Reforming Teacher Preparation for Twenty-First Century Students:
A Mixed Methods Study

by

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Reforming Teacher Preparation for Twenty-First Century Students:

A Mixed Methods Study

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ABSTRACT

In California, one-third of ninth-grade students drop out every year. Those that do graduate often lack the necessary knowledge and skills needed for postsecondary education and work. Reform efforts are moving ahead to transform American high schools, with the goal of preparing all students for the rigors of both college and careers. In response to these reforms, the focus has shifted to the way teachers are prepared to be able to blend academic and career-focused instruction. Teachers are considered to be the most powerful in-school influence on student achievement. This mixed methods study examined the differences between preservice teacher candidates prepared in a Linked Learning Lens Single Subject Credential Program with those candidates prepared in a traditional Single Subject Credential Program. The question that guided this research is whether or not preservice teachers who obtain a credential through the Linked Learning Lens Single Subject Credential Program are better prepared to meet the needs of the twenty-first century student. Using survey data, differences were analyzed between the Linked Learning Lens Credential teacher candidates and the non-Linked Learning Lens Credential teacher candidates and the impact on the teacher candidates’ attitudes and knowledge. Additionally, faculty syllabi were analyzed to compare curriculum, assignments, and assessments between the two programs of study. Findings showed that preservice teachers candidates prepared in the Linked Learning Lens Credential Program appear to have the skills and knowledge to teach in a Linked Learning environment, and they are also better prepared to bring twenty-first century skills into their classrooms, preparing students for the world of college and career.
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CHAPTER 1—INTRODUCTION

Every year, one-third of ninth-grade students drop out of California high schools (California Department of Education [CDE], 2007), with a yearly total equating to approximately 98,000 students (Stuit & Springer, 2010). These students face a future of marginal, low-paying jobs. 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. Only a third of high school students in California graduate on time and transition easily to postsecondary education and lasting career success (Hoachlander, Sterns, & Studier, 2008).

The academic, economic, and societal impact of this problem cannot be ignored. From the White House to the schoolhouse, policymakers, analysts, and educators are aware of the need for reform to stop the flow of our most precious asset—our children—out of school and back into the world of work and academia. More needs to be done to foster innovation and provide equitable access to high-quality education, especially for children born into poverty (Organization for Economic Cooperation and Development [OECD], 2012).

Education reform to address this problem in the past has ushered in changes in standards, assessment, curriculum, and teacher evaluation. Most recently, the focus has turned to teachers and to the preparation of these professionals, who are the most powerful in-school influence on student performance (Council for the Accreditation of Educator Preparation [CAEP], 2013). Many laypeople and a large number of
policymakers hold the view that almost anyone can teach reasonably well—that entering teaching requires, at most, knowing something about a subject (Darling-Hammond, 2006). As California State Superintendent Tom Torlakson (CDE, 2012) stated, “Every child deserves a great teacher” (p. 2). Historically, California investments in teacher quality have been paltry. Teacher education is uneven in duration and quality. While some educators receive excellent preparation, others receive much less in terms of both quality and quantity of coursework and clinical training before they teach or step into leadership posts. Secretary of Education Arne Duncan quipped that the current state of university teacher education would be laughable if the results were not so tragic for our nation’s children” (Grasgreen, 2011). Most teachers receive little financial support to prepare for their career, and the state invests little in preparation institutions. Hence, the quality of preparation depends in part on what candidates can afford to spend and what universities are willing and able to invest (CDE, 2012).

Each year, more than 100,000 new teachers enter classrooms across America, struggling with varying levels of preparedness (Darling-Hammond & Baratz-Snowden, 2005). Currently, the least prepared teach the most needy children (Adamson & Darling-Hammond, 2012), often within urban schools, where they face the biggest obstacles with limited resources (Tindle, Freund, Belknap, Green, & Shotel, 2011). This lack of teacher preparedness is especially acute in urban high schools—signaled by high dropout rates, graduates unprepared to succeed in college or career, and widespread student disengagement, especially among students of color (Darling-Hammond & Baratz-Snowden, 2005; Grubb, Davis, Lum, Plihal, & Morgaine, 1991; Little, 1993; Oakes &
Saunders, 2008; Zeichner, 2010). It is now apparent that most efforts in school reform will come to nothing unless teachers are up to the task (Caperton, 2006).

The realities of what it takes to teach in U.S. schools are overwhelming. In the classrooms most beginning teachers will enter, at least 25% of students live in poverty, and many of them lack basic food, shelter, and health care; 10% to 20% will have identified learning differences; 15% will speak a language other than English, and about 40% will be members of racial/ethnic minority groups, many of them recent immigrants from countries with different educational systems and cultural traditions (Darling-Hammond, 2006).

For more than a decade, the Center for the Future of Teaching and Learning has supported the Teaching and California’s Future (TCF) initiative to provide California policymakers with objective and timely data on the state’s teacher workforce. The initiative seeks to ensure that every child has a fully prepared and effective teacher and that every pathway into teaching will provide high-quality preparation (Bland et al., 2010).

Improving teacher preparation programs has long been underutilized as a strategic lever to improve student outcomes. In the coming years, it will be essential to California to have a strategic plan for reconstructing their education system, and teacher education must be a part of it (CDE, 2012). To that end, California State Superintendent of Public Instruction Tom Torlakson, in conjunction with Mary Sandy, Executive Director of the California Commission on Teacher Credentialing, convened the Educator Excellence Task Force (EETF). The EETF identified three critical priorities as the basis for implementing much needed reforms. They include (a) creating a coherent continuum
of learning expectations and opportunities for educators across their entire careers; (b) developing a learning system in California that supports collaborative learning about effective practices among educators across schools and districts, between and among school boards and unions, and with state agencies; and (c) developing a consistent revenue base for high-quality professional learning by creating a category of flexible funding to support it (CDE, 2012).

As educators, civic leaders, and policymakers grapple with issues of student retention and advancement, a variety of innovative ideas have emerged. Among these is the Linked Learning approach, a field of reform that includes various approaches to engage students in college and career readiness (Oakes & Saunders, 2008). However, according to Retallick and Miller (2010), high school teachers need to be able to help students make the connections between what they are learning in class and its application in the world of work. This is a major focus of the Linked Learning approach, a California-based approach to high school transformation in curriculum and instruction that integrates strong core academics, demanding career and technical education (CTE), and real world experience (Bishop & Mane, 2004; Gentry, Peters, Rizza, & Hu, 2005; Hoachlander et al., 2008; Hudson & Laird, 2009).

