

Changing Teacher Preparation for California's Changing Secondary Schools

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Introduction

From classrooms to communities to the White House, a growing chorus of educators, parents, and policymakers have concluded that large, comprehensive high schools are failing too many of today's students. In a 2010 speech to the U.S. Chamber of Commerce, President Obama called tackling the dropout rate an "economic imperative if the United States intends to remain competitive in the global society" (Zeleny, 2010, para. 1). At the same time, educators such as Milton Greenberg, a professor at American University, have called for American universities and colleges to play a central role in solving this problem. They must coalesce around a "shared national purpose" of responsibility for "the care, feeding and reform of elementary and secondary education in America" (Greenberg, 2010, para. 2).

In this article, we describe how one group of California teacher educators has responded to the call with new thinking and action in

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regard to making teacher preparation a key strategy for reducing high dropout rates, raising student academic achievement, and eliminating the pervasive inequities in learning opportunities for students. We present a five-year initiative in which teacher preparation institutions partnered around the shared purpose of preparing new teachers to teach in secondary schools that have adopted a major reform in secondary education known as Linked Learning, a reform that research suggests is accomplishing the aforementioned results. In this reform, schools tend to operate as small learning communities in which authentic applications of curriculum center on an industry theme (e.g., health sciences, engineering, hospitality and tourism). They blend academic and career technical education and implement problem-based, interdisciplinary projects as a key instructional strategy. By design, all students experience a rigorous academic core, a demanding technical core, and associated work-based learning activities across grade levels. In addition, a range of support services is designed to help students to be successful.

Nearly a decade of research shows that this reform—a transformative approach to high school improvement that is based on systems of career-themed pathways—has the potential to increase the number of students prepared for the full range of postsecondary education options and to close the achievement and opportunity gaps (Kemple, 2008; Stern, Dayton, & Raby, 2010). Teacher preparation programs that are preparing new teachers to teach effectively in these reform-oriented secondary schools have created what they call the *Linked Learning lens* within their programs by rethinking their curriculum to include knowledge and skills associated with the Linked Learning field. We describe the context for this reform, the research evidence on its success, and how the teacher preparation programs have adapted their curriculum to be responsive to the need for teachers who are knowledgeable about the reform.

A Brief Walk through History: Secondary Education

The history of secondary education is relevant to this discussion of school reform. It illuminates the origins of some key education problems that we face even today and the seeds of the Linked Learning approach that aims to address these issues. The first public high school in the United States, opened in 1635, was the Boston Latin School (Thattai, n.d.). It was an exclusive school that enrolled only boys who were preparing for college, especially in law or ministry. In 1751, Benjamin Franklin introduced the academy as a different kind of secondary school. It offered subjects such as geometry and bookkeeping, designed to relate more to preparation for adulthood (Bethany, n.d.).

As secondary schools increased in number through the subsequent decades, the curriculum varied widely from school to school and had no agreed-upon purpose. The lack of uniformity among high schools, coupled with the growing need for colleges to be able to evaluate students' high school experiences, led the National Council of Education in 1891 to appoint the Committee of Ten, chaired by Charles Eliot, president of Harvard University. The 10 appointed members met in July 1892 at the National Council's conference, at which time nine subject-matter subcommittees, each with a content matter focus and comprised of 10 members, were appointed to consider the optimal allotment of amount of time spent on the subject, when it should be taught in the high school program, and how it should be taught (e.g., presentational modes; "Committee of ten's recommendations, 1892," n.d.).

In 1906, to create greater transparency in college and university enrollment decisions and, essentially, help these schools select students for admission, the Carnegie Foundation for the Advancement of Teaching developed the Carnegie Unit (CU) as a measure of the amount of time a student spent in class (*The Glossary of Education Reform*, 2013). Here we see the genesis of a problem that has plagued school reform efforts. The intent of the Carnegie Foundation was to create a benchmark standard for the quality of education. However, it measured outputs, not outcomes. The Carnegie Unit was not a measure of student learning or performance (Schaffhauser, 2013).

