affairs, and family life.

Expanding Pathways
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