While the term Linked Learning is used primarily in California, it is also being used nationwide to describe the various models of the approach, including California Partnership Academies, National Academy Foundation academies that have been developed across the country, Big Picture schools also found nationwide, and other career academies. The Linked Learning approach simultaneously prepares students for participation in the labor market and for advanced education.
In the Linked Learning approach, students’ high school experiences are in industry-themed pathways, each of which represents a particular industry sector relevant to the region. In these pathway programs, academic and technical courses are designed to make the content relevant to the pathway theme. However, “academic teachers often have limited knowledge of technical fields and may lack experience in helping their students employ academic content in industry applications” (Hoachlander et al., 2008, p. 26).

**Statement of the Problem**

As reported by California State Superintendent Tom Torlakson’s Task Force on Educator Excellence (CDE, 2012), there is growing recognition that expert teachers are perhaps the most significant resource for improving student learning. However, the majority of current teacher preparation programs are preparing Single Subject teachers for the traditional high school, not new reform models in secondary education. Furthermore, they are not preparing teachers to participate effectively in reforms that a growing body of research indicates are narrowing, if not eliminating, what has been a persistent achievement gap in high schools (G. Duncan & Murnane, 2011; Hoachlander et al., 2008; Packard, Gagnon, & Moring-Parris, 2010).

In order to identify a solution to this problem, several California teacher preparation institutions adopted a major reform in secondary education known as Linked Learning (Farnan, Hudis, & LaPlante, 2014). However, little empirical research exists that measures the effects of teacher preparation through a Linked Learning credentialing program. The question posed then is: Do teachers prepared in a Linked Learning
credentialing program better meet the needs of the twenty-first century learner (Partnership for 21st Century Skills, 2008)?

Linked Learning and twenty-first century skill readiness provides students with capabilities to compete in the global economy (Partnership for 21st Century Skills, 2008; Rustique & Stam, 2012; Saunders, Hamilton, Fanelli, Moya, & Cain, 2013). Too many students are dropping out, because they do not see any connection with what they are learning in school and the careers they want to pursue. At the same time, many in high growth industries complain that they face a shortage of skilled workers (Steinberg, 2013).

Grubb (2008) reviewed the Linked Learning strategy by using California as a case study. He postulated that “there are multiple Californias: The state is increasingly divided by class, race, and residential location” (p. 93). Researchers have noted that racial and class segregation was on the rise in California, and the Economic Policy Institute reported that California is among the worst 10 states in terms of economic disparity by income class (Grubb, 2008). Linked Learning reform may be part of a remedy to this problem. It is a strategy that accommodates labor market needs and provides benefits to students, workers, and the economy as a whole. It implicitly acknowledges the growing diversity of the population by allowing students to choose a trajectory that may change over time (Grubb, 2008). A true Linked Learning strategy is not simply an educational intervention that can be inserted into any education system; it will require policies that address other major challenges in California and elsewhere, including immigration pressures, declining labor standards, and slowing economic growth (Grubb, 2008).

Linked Learning may be a central part of the answer. A growing body of exploratory data demonstrates that when schools establish the conditions of a Linked
Learning environment, they can transform the high school experience, increase student engagement, and reduce dropout rates (Saunders et al., 2013). The programs typically combine college-preparatory academics aligned to a specific career field alongside real-world work experiences, including internships, job shadowing, or mentoring opportunities. The focus is on preparing students for college and careers, which is the goal of current reforms such as the Common Core State Standards (CCSS) and the Local Control Funding Formula (Osborne & Maitre, 2014). However, resistance to change amid the traditional mind-set of educators creates barriers to full implementation at many high schools (Good & McCaslin, 2008; Grubb, 2008; Saunders et al., 2013). This is where major changes in teacher education could become an effective part of a strategic plan for transformational education improvement.

In an effort to further support the creation and sustainability of Linked Learning programs, the 2013-14 California State Budget included $250 million to be allocated by the California Department of Education through the California Career Pathways Trust, a competitive grant fund geared towards the development of work-based learning infrastructure, innovative regional partnerships for career pathway support, and the expansion and improvement of career pathway programs statewide. The scale of this investment is recognition of the value of career pathways (CDE, 2014).

The question that remains is how to change the practices in teacher preparation programs that will best facilitate the integration of Linked Learning and twenty-first century skills in today’s high schools (Kolderie, 2007; Partnership for 21st Century Skills, 2008; Rustique & Stam, 2012; Saunders et al., 2013).
Teachers engaged in the Linked Learning approach require key skills and proficiencies, including using inter- and intra-disciplinary collaboration in curriculum design and delivery; developing lessons using problem- and project-based learning; creating industry and postsecondary education partnerships; and developing learning experiences that integrate career-technical standards, academic standards, and work-based learning experiences (Almond & Miller, 2014).

An increasing number of universities across the state have teacher preparation programs that incorporate a Linked Learning perspective in the state-approved the Single Subject Credential Program. These programs are developing (a) replicable models for Single Subject Credential Programs that will prepare new teachers to participate as professional educators in Linked Learning pathways and schools, and (b) a network of teacher preparation institutions throughout the state that are implementing these models. Student teaching occurs in collaboration with and at Linked Learning sites so that credential candidates learn about the Linked Learning approach in their coursework, but also directly experience and fully engage with it as pre-service teachers (Almond & Miller, 2014).

**Purpose of the Study**

The purpose of this study was to examine a Single Subject Credential Program at a large university in the southwestern United States. The university has worked diligently for 6 years to create reforms that include curriculum and course revisions, development of new school partnerships, and development of new assignments. The research question that this study attempts to answer is whether or not preservice teachers who obtain a credential through the Linked Learning Lens Single Subject Credential Program are better
prepared to meet the needs of the twenty-first century student than those pre-service teachers who obtain a credential through a traditional Single Subject Credential Program.

Related to this is the following question: do the knowledge, skills, and abilities of new teachers prepared in a Linked Learning Lens Single Subject Credential Program designed to prepare new teachers to teach effectively in Linked Learning environments differ from the knowledge, skills, and abilities of new teachers prepared in a traditional Single Subject Credentialing Program? The research will also examine syllabi from concurrent Single Subject Credentialing Programs, one utilizing the Linked Learning Lens, while the other utilizes a traditional curriculum. The curriculum of the Linked Learning Lens program delivers instruction designed to include a different set of knowledge, skills, and abilities that new teachers completing the program know and understand. This is a new field of study, using an exploratory approach, which is designed to provide a foundation for future research.

**Role of the Researcher**

The research study is designed to inform and increase knowledge regarding improving teacher preparation programs to address the needs of the twenty-first century student. According to Merriam (1998), the researcher fits the description of “observer as participant” (p. 101) because stakeholders were apprised of the study and the intent of the researcher; however, the researcher did not directly participate in activities. Merriam explained that this approach allows the researcher access to a greater number of people and to gain an insider perspective.