Fast Forward to the 21st Century

Ted Sizer noted the problem in his 2013 book, published posthumously:

Americans have burdened themselves, however unintentionally, with a high school design that is inefficient and runs counter to an abundance of solid research about how formal learning in fact takes place. What were dogged improvements made by educators more than one hundred years ago clearly do not serve us well today. (p. 1)

As Sizer expressed well, most 21st century high schools look much as they did in the 19th century. Some of the curricular content has changed, but the structures and focus on outputs in the form of number of hours of study (i.e., CUs) remain, and the current structures are serving the needs of too few students. In the preface of their book, *Beyond Tracking: Multiple Pathways to College, Career, and Civic Participation*, Oakes and Saunders (2008) decry the existence of these educational inequities in our schools, inequities "that mirror inequalities in American society, especially for Latino and African American students who have fewer op-

portunities and experience less success than their white counterparts” (p. x). There is, however, some good news: College attainment has risen steadily for students across all racial and ethnic groups. As Stoll (2008) noted, “Between 1980 and 2000, rates of high school completion and college attainment rose for most racial and ethnic groups, including disadvantaged Blacks and Latinos” (p. 115). However, as Reardon (2013), a nationally recognized expert in educational research and policy development at Stanford University, stated, there has been a “sharp increase in economic inequality in education outcomes in more recent decades” (p. 11). This is seen particularly in the income gap, which disproportionately affects certain racial and ethnic groups and that is growing (Reardon, 2013).

While there are many well-documented reasons for the achievement gap, complicit in the stubbornly persistent disparities in student achievement is the practice of tracking high school students into segregated education programs for college or career preparation. Although there have been efforts to eliminate the tracking of select students into academic, rigorous coursework and others into course sequences that include less-rigorous courses sometimes labeled vocational and “general” (Stern & Stearns, 2008), many students today are assigned to what is considered a non-college track. These students tend to be less affluent and to belong to racial and ethnic minorities. Although tracking has been “discredited as unfair and wasteful” (Stern & Stearns, 2008, p. 41), it still exists in the course-of-study options in high schools today.

A key goal is to make achievement for all students the core of high school improvement. Educators have been challenged to ensure that all students are ready for the demands of good jobs and lifelong education in the 21st century. Central to the challenge is to ensure that all students have the same opportunities to achieve these goals. Oakes and Saunders (2008) report on research that examines a “revolutionary approach to high school education” (p. ix), known as Linked Learning (formerly called Multiple Pathways), an approach that “challenges and shifts this century-old discussion about how to improve high schools” (p. 5). They offer compelling arguments for why it is no longer acceptable to track students into courses that prepare them for college *or* career—why the conjunction must change from *or* to *and* for all students.

To reverse the role that traditional high school structures often play in furthering the inequity of educational achievement and opportunity for too many students, reform-oriented high schools and programs are asking teachers to embrace a collaborative, interdisciplinary instructional model aimed at dramatically increasing student engagement in learning. In these Linked Learning high schools, teachers apply new skills that connect rigorous academic standards to challenging technical standards

and real-world experiences to make learning relevant. All students take rigorous coursework that prepares them to succeed in a four-year university, with relevant support services for students who need them, and take challenging career technical courses. The curriculum is taught through the lens of a business and/or industry theme that is relevant to the region's workforce and that makes learning authentic and relevant.

There are many models of the Linked Learning approach: National Academy Foundation academies, National Career Academy Coalition academies, California Partnership Academies, other career-themed academies, themed small high schools and small learning communities, themed magnet programs/schools, High Tech Highs, and Big Picture Schools (ConnectEd: The California Center for College and Career, n.d.). They all share a commitment to the following organizing principles: (a) prepare all students for success in college, career, and life; (b) apply student learning to real-world experiences and the workplace through integrated, interdisciplinary approaches that connect academics with career technical education; and (c) maintain a laser-like focus on improving achievement so that all students leave high school ready for the range of postsecondary options. When fully implemented, these programs share the following four core structural components (Linked Learning Alliance, n.d.a):

- a standards-based academic course sequence for all students that meets admission requirements of postsecondary institutions;
- a technical course sequence that meets industry standards and provides opportunities for industry certification, when available;
- work-based learning opportunities; and
- support services that include counseling and additional instruction, particularly in reading, writing, and mathematics, to support struggling students.

These four components are linked through learning and teaching that bring both rigor and relevance to the high school experience via authentic career-related applications. Teachers raise the stakes in terms of both academic challenge and personal relevance by using collaborative problem-, project-, and inquiry-based learning and by connecting standards-based academic and technical content to students' communities and personal interests (ConnectEd: The California Center for College and Career, n.d.). In addition, teachers deliberately focus on building the 21st century skills that are so often missing among college students and young entrants to the workforce (Partnership for 21st Century Skills, 2008).