The researcher is a dean at a charter high school with an intensive internship program and Linked Learning, project based learning approach to curriculum. Her
background includes 10 years as a high school pathway coordinator and Career Technical Education (CTE) teacher who developed and implemented a medical career pathway in an impoverished community by the U.S./Mexico border. The researcher brings insight from the perspective of being a student of vocational education, CTE, and academic science teacher. Among other duties, the researcher is responsible for grant writing and developing and maintaining community and business partnerships to further the sustainability of an internship program at an urban high school.

**Definitions**

For the purpose of this study, the following definitions will serve as working definitions:

*Big Picture Schools*: Big Picture Schools are designed on three foundational principles: (a) learning must be personalized and based on the interests and goals of each student; (b) curriculum must be relevant to people and places that exist in the real world; and (c) a student’s abilities must be authentically measured by the quality of her or his work. In addition, Big Picture Schools have five learning goals: empirical reasoning, quantitative reasoning, communication, social reasoning, and personal qualities (Big Picture Learning, 2014).

*California Partnership Academies (CPAs)*: A network of schools supported by state grants. The programs offer a 3-year program of study for grades 10 through 12 and typically operate as a small learning community within a larger high school. The curriculum is intended to prepare students for both college and careers. Students at each grade level take several classes together, including core academic classes and a technical class related to the academy’s theme. Common academy themes are health professions,
business and finance, architecture and construction, media and communications, environmental science, engineering, and information technology. The CPA model receives annual funding from the California Department of Education (Almond & Miller, 2014). There are currently approximately 500 CPAs in California.

*Career and technical education:* A course of study that prepares students for both postsecondary education and careers once called vocational education (Bray, 2002).

*Career and technical education integration:* Blending rigorous academic core courses with challenging technical and work based curriculum (Hoachlander et al., 2008).

*Change process:* The sequence of events that takes place as an organization integrates a new program or system (Westbrook & Spiser-Albert, 2002).

*Linked Learning:* Linked Learning is an approach that is transforming education for California students by integrating rigorous academics with career-based learning and real world workplace experiences. Linked Learning ignites high school students’ passions by creating meaningful learning experiences through career-oriented pathways in fields such as engineering, health care, performing arts, law, and more (Almond & Miller, 2014).

*Linked Learning District Initiative:* Launched in 2009 in nine California districts to expand linked learning models. The initiative is directed by ConnectEd, a Berkeley-based nonprofit, which provides support and coaching to the schools (Almond & Miller, 2014).

*National Academy Foundation:* A New York-based nonprofit, runs a network of career academies across the nation, including several in California. The programs can be stand alone high schools or small learning communities within a larger campus. The
academies are organized around one of five career themes: finance, hospitality and
tourism, information technology, health sciences, or engineering (Osborne & Maitre,
2014).

*Pathway:* A sequence of classes focused on a specific career area (Hoachlander
et al., 2008).

*Regional Occupational Program:* A California organization providing
occupational training for students 16 years of age through adults (Hoachlander et al.,
2008).

**Limitations**

Generalizations of the results of this study are limited for several reasons. This
study focused on a single university teacher preparation program. The university is
located in an urban setting within a large city in the western region of the United States.
The results may not be applicable to sites that do not mimic this sample.

This is an exploratory study, designed to provide a foundation for future research.
Areas of challenge in the Linked Learning movement include: (a) faculty resistance to
change in the beliefs, expectations, and practices to enable a more rigorous and engaging
curriculum that integrates technical education; (b) districts struggle to develop and
communicate a well-articulated vision for college and career readiness; (c) considerable
variation in the organization of multiple systems at the district level; (d) district level
policies and programs do not yet demonstrate a commitment to Linked Learning; and
(e) recruitment and development of trained Linked Learning teachers and the struggle to
protect them from layoffs or transfers due to local union contracts (LaFors & McGlawn,
2013).
Furthermore, many researchers have worked diligently to establish causal relationships between aspects of teacher preparation and outcomes in student achievement. This is difficult, as programs may differ in the types of candidates that they attract and in the types of knowledge and skills that candidates acquire (National Research Council [NRC], 2010). Programs may also differ in whether or where their graduates teach (e.g., what kinds of schools, urban or rural) and how long they remain teachers (NRC, 2010).
CHAPTER 2—LITERATURE REVIEW

This literature review examines the research related to (a) rethinking teacher preparation (Bruijn & Leeman, 2011; Darling-Hammond, 2006, 2012; Darling-Hammond, Chung, & Frelow, 2002), (b) the Linked Learning approach (Alfeld, Stone, Aragon, Hansen, & Zirkle, 2006; Grubb, 2008; Hoachlander et al., 2008; Kosine & Lewis, 2008; Lewis, 2008; Lynch, 2000; Rice & Rutherford-Quach, 2012; Rustique & Rutherford-Quach, 2012), and (c) educational reform efforts related to twenty-first century skills and knowledge (Castellano, Stringfield, & Stone, 2003; Collaborative Communications Group [CCG], 2006; Fullan, 2001; Good & McCaslin, 2008; Johnson & Uline, 2005). In combination, these areas of research and scholarship lay the foundation for the current study of teacher preparation. The context for rethinking teaching preparation is a growing number of high schools that are engaged in well-defined transformation that focuses directly on twenty-first century teaching and learning.

Education and Work: A Historical Relationship

The beginning of the major federal influences in molding and shaping secondary and postsecondary vocational education began with the Smith-Hughes Act of 1917 (Lynch, 2000). This legislation was devised in response to a complex set of social, economic, and political forces. In particular, it was enacted to prepare youth for jobs resulting from the industrial revolution and to provide them with an alternative to the general curriculum of schools. The Smith-Hughes Act provided for a continuing appropriation for vocational education in agriculture, trades and industry, home economics, and for teacher training in each of these fields (Lynch, 2000). The Smith-Hughes Act called for new curriculum that would better meet the needs of the children of
the working class. Lynch (2000) pointed out that it is important to note that the Smith-Hughes Act established vocational education with a separate Board of Education, as well as separate funding, separate teacher preparation and certification, separate students, and segregated curriculum, as opposed to “regular” education (p. 16).

The birth of occupational and technical training in the 1900s did not eradicate academic training, but rather divided school curricula into a vocational track and a college preparation track (Perry & Wallace, 2012). The Vocational Education Act of 1963 broadened the focus of vocational education and allocated funding for new programs. The expanded definition included business, commerce, and options for disadvantaged and disabled individuals. While the definition expanded, the philosophy of separate goals and means for educating college and workforce-bound students remained (Oakes & Saunders, 2008; U.S. Department of Labor, 2000). The act was amended in 1968, 1974, and 1976 to serve a broader population of students, including students with disabilities, disadvantaged students, bilingual students, students preparing for nontraditional gender occupations, and postsecondary students (Wonacott, 2003). The need for greater reform once again became evident in the early 1980s as the United States lost its competitive edge internationally, both on the academic and market fronts (Oakes & Saunders, 2008; Wonacott, 2003).

Legislation prior to 1998 had defined vocational education as preparation for occupations requiring other than a baccalaureate degree. Throughout much of the twentieth century, vocational programs focused primarily on job skills and served students who were either struggling in academic programs or were not seen as college bound. The school curriculum was aimed at preparing youth for jobs in an
industrial-based economy. Vocational education came to be viewed as a second-rate education, allegedly reinforcing class boundaries. This set the stage that remains today for the debate around rigor versus relevance, or academic standards versus real-world applications (Perry & Wallace, 2012).

By the end of the twentieth century, an ideology of everyone going to college had thoroughly permeated policymaker thinking (Cuban, 2013). The belief gripped parents and students, from wealthy to poor, that a college diploma was essential for entering the labor market and obtaining economic success. Recognizing the growing economic importance to students and employers of college and education, the federal government today emphasizes using federal funds to support efforts to develop challenging academic standards, integration of academic and vocational instruction, and linking of secondary and postsecondary education (Lynch, 2000).

In 1983, the National Commission on Excellence in Education (NCEE) released A Nation at Risk: The Imperative for Educational Reform, arguably the most influential document on education policy since Congress passed Title I in 1964. A Nation at Risk called for higher expectations for all students, regardless of socioeconomic status. When the NCEE released A Nation at Risk in 1983, many states increased academic course graduation requirements in an attempt to prepare students for higher education (Bishop & Mane, 2004). Vocational students were required to develop their occupational skills on a strong academic foundation. This resulted in an increase in academic course offerings, while reducing the number of vocational courses (Perry & Wallace, 2012).

In 1984, Congress passed the Carl D. Perkins Vocational Education and Applied Technology Act (Lynch, 2000). The Perkins Act contained two main objectives: (a) the
improvement of vocational programs, and (b) better services and increased access to vocational education for students with special needs. In the late 1980s, vocational education experienced unprecedented enrollment percentages from special populations as an increasing number of general education student groups opted out of vocational education to take more academic courses (Lynch, 2000).

Following the 1990 Amendments to the Perkins Vocational Education Act of 1984, the National Assessment of Vocational Education and the Secretary’s Commission on Achieving Necessary Skills (SCANS) in 1991, ushered in a new era of career education. The goal of the SCANS report was to determine the skills needed by young people to succeed in the world of work. The Commission’s fundamental purpose was to encourage a high-performance economy characterized by high-skill, high-wage employment (U.S. Department of Labor, 2000). The skills outlined by the report included basic academic skills of reading, writing, and math, as well as thinking skills, including the abilities to think creatively, make decisions, problem solving, and reasoning.

The School-to-Work Opportunities Act (STWOA) of 1994 incorporated the work-based competencies of the SCANS report. It was passed in response to the rapidly changing needs of the workplace and provided seed money for states to create partnerships with businesses, community colleges, universities, and technical schools (Perry & Wallace; Zinser, 2003). In 1998, the American Vocational Association voted to use career and technical education as the term that best described their work and profession and changed their moniker to the Association for Career and Technical Education (Lynch, 2000). The emphasis shifted and the name changed from vocational
education to career and technical education (CTE). Lynch (2000) noted that Perkins III (1998) made further dramatic shifts in federal direction for CTE, calling for programs to develop more fully “the academic and occupational skills competencies needed to work in a technologically advanced society” (p. 18). The Carl D. Perkins Career and Technical Education Act, reauthorized in 2006, continued to provide states with funds to support CTE, operating expenses, innovation, and program improvement.

Integrating vocational and academic education is not necessarily an end in itself (Grubb, 2008). Instead, it provides a vision of education and a way of overcoming some deficiencies of the American high school. This vision has its roots in research on how students learn. As early as 1916, John Dewey (as cited in Bransford, Brown, & Cocking, 2004) pointed out:

From the standpoint of the child, the great waste in school comes from his inability to utilize the experience he gets outside . . . while on the other hand, he is unable to apply in daily life what he is learning in school. That is the isolation of the school—its isolation from life. (p. 147)

Today, students need to understand the current state of their knowledge and to build on it, improve it, and make decisions in the face of uncertainty. Society envisions graduates of school systems who can identify and solve problems and make contributions to society throughout their lifetime. To achieve this vision requires rethinking what is taught, how teachers teach, and how students are assessed (Bransford et al., 2000).

In their qualitative study employing observations and interviews at 70 school sites, Grubb and colleagues (1991) found that the integration of vocational and academic education could reform high schools in the United States. In fact, integration as an
intermediate goal provided an impetus for broader change. Grubb and colleagues observed that successful schools benefitted from smaller class sizes, coherent programs, and involved teachers. Within integrated programs, teachers tended to teach within small academies or clusters, collaborating more frequently in their efforts to make decisions about what constitutes a coherent curriculum (Grubb, 2008).

In public secondary schools, one or more courses identified with CTE are offered in 93% of the nation’s 15,200 comprehensive high schools (Lynch, 2000). Nearly all of these high schools offered introductory courses taught for purposes of general labor market preparation or to provide students with practical life skills, such as word processing, technology education, or consumer sciences. By the early twenty-first century, thousands of high schools and community colleges had implemented some form of career academies, clusters, majors, or a combination of these approaches (Castellano et al., 2003). As a result, a demand was growing for teachers with new capabilities. Foremost among these was the capacity to integrate academic and vocational studies, coordinate school- and work-based learning, and articulate secondary with postsecondary studies. Experiential learning, long a hallmark of career and technical education (Retallick & Miller, 2010), began to expand beyond CTE courses.

Lynch (2000) noted that about 75% of all comprehensive high schools offered specialized courses in one or more occupational programs, historically identified as agriculture, business, marketing, health, consumer sciences, trade and industrial, and technical and communications. More recently the federal government has added public and protective services, childcare and education, food service and hospitality, and personal services to its classification of occupational program areas (Lynch, 2000).
The first career academy appeared in 1969 in Philadelphia, where thousands of students now enroll in academies. In the early 1980s, the model was brought to California, starting with two high schools in the Sequoia Union High School District just north of Palo Alto. Based on a series of evaluations that demonstrated significant improvement in student performance, the State of California began replicating the model in 1985, and now supports approximately 500 career academies across the state. Many other academies in California and elsewhere have started on their own without state grants (College and Career Academy Support Network [CCASN], 2010).