While the traditional high school is a familiar institution, Linked Learning pathways/career academies differ in substantive ways. By way

of explanation, we need to take a brief look inside a hypothetical pathway program. Aero High School designed four pathways for its 2,500-student population. A pathway can be a stand-alone school, but one or more pathways are often developed within an existing school. Pathways are developed around an industry theme that brings a real-world context to learning. After analyzing workforce demands in Aero's region and conducting a survey of students' interests, one pathway identified its theme as being health science related. Other common pathway themes include engineering, media and communications, health, hospitality and tourism, law and justice, and environmental science.

This School of Health Science at Aero is open to any interested student in the larger school. There are no admissions requirements, and students in the larger school are encouraged to express a pathway choice. The expectation in pathway schools is that all students will graduate ready for both college *and* career. Most of the School of Health Science's courses are approved for college readiness (in California, identified as a-g credit).

To ensure that all students are successful in these courses, pathway teachers are vigilant in monitoring student progress, and the school has various mentoring and tutoring opportunities for struggling students. Teachers collaborate in grade-level teams and often have common planning times so they can not only discuss the progress of their students but also plan together. This collaboration supports student learning and creates a personalized environment where students are known by all teachers and feel connected to their teachers and each other. Pathways are designed to prioritize three key concepts: rigor (in curriculum and expectations), relevance (through the lens of authentic curriculum; projects; and partnerships with relevant businesses, industries, and community agencies), and relationships (focusing on student success and well-being, academically and socio-emotionally).

Interdisciplinary project-based learning is a key instructional strategy, and, at Aero, teachers work together to develop health science-related projects and, whenever possible, engage students in learning through a health science lens. For example, an English teacher may choose many of his or her expository and narrative texts to focus on health science. Projects are designed in collaboration with input from industry and business partners to ensure that not only does the design include content standards but also that they are developed to meet industry and workforce expectations and skills.

At each grade level, students engage in a continuum of work-based learning experiences, from bringing professionals into the school as guest speakers to job shadowing to internships, both paid and unpaid. These experiences are designed to connect student learning to authentic, real-

world applications. At each grade level, students take required academic courses, as well as one technical course, often, along with the academic courses, approved for a-g credit and focusing on health science. For example, the ninth grade technical course is “Health Science in the 21st Century.” Teachers across disciplines, including the technical education teachers, collaborate to develop meaningful, interdisciplinary projects.

Emerging Research and Implications for Practice

The body of evidence associated with the Linked Learning field is growing (LaFors & McGlawn, 2013; Stern, Saroyan, & Hester, 2010). Substantial data, when analyzed by demographic representation, suggest that students in Linked Learning schools are achieving success at higher levels than are other students in their districts and the state. For example, Manpower Demonstration Research Corporation (MDRC) conducted a “rigorous evaluation of the Career Academy approach” that used a “random assignment research design in a diverse group of nine high schools across the United States” (Kemple, 2008, para. 2). The study found that,

... for eight years after scheduled graduation from high school, academies produced sustained earnings gains that averaged 11 percent (or \$2,088) more per year for Academy group members than for individuals in the non-Academy group—a \$16,704 boost in total earnings over the eight years of follow-up (in 2006 dollars). These labor market impacts were concentrated among young men. Through a combination of increased wages, hours worked, and employment stability, real earnings for young men in the Academy group increased by \$3,731 (17 percent) per year—or nearly \$30,000 over eight years. (para. 3)

Research provides strong evidence that California students in Linked Learning pathways, as compared with their peers, not only earn more in the years after high school but also attend school at higher rates, are less likely to drop out, and are more likely to score proficient or higher on the California Standardized Tests in English, science, and social studies. In mathematics, research to date suggests that pathway students tend to score similarly to students in traditional high school programs, where there is definitely room for improvement (“Insights: Lessons learned from our grant-making programs,” 2009; Stern, Dayton, & Raby, 2010).

In 2014, SRI International released a four-year review (Guha et al., 2014) of certified pathways, in which certification means that reviewers trained by ConnectEd: The California Center for College and Career determined implementation of high quality Linked Learning reforms. The key findings of SRI’s rigorous quantitative study, which compared pathway students with similar peers, include the following:

- Pathway students made significantly more progress toward graduation each year, although they did not necessarily score higher on standardized tests of English and mathematics. Progress toward graduation was determined by credits accumulated toward high school graduation at each grade level, credits that are critical for both for high school graduation and college eligibility.
- Students in pathways showed higher engagement in school, as measured by attendance and retention, indicators that may show that pathway students are more motivated to attend and stay in school.