Preliminary data today indicated that after two decades of decline, secondary CTE is experiencing a resurgence in both image and enrollment, backed by students’ interest and a growing realization that students need some job skills in order to earn funds to continue their education (Lynch, 2000).

Efforts to reform schools are limited by the fact that education has little scientific capital, but a great deal of organization capital (Cusick, 2014). Educational reformers push their efforts into the way human learning is organized. Lynch (2000) emphasized two major points on learning. First, school “routinely and profoundly violates” all that we know about how students learn and the proper conditions under which they should apply knowledge appropriately to new situations (Lynch, 2000, p. 39). Second, these practices permeate all levels of American education. Lynch asserted that the new economy calls for the inclusion of more thinking and culture into CTE. This work on cognition and contextual learning gives credence to the need for reforming teacher preparation, bringing more of the pedagogy historically identified with CTE to academic subjects (Lynch, 2000). It is incumbent upon career and technical educators to include
more of the theory underlying knowledge and skills they teach relative to particular industries and careers.

Reforming the organization has become the agenda, with 4.5 million teachers caught in the middle. They are the most numerous, central, accessible, and vulnerable. The current thinking argues that too many students are failing and, therefore, the schools are not doing well. But research shows that teachers do make a difference (Darling-Hammond & Baratz-Snowden, 2005). Cusick (2014) argued that the organization of schools allows teachers to fail, resulting in student failure. He proposed moving away from current practices and establishing a system characterized by cumulative and linear progress with clear and stated, preconceived, tangible, and quantifiable goals. There is evidence of such instructional systems occurring in many states with the implementation of the Common Core State Standards (CCSS).

Teachers employed in these comprehensive reform settings are often expected to integrate, coordinate, and articulate school-to-career activities on a regular basis (Finch et al., 1999). In addition, the National Commission on Teaching and America’s Future (as cited in Retallick & Miller, 2010) argued that a major flaw in comprehensive reform is the disconnect between teacher education coursework and early field experiences. Education reform must include the reform of teacher preparation (NCATE, 2008).

**Teacher Preparation for Integrated Career,**

**Technical, and Academic Education**

The U.S. Department of Education (DOE) estimates that more than 674,000 new teachers will need to be hired from 2008-2018, most recently noted by the Bureau of Labor Statistics (Lacey & Wright, 2010). Teacher shortages, most acute in inner city and
rural areas, are not uniform across content areas and fields of study, with the greatest
needs in special education, math, science, and CTE (Fayne & Matthews, 2010; Newton,
Jang, Nunes, & Stone, 2010).

More than half of the nation’s teachers graduate from a school of education. As
U.S. Secretary of Education Arne Duncan (2009) stated:

To keep America competitive, and to make the American dream of equal
educational opportunity a reality, we need to recruit, reward, train, learn from, and
honor a new generation of talented teachers. But the bar must be raised for
successful teacher preparation programs. (para. 13)

In addition to the new economy, increased public expectations that more high
school graduates will attend college, affects important reforms necessary in CTE teaching
(Lynch, 2000). The availability of highly qualified teachers, who teach to high standards
and help students achieve them, adjusting instruction to different learning styles, is key to
increased student achievement. Lynch (2000) asserted that strong support for teachers,
beginning with preparation and continuing with mentoring programs in their first 3 years
of experience is essential to reform efforts.

While the organization, governance, and curricula in school has changed
dramatically in the past century, reformers have failed to alter substantially the ways
teachers are prepared and the way they teach (Cuban, 2013). Reformers have tried to turn
teacher-centered classroom practices into more flexible and demanding pedagogies that
included substantial intellectual content and a deeper understanding of ideas, learning
through inquiry, and project based learning. Technological innovations have been drafted
into the task of altering teacher-centered practices. Yet, even in modern classrooms filled
with computers, lessons unfold in the familiar progression of tasks and activities (e.g., homework, textbook assignments, worksheets, test, etc.). For the most part, teachers use technological innovations to drive classroom practices that resemble twentieth century pedagogy (Cuban, 2013). Overall, Cuban (2013) asserted that these incremental, or first order, changes have largely left intact teaching routines that are a century old.

Colleges of education need to make dramatic changes to better prepare teachers to teach twenty-first century students to compete in the global economy. Teacher-preparation programs should ensure that new teachers will master the content of the subjects they will teach, and they will have well-supported field-based experiences embedded throughout their preparation programs. Their ultimate goal should be to create a generation of teachers who are focused on improving student achievement and ready to deliver on that goal (A. Duncan, 2009).

Changing the preparation of teachers has been the dominant policy strategy to improve classroom instruction. Cuban (2013) noted that over decades, reformers have established structure that raised standards in recruiting, preparing, selecting, and evaluating teachers. Teachers in the United States now need a bachelor’s degree and, in many states, a master’s degree to teach. Spurred by philanthropic and federal grants, state lawmakers and district policy makers have generated procedures aimed at distinguishing between effective and less effective teachers based on test scores and other measures. This favored strategy aimed at improving the quality of teaching (Cuban, 2013; Darling-Hammond & Adamson, 2010).

Preservice and beginning teachers are asked to navigate an array of ongoing changes. In addition to meeting university and professional requirements and standards,
new teachers are faced with the complexity of changing legislation, policies, philosophy, and practices (Joerger & Bremer, 2001). This is especially true with the development and implementation of the new CCSS (Rustique & Stam, 2012). Beginning teachers are expected to prepare students to be members of today’s workforce with the ability to apply knowledge, reason analytically, and solve problems. At the same time, American society is becoming more diverse, with students in classrooms drawn from many cultures and ethnic groups (NCATE, 2008).

Student achievement depends on what teachers know and do in their classrooms, a consequence of their preparation and professional development (Leithwood, 2010). Teachers benefit from opportunities to model the instructional practices that they are expected to employ, including problem solving, learning in authentic settings, and examination of student work. Leithwood (2010) examined survey responses from 2,570 teachers from elementary and secondary schools in order to ascertain the significance of collective leadership and its effect on teachers’ preparation and professional development. Using path-analytic techniques, Leithwood and Mascall (2008) asserted that teachers could be influenced through leadership efforts in preparation and professional development to become better at their craft. Based on these realities, a need exists to better prepare teachers who, in turn, can better prepare students.

To meet these challenges, Zeichner (2011) asserted that the preparation of teachers for democratic societies must be based on an epistemology that is in itself democratic and includes respect for and interaction among practitioner-, academic-, and community-based knowledge. One of the fundamental weaknesses in teacher preparation
is the weak link between the clinical preparation for teaching that novice teachers receive and the preparation that occurs in various kinds of coursework (Zeichner, 2011).

Teacher preparation programs need to improve the effectiveness of instruction (Cochran-Smith, Piazza, & Power, 2013; Corcoran & Silander, 2009). Corcoran and Silander (2009) define instruction as the interactions between teachers and students around curriculum content and learning goals. Their research examined how instruction is organized and found that organization structure did affect instruction in meaningful ways. Schlechty (2011) asserted that teachers need to be prepared to engage students, going so far to state that engagement is central to the “future of public education” (p. 14). Engagement has become increasingly important because it is so integrally related to effort (Schlechty, 2011). The Gates Foundation determined that redesigning high schools into small learning communities and academies resulted in modest achievement gains (Corcoran & Silander, 2009). However, Goodwin (2002) asserted that findings from research on small learning communities merely suggested possible outcomes and that causal inferences could not be drawn. It is essential to also alter learning and teaching practices in the classroom.

Teaching and learning for the twenty-first century must begin with a much broader set of student learning outcomes, ones that include college and career employability skills. There is a growing consensus that these career and real world employability skills should be taught in high schools (Hoachlander et al., 2008; Packard et al., 2010). The Partnership for 21st Century Skills (2008) task force maintains that not only do future workers need to be able to read, write, and perform arithmetic at the same time they apply critical thinking (problem solving) skills, demonstrate strong
communication skills, collaborate, and demonstrate creativity (innovate), all skills that will become increasingly important to organizations. These skills are referred to as the “4 C’s” (American Management Association [AMA], 2010). These skills cannot be taught effectively using traditional “teaching by telling” methods.

This begs the question of whether teachers are competent to provide instruction on employability skills and contextualize academic learning and teaching within a career theme and whether teacher-training programs are preparing teachers to do so (Zinser, 2003). High school programs of study that integrate vocational and academic education require a variety of instructional and organizational strategies that are not typically taught in teacher preparation programs. To complicate matters, if these skills have not been part of their preservice teacher training, teachers may have neither the experience nor the comfort level to be effective or the opportunities to develop these skills. To that end, ConnectEd: The Center for College and Career, developed a crosswalk between California’s Standards for Teacher Preparation and the skills and proficiencies needed by teachers in Linked Learning programs. The crosswalk became the foundation for building the Linked Learning Lens within California’s SB 2042 Single Subject Credential (Farnan et al., 2014; see Appendix A).

Reforming Teacher Preparation

There is a growing consensus among a number of national organizations that there is a need for transformative improvements to the teaching profession. The relationship between teacher education and teacher effectiveness has been hotly debated in recent years (Darling-Hammond & Baratz-Snowden, 2005). The need for reform has become more apparent in the last two decades, with an influx of students from culturally and
linguistically diverse backgrounds and students with disabilities (Dykes, Gilliam, Neel, & Everling, 2012). Recently, under the supervision of Secretary of Education Arne Duncan, the U.S. Department of Education (2013) released *A Blueprint for R.E.S.P.E.C.T.: Recognizing Educational Success, Professional Excellence and Collaborative Teaching*. This initiative is supported by the American Association of School Administrators, (AASA), the American Federation of Teachers (AFT), the Council of Chief State School Officers (CCSSO), the Council of Great City Schools (CGCS), the Federal Medication and Conciliation Service (FMCS), the National Education Association (NEA) and the National School Board Association (NSBA; DOE, 2013).

In 1986, the Carnegie Task Force on Teaching as a Profession released its response to *A Nation at Risk* by the NCEE, a report distributed to Congress in 1983. Its response, compiled in *A Nation Prepared: Teachers for the 21st Century*, identified teaching standards and has been instrumental in defining and initiating teacher education reform efforts (Adams, 2010).

The National Council for Accreditation of Teacher Education (NCATE) was founded in 1954 to accredit colleges and universities that provided teacher preparation programs. Its standards are based on the belief that all children can and should learn (NCATE, 2008). In their work as an accrediting body, NCATE seeks to ensure that new teachers receive a broad liberal arts education; in-depth study of the subject they plan to teach; a foundation of professional and pedagogical knowledge upon which to base instructional decisions; diverse, well-planned, and sequenced experiences in P-12 schools; and ongoing assessments of competence to practice, through an array of performance measures (NCATE, 2008). In 2007, NCATE ratified a call to action
asserting that a commitment to social justice demands that appropriate action be taken to fulfill the promise of the federal law *No Child Left Behind* by assuring high quality education for all children. The NCATE standards that specifically address teacher quality include preparing teachers who: (a) acquire the necessary content, pedagogical, and professional knowledge and skills to teach both independently and collaboratively; (b) are prepared to teach a diverse community of students; (c) can integrate technology into instruction to enhance student learning and to teach to P-12 student standards set by specialized professional associations and states; (d) explain instructional choices based on research-derived knowledge and best practice; (e) apply effective methods of teaching students who are at different developmental stages, have difference learning styles, and come from diverse backgrounds; (f) pursue in-depth study of the subject they plan to teach; (g) possess a foundation of professional and pedagogical knowledge upon which to base instructive decisions; and (h) complete diverse, well-planned, and sequenced workplace experiences in P-12 schools.

Villegas (2007) described that NCATE further reinforced the role of teacher dispositions in the preparation of educators with its adoption of *Standards 2000*. Dispositions are defined as “tendencies for individuals to act in a particular manner under particular circumstances, based on their beliefs” (Villegas, 2007, p. 373). The new standards, which NCATE has used to accredit programs of teacher education since 2000, specify that candidates preparing to work in schools as teachers must demonstrate the professional knowledge, skills, and dispositions necessary to help all students learn. Standards 2000 further requires that programs seeking accreditation from NCATE
develop and implement a performance-based system for assessing candidates, including their dispositions (Villegas, 2007).

To maximize the impact of formal preparation on teacher learning, teacher educators must create ample opportunities early in the program for candidates to examine critically their taken-for-granted beliefs in relation to classroom actions. Without such reflection, many preservice teachers are unable or unwilling to incorporate new ideas and new habits of thought and action into their teaching, preferring instead to teach based on their taken-for-granted beliefs (Villegas, 2007). A focus on candidates’ beliefs requires a shift in teacher education from a training model that stresses the transmission of propositional knowledge and the development of technical skills to a learning model that emphasizes how prospective teachers construct their understandings of learning to teach, how those understandings are affected by what they bring to their formal preparation, and how their thinking changes over time. Teacher candidates’ beliefs about students, especially students of color, merit special attention (Cochran-Smith & Zeichner, 2005).