Like a *constructive existence proof* in mathematics, the accumulating research cannot be ignored, and California legislators are not ignoring it. Over the past few years, several pieces of legislation have been written to support the implementation of this secondary reform. The full list of chaptered bills relevant to Linked Learning can be seen, organized by year, at the Linked Learning Alliance website (Linked Learning Alliance, n.d.b). Two bills especially relevant for California schools and teachers include AB790, a bill that established a Linked Learning pilot program administered by the California Department of Education, and AB1304, which authorized the California Commission on Teacher Credentialing to incorporate Linked Learning-related knowledge and skills into the Single Subject SB 2042 credentialing standards and to create a Linked Learning Recognition of Study to recognize these efforts. These bills, and the others listed at the Alliance website, such as AB 790, which establishes consortia of school districts and their partners across California to develop pathway programs within their schools, highlight the reality that the Linked Learning approach will soon influence the education of over one-third of California's secondary students.

The Linked Learning Lens in Teacher Preparation

As the research evidence for the Linked Learning approach has grown, and the approach is increasingly implemented in secondary schools, teachers and administrators who work in these schools have become aware that extensive professional development is needed for teachers who had no experience with and, therefore, not surprisingly, did not understand the many unique aspects of teaching in these new learning environments. To identify these unique aspects of teaching, teachers and administrators in Linked Learning schools developed a comprehensive list of the unique skills and proficiencies needed by teachers in these schools. Located throughout California, the schools were part of a career academy development effort that was begun in collaboration with ConnectEd: The Center for College and Career and funded by the

James Irvine Foundation. Using this list, created by those who work in the field, we developed a crosswalk between California's Standards for Teacher Preparation and the skills and proficiencies needed by teachers in Linked Learning programs. The crosswalk was vetted with a variety of professionals and, when completed, became the foundation for building the *Linked Learning lens* within California's SB 2042 Single Subject Credential (see Appendix A).

In developing the crosswalk, we were not surprised to find that many elements on the list of Linked Learning teachers' necessary skills and proficiencies were already part of the requirements for Single Subject Credential candidates in California; however, several critical elements were not. The elements that were not a part of the traditional credential program became the lens. The goal was not to create a new credential program but, rather, to develop a curricular and experiential *lens* within the existing, state-approved California Single Subject Credential program. As Appendix A shows, some of the areas of knowledge and core proficiencies absent in traditional teacher preparation include the following:

- designing and delivering inter- and intra-disciplinary collaboration in curriculum,
- designing and implementing problem- and project-based learning,
- establishing industry and postsecondary education partnerships, and
- integrating career-technical standards and work-based learning approaches with academic standards.

Recognizing the need for teachers prepared to teach in pathway programs, The James Irvine Foundation funded an initiative led by San Diego State University (SDSU). In collaboration with ConnectEd: The California Center for College and Career, we began a two-pronged initiative in 2008: (a) to develop a replicable model for Single Subject Credential programs to prepare new teachers with the unique skills and knowledge to participate fully as professional educators in Linked Learning pathways and schools, and (b) to create a statewide consortium of teacher preparation institutions that would become network partners in the initiative.

A first step toward meeting these two goals occurred when faculty members from four California State University (CSU) teacher preparation programs—CSU Fresno, CSU Long Beach, CSU San Bernardino, and SDSU—began collaborating to modify the Single Subject curriculum to incorporate elements of the *Linked Learning lens*. Through numerous meetings, faculty members began to integrate the Linked Learning elements into credential program courses, including making decisions

about not only how, but also where, to integrate various *lens* elements. Appendix B presents some of the student learning outcomes developed for credential classes as part of the *lens*.

In 2008, faculty members from all four teacher preparation programs met to share their initial plans to implement the *Linked Learning lens*. Each program was structured somewhat differently. Although all four had programs that met the California Standards for Teacher Preparation, one structured its program around cohorts of students. In another, all of the content area teacher preparation faculty were in the College of Education. In yet another, the content methods instructors were based in the university's content majors; and in another, students took their courses in an organized sequence, but not with a specific cohort of students. Despite the programs' structural differences, each one began to implement the lens, which indicated that, indeed, the *Linked Learning lens* approach was replicable across programs.

In the second year of the initiative, two additional teacher preparation programs joined the collaboration and, in the following year, two more. The initiative, which grew out of an urgent message from the field, has grown into an active network of eight universities that today includes, in addition to SDSU, the California State University campuses of East Bay, Fresno, Long Beach, Los Angeles, Sacramento, and San Bernardino as well as Claremont Graduate University. These programs have challenged the traditional high school model and have prepared new teachers who not only understand the Linked Learning reforms but also have the skills and proficiencies necessary to teach in Linked Learning schools and programs.

Collaborations such as those described here, which result in a network of university institutions' working together toward a common goal, do not happen without clear purpose and commitment. Regular professional development workshops for Single Subject Credential Program faculty members at each teacher preparation institution were conducted. In addition, beginning in summer 2008, and over the past five years, as institutions joined the initiative, faculty members from these teacher preparation programs met each summer at a three-day Linked Learning Summer Convening, where they learned with and from each other. Faculty teams from each campus met to plan and share successes, challenges, and best practices. Agendas for these three-day networking events included one or more speakers grounded in research and practice in the Linked Learning field and professional development sessions on topics such as implementing work-based learning, designing interdisciplinary problem-/project-based learning projects, developing performance-based assessments, connecting the Linked Learning approach to the Common

Core State Standards (CCSS) and CCSS implementation strategies (Rustique & Stam, 2013), and examining the structures and processes through which equity is realized in Linked Learning pathways. Faculty members collaborated on syllabus development and shared best practices as they moved forward in the spirit of continuous improvement.

Development of the *Linked Learning lens* has involved more than creating new learning outcomes and presenting new concepts as information for credential candidates. Development of the lens included adding assignments to engage candidates in the work of pathway teachers, including collaborating across disciplines to develop interdisciplinary, project-based lessons; developing performance-based assessments; and making connections with business and industry to identify curricular connections.

In addition, ConnectEd: The California Center for College and Career has been a key technical assistance partner and instrumental in designing a web portal that serves as a platform for an online network learning community comprised of the following: teacher preparation faculty at each institution; credential students in the *Linked Learning lens* programs across the state; and principals and other school-site personnel, including teachers who work directly with the credential candidates. The web portal is growing in its capacity to provide resources for all participants; as a forum for the network community; and as a place where all stakeholders can communicate, share successes, and pose questions related to the Linked Learning field, schools, and classrooms. It also includes a Job Board, where schools and districts can post jobs and credential candidates can post their résumés.

The Critical Role of a Clinically Based Model

In 2010, the National Council of Accreditation of Teacher Education (NCATE, now the Council for the Accreditation of Educator Preparation [CAEP]) published a report, *Transforming Teacher Education Through Clinical Practice: A National Strategy to Prepare Effective Teachers*. NCATE (now, as noted, CAEP) convened a diverse group of individuals who represented higher education, P-12 schools, state officials, and education critics. The resulting Blue Ribbon Panel on Clinical Preparation and Partnerships for Improved Student Learning explicitly addressed “the gap between how teachers are prepared and what schools need” (National Council for Accreditation of Teacher Education’s Blue Ribbon Panel, 2010, para. 6). The report’s Executive Summary begins as follows:

The education of teachers in the United States needs to be turned upside down. To prepare effective teachers for 21st century classrooms, teacher education must shift away from a norm which emphasizes

academic preparation and course work loosely linked to school-based experiences. Rather, it must move to programs that are fully grounded in clinical practice and interwoven with academic content and professional courses. (para. 1)

The clinical model of teacher education is a key component of the *Linked Learning lens* approach. An essential element of this clinical model is that credential candidates have fieldwork experiences in Linked Learning pathways and schools. Candidates not only learn about Linked Learning reforms in the credential program coursework, but they also experience the reforms in action. They work with teachers as they partner with industry professionals and collaborate with teacher teams who are planning, implementing, and assessing interdisciplinary projects that have real-world relevance. Credential candidates contribute actively as not just teachers-in-training, but as partners and co-teachers, in their content areas and with interdisciplinary grade-level teams.

Given the important role that clinical experience plays in the development of new teachers, one challenge faced by each of the teacher preparation programs in this network has been to find a sufficient number of high-quality pathways to serve as sites for candidates' fieldwork experiences. Many pathways are, themselves, works in progress. Instead of interpreting this challenge as a negative aspect of the work, an assignment that posed the following questions was developed in one of the first *Linked Learning lens* cohorts at SDSU: "What critical components of Linked Learning are you not seeing?" "What are the challenges and barriers to implementing these elements?" "What can be done to move this pathway toward high quality Linked Learning implementation?" In doing so, the instructor turned the challenge into an exercise in critical thinking and professional problem solving, similar to what occurs regularly in schools that are developing reforms for the purpose of improving student learning and achievement. While the best placement for each student teacher would be in a fully developed pathway, when that was not possible, we structured an opportunity for candidates to engage in the critical thinking and problem solving that pathway teachers experience as they participate in a pathway's development. It also allowed the student teachers to experience what it means to actively participate in educational change and become future change agents and leaders in the teaching profession.