In 2010, NCATE published a report titled *Transforming Teacher Education through Clinical Practice: A National Strategy to Prepare Effective Teachers*. The NCATE convened a diverse group of individuals representing 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” (NCATE, 2010, p. ii). The report’s Executive Summary begins with the following:

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 that 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. (p. ii)

In July 2013, NCATE and the Teacher Education Accreditation Council consolidated into the Council for the Accreditation of Educator Preparation (CAEP), the new accrediting body for educator preparation. The Council for the Accreditation of Educator Preparation’s primary goals include raising the performance of candidates as practitioners in P-12 schools, and elevating the stature of the entire profession by raising the evidence of quality in the field (CAEP, 2013).

Goldhaber (2006) analyzed 10 years of student test scores linked to individual classrooms and teachers. He examined over 700,000 student records and the licensing records for almost 24,000 teachers. Goldhaber found that teacher education makes a difference. He concluded that students of teachers who graduate from an approved training program outperform those whose teachers do not. The effect is significant though not large. Studies on underprepared teachers working with at-risk students vividly demonstrate how we are failing our most vulnerable students (Darling-Hammond, Holtzman, Gatlin, & Vasquez Heilig, 2005). The Center for Teaching Quality noted in its analysis, “The findings illustrate the failed teaching policies that plague our nation’s urban schools” (NCATE, 2010, p. 13).

The National Academy of Education Committee of Teacher Education (as cited in Darling-Hammond, 2006) observed “many analysts [noting] . . . very little relationship between the organization of the typical American school and the demands of serious
teaching and learning” (p. 302). In contrast to high achieving schools in Europe and Asia, American schools offer fewer opportunities for teachers to spend time working with one another to develop curriculum, plan lessons, discuss teaching strategies, and assess student work in authentic ways (Darling Hammond, 2006). In schools in industrialized countries in Asia and in Europe (where they do not spend much more money per pupil than the United States, but they spend it differently), teachers spend between 15 and 20 hours of a 40- to 45-hour work week in their classrooms with students. Thus, they have 20 hours or more per week to plan lessons, to meet with students and parents, and to work together and learn from one another (Darling-Hammond, 2006).

Darling-Hammond (2006) asserted that schools of education must design programs that help prospective teachers understand a wide array of things about learning, social and cultural contexts, and teaching and be able to enact these understandings in complex classrooms serving increasingly diverse students. Darling-Hammond stated, “If prospective teachers are to succeed at this task, schools of education must design programs that transform the kinds of settings in which novices learn to teach and later become teachers” (p. 302). The CAEP standards denote that teacher candidates should learn to contextualize teaching and draw effectively on representations from the students’ own experiences and cultures. Ideally, the teacher candidate challenges students toward cognitive complexity and engages all students, including English language learners and students with exceptionalities, through instructional conversation (CAEP, 2013).

The U.S. Department of Education (2013) asserted that in order to transform the teaching profession, seven critical components need to exist: shared responsibility and leadership, recruitment and preparation, growth and development, evaluation,
compensation and advancement, school climate, and community engagement. Educators consistently identified these components as critical to transforming the profession and characteristic of the highest-performing school systems in the United States and abroad (DOE, 2013).

There is a growing movement in college and university-based teacher education today to move the preservice preparation of teachers closer to practice. This would require conducting some of the instruction of new teachers in the settings in which teacher candidates will later need to use the teaching practices they are learning (Zeichner, 2010). This would strengthen the clinical component in teacher preparation by investing in building the capacity of schools to serve as sites for clinical teacher education and experienced teachers to serve as effective mentors (NCATE, 2010). There are a growing number of examples of a new more connected and school-based form of college and university teacher education (Zeichner, 2010).

**Teacher Credentialing**

In 2007, spurred by the larger context of national standards for teacher preparation, the California Commission on Teacher Credentialing modified and adopted new language with regard to teacher credentialing, seeking to ensure high quality educators for California’s diverse students, schools, and communities (E. Brown, 2011). Toward this end, the Commission holds colleges and universities accountable for the integrity and high quality of their preparation programs. The unique structure of the school-to-work reform movement in California specifically addresses the lack of alignment between traditional schools and the ability of young people to capitalize on the opportunities in an increasingly technological society. Linking high school subject matter
to the real world of work and future employment possibilities is vital to student success. This presents a challenge, however, for teachers with little business or industry experience (Finch et al., 1999). This is particularly challenging, as there are few teacher preparation programs of study that address this need.

Preservice teacher education can only foreshadow teaching. If prospective teachers are to succeed, schools of education must design programs that transform the kinds of settings within which novice teachers learn to teach and later become teachers (Darling-Hammond, 2006). This will require that the enterprise of teacher education venture out from the university setting and engage ever more closely with schools and community partners in a mutual transformation agenda. Intensive immersion experiences in communities have the potential to facilitate the deepest learning for preservice teachers (McDonald et al., 2011).


Evidence abounds that high schools simply don’t work very well: witness strikingly high dropout rates, large percentages of graduates unprepared to succeed in college or career, education gaps that jeopardize African American and Latino students’ life chances, and widespread student disengagement. (p. 3)

Grubb and Gardner (2006) conducted a longitudinal study of students in Grades 8-12 to determine causal effects for dynamic inequalities in minority student populations. They found that African American and Latino students experienced greater outcome divergence than their white peers. The researchers asserted what really counts for many dimensions
of adult life is dynamic inequality—the inequality that increases among students over the long years of elementary, secondary, and the postsecondary education. Students start school with initial differences, and by 12th grade the differences among individuals are enormous: some have dropped out and are still reading at the sixth grade level, while others have accumulated many AP credits and are about to enter the best universities in the world. The differences at age 30 are wider still, comparing high school dropouts to individuals with advanced professional and doctoral degrees (Grubb & Gardner, 2006).

McNeil, Coppola, Radigan, and Vasquez Heilig (2008) substantiated this through their research on student dropouts. In an ethnographic study of urban high schools in a southwestern state; a statistical analysis of a large, urban district’s student-level data over a 7-year period; an in-depth ethnography of a high-poverty mostly Latino high school working to balance accountability compliance and educational improvement; and school-site interviews and observations in a larger sample of urban high schools to investigate school-level actions along points of significance emerging in the statistical data (McNeil et al., 2008). The study’s focus on youth and their experience under a standardized system reveals that a convergence of policies built into the accountability system exacerbates the pressure on youth and stacks the deck against persistence in school for many youth, particularly those who are poor, immigrant, English-language learning, African American, or Latino (McNeil et al., 2008).