Reflections and Next Steps

It is time to reflect on where we are now that the *Linked Learning lens* is being implemented in eight universities throughout California.

As high school pathway programs expand throughout the state, additional teacher preparation institutions have expressed interest in this approach. There is also a need for a *Linked Learning lens* in programs that prepare school counselors and secondary administrators. Many of the skills, knowledge, and proficiencies that were identified by administrators for the *Linked Learning lens* in teacher preparation are relevant to other educator preparation programs. No doubt, additional skills, knowledge, and proficiencies need to be identified for counselors and administrators in Linked Learning settings.

It is impossible to reflect on the success and/or progress of an initiative without evaluating its effects. MPR Associates, now part of RTI International, an independent research organization based in North Carolina, conducted an external evaluation of the *Linked Learning lens* initiative. They collected data from the first two years of the *Linked Learning lens* initiative, 2008–2009 and 2009–2010. The data came from six sources: (a) site visits during spring 2010 to the network campuses, where they interviewed the designers of the program, participating faculty, and students; (b) analysis of the June 2009 and June 2010 required program exit survey of all candidates who completed the *Linked Learning lens* program, a survey that requests information regarding students' satisfaction with the program and their self-reports of preparedness on a variety of topics, such as being prepared to teach a classroom of diverse students; (c) a survey in April 2011 of alumni of the first San Diego cohort; (d) analyses of syllabi of participating faculty in 2010–2011; (e) interviews with principals at schools where Linked Learning candidates had been placed for student teaching; and (f) analysis of California's high-stakes credential exam results at the end of the 2009–2010 academic year at three network campuses, SDSU, CSU San Bernardino, and CSU Fresno.

During semi-structured, 15-minute, small-group interviews, the evaluators asked credential candidates what they had learned in their credential program that best prepared them for teaching and in which areas they felt least prepared. The researchers evaluated the responses with the frequently used constant comparative method (Glaser & Strauss, 1967). Interview data confirmed the importance of fieldwork placements to candidates' understanding of the Linked Learning approach. The majority of students felt well prepared in the following areas: to prepare high-quality lesson plans, to use an effective mix of teaching strategies, to assist students in problem solving and critical thinking, and to critically reflect on their own teaching. They reported feeling adequately prepared to involve students in engaging activities; help students sustain on-task behavior; design hands-on classroom activities that suit the attention span of many students; teach lessons designed to reach students with varying

long-term educational goals; and enable students to interact with their peers in healthy, productive ways as well as to engage in the following key Linked Learning strategies and practices: encouraging students to take risks in discovery activities and divergent thinking; teaching using problem-based or project-based lesson plans; team-teaching or teaching collaboratively with fellow teachers; and integrating rigorous academic instruction with technical curricula.

It is interesting that, in interview group conversations, Linked Learning credential candidates also articulated that they felt prepared to support students' problem-solving and critical thinking skills. In today's world, students need more than academics to be successful in life. They must develop skills that are necessary in the 21st century workforce. Credential candidates in the *Linked Learning lens* articulated that they learned through coursework and experienced firsthand in student teaching ways to make oral and written communication meaningful for adolescents; engage students in authentic learning and innovation experiences; place students in environments where they can develop interpersonal skills, real-world ethics, and social responsibility; take on new roles required of teachers in pathway programs, including specific leadership roles; and develop professional behaviors, such as being an effective member of a team.

One way that California credential programs assess candidates' performance is through one of three state-approved, high-stakes assessments. It was important to know how the *Linked Learning lens* candidates performed on this important assessment. The evaluators examined candidate assessment results at three of the *Linked Learning lens* network partners: SDSU, CSU Fresno, and CSU San Bernardino. The assessment at SDSU is the Performance Assessment for California Teachers (PACT), administered near or at the end of candidates' credential program. PACT data were analyzed at SDSU in 2009 and 2010. The data showed that credential candidates in the *Linked Learning lens* cohort performed at least as well as candidates in traditional cohorts on the criteria assessed. This assessment focuses specifically on the general performance categories of planning; instruction, including a video review of a candidate teaching; assessment; reflection; and the teaching of academic language. In 2009 and 2010, respectively, 94% and 95% of Linked Learning candidates passed this high-stakes assessment on their first attempt. In two other Single Subject cohorts, the combined pass rates on the first attempt in those same two years were 87% and 100%. In this analysis of 170 credential candidate's performance assessment results, the overall pass rate was 95%.

A second state-approved, high-stakes assessment in California is the

Fresno Assessment of Student Teachers (FAST), which was developed at and approved only for CSU Fresno. This program's FAST data, reported on a scale of 1-to-4, were analyzed during the same two years as were the PACT data, 2009 and 2010. This assessment is comprised of four parts, two administered in the fall (the *Comprehensive Lesson Plan Project* and the *Site Visitation Project*) and two in the spring (the *Teaching Sample Project* and the *Holistic Proficiency Project*). In the first year, Linked Learning candidates performed slightly below the averages of other teacher candidates on three of the four parts of the assessment (Linked Learning candidate scores: 2.70, 2.82, 2.85, 2.80, and other Single Subject candidate scores: 2.57, 2.96, 3.29, 3.34). In 2010, Linked Learning candidates' performance was slightly above that of other candidates on the first two parts (Linked Learning candidate scores: 2.55 and 3.23, and other Single Subject candidate scores: 2.46 and 3.18; data on the final two parts were not available at the time that the evaluation report was due).

CSU San Bernardino credential candidates complete the state-approved CalTPA, which, like the FAST, consists of four parts: Single Subject, Designing Instruction, Assessing Learners, and Culminating Teaching Experiences. Only eight Linked Learning candidates took this assessment, all of whom scored above 3.0 on a 4-point scale. Although this university did not report scores from other Single Subject candidates, they noted that the overall average pass rate on this assessment is historically slightly higher than 3.0, as was the case with the Linked Learning candidates.

Data indicated that the Linked Learning candidates' performance on these state-mandated, high-stakes assessments was, across three teacher preparation programs and three assessments, similar to that of other Single Subject candidates. In addition, the external evaluation indicated that the Linked Learning candidates articulated knowledge and understanding that are central to effective practice in the Linked Learning field.

Finally, it is important to more fully address the goal of creating a replicable model of the *Linked Learning lens* in teacher preparation programs. Here the term replicable refers to whether a *Linked Learning lens* could be developed and implemented in credential programs that are designed and structured differently, albeit designed to address the same state standards for credentialing. As indicated earlier, in our network, no two teacher preparation programs are structured exactly alike. Some are organized around cohorts, as is the case at SDSU, while, in others, their candidates are assigned to a sequence of classes, but not assigned in cohort groups that remain together through the program. In some programs, faculty members who teach the content methods courses work within teacher preparation departments; in others, their faculty assignments are in undergraduate content departments (e.g., mathematics,

science, history). We discovered that, regardless of a program's organizational structure, the *Linked Learning lens*, with its unique elements that prepare teachers to teach in Linked Learning pathways, is applicable to a variety of credential program structures. This is verified by the high-stakes assessment data as well as through review of faculty syllabi that show the integration of the *lens* within a program. We also found, as we suspected in 2008, when we began this journey, that the development of a new credential to do this work is not required.

A focus on the *lens* is what made this work replicable across credential programs with various program structures. Each program introduced its candidates to the Linked Learning approach and the growing body of research. Each program began to incorporate interdisciplinary, project-based curriculum planning, and each one began to develop and incorporate performance assessments into the curriculum as a complement to project-based learning. In several programs, teacher preparation faculty themselves began to collaborate on shared assignments to model interdisciplinary instruction. Campuses introduced the concept of work-based learning, which one campus piloted as a student teacher externship assignment/experience that it shared with the network campuses. Another important example of the *lens* is seen in the fact that each program, knowing the importance of the clinical aspect of teacher preparation, provided its candidates with a student teaching placement or other fieldwork experience in a pathway program. By incorporating into curricula the elements of the *Linked Learning lens* (see Appendix A), each credential program, regardless of its structure, was able to replicate the *lens* within its program.

Funding from the James Irvine Foundation supported the development and expansion of this work, which likely would not have begun, or at least not grown as quickly as it has, without it. Now, the *Linked Learning lens* in teacher preparation is a sustainable initiative, albeit one that is evolving in the spirit of continuous improvement. For example, more programs are slowly beginning to explore the concept of student teacher externships. SDSU's initial work with this process has been shared across the network.

As the number of high school Linked Learning pathways grows, the demand for uniquely trained teachers will likewise grow. The models developed in California's universities were designed to be shared and replicated. California has created a network of teacher preparation programs and an infrastructure to support the sharing and exchange of ideas and resources. The teacher preparation programs involved in this work to date have revised their curricula and forged new partnerships with schools and districts, creating a sustainable base for the future. In

addition, in 2014, the CSU Office of the Chancellor in Long Beach, along with CSU Long Beach, are leading the effort forward, building on the foundation for the *Linked Learning lens* already created to expand the initiative to teacher preparation institutions beyond the network.

In this article, we have described one way that teacher preparation programs can respond to a growing body of research that provides evidence of the power of this high school transformation to make progress toward eliminating the achievement gap. We wanted to share our experiences with other teacher preparation programs that may be interested in preparing new teachers to teach effectively in reform-oriented high schools that are restructuring around the career academy concept and the Linked Learning field. The article provides somewhat of a roadmap to begin that process. The authors would willingly respond to questions regarding our experiences in creating the *Linked Learning lens* in anticipation that an increasing number of career academies across California and beyond will need new teachers with the knowledge, skills, and abilities to teach effectively in these reform-oriented high schools.

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Appendix A

***Preparing Single Subject Academic Teachers for a
Linked Learning High School Environment***

Philosophy and Core Proficiencies

Crosswalked to California's SB 2042 Teacher Preparation Expectations*

Overarching Goal: To prepare teachers who empower students to be successful in the full range of postsecondary options and life.

I. Philosophy

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

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

II. Core Areas of Proficiency

Teachers will demonstrate *content knowledge* related to:

- Disciplinary academic standards (TPEs 1 and 9)
- Career Technical Education standards (structure, goals)
- Information management and technology
- Collaborative classroom structure and operations
- Work-based learning approaches
- Career exposure and development

Teachers will be able to *design curricula* that:

- Reflect interdisciplinary/integrated problem- and project-based structure and content
- Meet the California "a-g" requirements with respect to course structure and content (TPEs 1 and 9)
- Address state academic and CTE standards (TPEs 1 and 9)
- Incorporate skills from the SCANS Report

Teachers will *practice pedagogy* that:

- Incorporates industry-based applications
- Reflects a student-centered teaching approach (TPEs 2, 4, 5, 6, 7, and 8)
- Emphasizes integrated problem- and project-based learning
- Includes differentiated instruction (TPEs 4, 5, 6, and 7)

- Demonstrates a research-based instructional model
- Utilizes information provided by formative and summative assessments (TPEs 3 and 8)

* Knowledge and skills that do not crosswalk to SB2042 TPEs are unique to teaching in a Linked Learning Pathways environment or are not explicitly identified in California's current SB2042 TPEs.

** Parentheses show Teacher Preparation Expectations (TPEs) within California SB 2042 Standards for Teacher Preparation for each of the Linked Learning elements listed.

Appendix B

Learning Outcomes for Teacher Preparation with a Linked Learning Lens

The following are learning outcomes related to coursework and learning experiences, including the student teaching field experiences, in teacher preparation programs that prepare new teachers to teach in Linked Learning schools and programs. Program courses include Educational Foundations, Educational Psychology, Secondary Reading Methods, Social Studies Methods, and others. In no particular order, the following are a few of the learning outcomes that are relevant in teacher preparation programs with a *Linked Learning lens*. The outcomes are complementary and, in some cases, overlap. While the list is not exhaustive, it represents elements that define the *Linked Learning lens*.

Credential candidates will:

- Articulate the roots of secondary education in a historical perspective of general education and schooling.
- Explain the path of secondary education that has led to the current educational model referred to as Linked Learning, including its theoretical framework.
- Create standards-based interdisciplinary lessons that reflect the philosophy and instructional practices in linked learning schools and programs.
- Create lessons that have workforce, work-based, and industry-based applications.
- Collaborate with teacher preparation colleagues to create interdisciplinary project- and problem-based learning experiences.
- Articulate critical cognitive processes that occur as adolescents construct meaningful knowledge, including an understanding of situated cognition in contextualized, authentic learning experiences.
- Articulate the role of industry and post-secondary education partnerships in preparing adolescents for both college and career.
- Describe the variety of work-based, authentic learning experiences that might be available to students in linked learning programs.
- Explain Career Technical Education and its role in linked learning programs.
- Articulate the relationship between academic teachers and career technical education teachers in linked learning programs and provide examples of the relationship within a high school.