Although some teachers are better prepared than others, a growing number who serve the most vulnerable students enter teaching before they have been adequately prepared to teach and are increasingly ill prepared for what they must accomplish (Darling-Hammond, 2006). Darling-Hammond, LaFors, and Snyder (2001) assert that
teacher expertise is one of the most influential factors influencing student achievement. This means that teachers need highly refined knowledge and skills for assessing student learning, along with the knowledge to know when to use different strategies for different purposes (Darling-Hammond, 2006). The importance of addressing these issues has never been more urgent. With the wave of baby-boomer teacher retirements, novices make up a greater share of the teacher workforce than ever. The real challenge is that first-year teachers now teach around 1.5 million students every year, many of whom, because of district placement practices, are already behind in their learning (National Council on Teacher Quality [NCTQ], 2013).

According to Grubb (2008) good teachers share some predictable characteristics. They are knowledgeable practitioners of their occupations. They are committed to student development, both in terms of occupational skills and cognitive and social domains. Additionally, effective teachers give students room to try things out and blunder, but they know when to intervene and guide (Grubb, 2008).

Due to weak accountability policies and the absence of universal accreditation standards, universities vary greatly in the content and quality of the training they provide (Darling-Hammond et al., 2001). In 2013, the NCTQ examined the effects of preparation on teacher performance. Purported differences found in research from the last 50 years regarding the effectiveness, on average, of teachers who had traditional preparation and those who had little preparation are questionable. More recent research, however, suggests that graduates of some programs are overall more effective than graduates of other programs, suggesting that preparation can make a difference. But the research does not definitively suggest what kind of preparation or how much is needed (NCTQ, 2013).
Adamson and Darling-Hammond (2012) conducted research to determine how district-level school expenditures affected the supply and quality of teachers. As a result of their mixed methods study, Adamson and Darling-Hammond assert that, although education is a state responsibility, federal policy could leverage strong steps toward ensuring that every child has access to quality teachers. Adamson and Darling-Hammond used wage adjustments to control for cost of living differentials, and found that both overall school funding and teacher salary levels are highly inequitable both across and within states—generally exhibiting a ratio of 3 to 1 between high- and low-spending jurisdictions. Furthermore, low-salary districts serve students with higher needs, offer poorer working conditions, and hire teachers with significantly lower qualifications, who typically exhibit higher turnover. Adamson and Darling-Hammond found that districts serving the highest proportions of minority and low-income students have about twice as many uncredentialed and inexperienced teachers as do those serving the fewest. In an elasticity analysis, they found that increases in teacher salaries are associated with noticeable decreases in the proportions of teachers who are newly hired, uncredentialed, or less well educated. These teacher qualifications, in turn, are associated with student achievement, holding student characteristics constant (Adamson & Darling-Hammond, 2012).

A study of teacher programs by the National Commission on Teaching and America’s Future (as cited in Darling-Hammond et al., 2001) found that there are common features of successful programs that prepare teachers to meet the needs of diverse learners. These include a common, clear vision of good teaching; well-defined standards of practice and performance; a rigorous core curriculum; extensive use of
problem-based methods; intensely supervised, extended clinical experiences (at least 30 weeks); and a strong relationship with reform-minded local schools. “A critically important feature of these programs is that they allow teachers to learn about practice in practice” (Darling-Hammond et al., 2001, p. 20). Because requirements for teacher education are dramatically uneven across the country, and because most states lower or ignore their standards whenever districts have trouble filling vacancies, teachers get radically different kinds and qualities of preparation depending on where and how they choose to enter the profession. As a consequence, teachers’ qualifications in the United States are tremendously uneven. Whereas many new teachers who attend recently redesigned programs are better prepared for teaching than ever, many others have inadequate training for their work (Darling-Hammond et al., 2001).

In order to establish what teachers need to know, CAEP adopted a framework organized around content, the learners, and teaching (Darling-Hammond, 2006). This framework rests on the assumption that teaching is in service to students, creating the expectation that teachers will come to understand how students learn and connect the curriculum in meaningful ways. To this end, Hoachlander and colleagues (2008) recommend that teachers learn to “develop and deliver curricula that mutually reinforce academic and technical content” (p. 27).

In a longitudinal study from 2005-2008, National Board for Professional Teaching Standards (NBPTS) evaluated certification programs, including what twenty-first century CTE teachers should know (Hakel, Koenig, & Elliot, 2008). Viviano (2012) explained what the NBPTS outlined as the 13 standards of accomplished practices for CTE teachers
and administrators. The standards are listed along with how administrators should help teachers implement these standards:

1. Knowledge of students

CTE administrators are committed to advancing the learning and well-being of all of our students. They will encourage CTE teachers to use learning style inventories to help teach students in a manner that they are accustomed to learning.

2. Knowledge of subject matter

Strong administrators make sure that CTE teachers command a core body of knowledge about their profession and about pedagogy and they draw upon this knowledge to design instruction, facilitate student learning, and assess student progress.

3. Learning environment

[Administrators] encourage CTE teachers to effectively manage their classroom and laboratory environments in a way that fosters democratic values, risk taking, and love of learning. This can be done through frequent walkthroughs and informal observations.

4. Embracing diversity

Administrators encourage a [CTE] teaching environment that reflects equal treatment, fairness, and respect for diversity is modeled and taught.

5. Advancing knowledge of CTE subject matter

In order to ensure a high percentage of students who receive proficient or better on the . . . National Occupational Competency Testing Institute
assessments, CTE leadership makes sure teachers foster a learning environment rich in differentiated instruction, conceptual learning, experiential learning, performance based learning, and one which includes rigorous academic integration.

6. Assessment

[Administrators prompt CTE teachers] to use a variety of assessment strategies to meet the needs of all students. Supervisors check often for a variety of formative and summative evaluation of student work.

7. Workplace readiness

[Administrators inspire CTE teachers] to promote citizenship and employability skills by using standardized instruction in personal and professional behavioral-designed curriculum.

8. Managing and balancing multiple life roles

[Administrators] model for CTE teachers’ development in student’s self-awareness, character, leadership, and civic values and ethics, along with teaching socially acceptable behavior.

9. Social development

As administrators develop in CTE teachers confidence, character, self-confidence, leadership and sound personal, social, and civic values, supervisors look for teachers to pass these traits onto their students.
10. Reflective practice

[Administrators] look to find and help develop in [CTE] teachers the art of reflecting on their teaching, either with colleagues or with administration, and are always looking to analyze and evaluate their teaching practice.

11. Collaborative partnerships

[Administrators] require [CTE] teachers to establish collaborative partnerships with local business and industry as well as post-secondary institutions to enrich learning opportunities for our students and to ease transition into the workplace and college.

12. Contributions to the educational process

Leaders as role models should encourage all of our teachers to contribute at least locally to the educational process by staying current with new teaching initiatives for advancement in their field and the field of pedagogy.

13. Family and community partnerships

[Administrators] inspire CTE teachers to sustain family contact to achieve common goals for their students. (Viviano, 2012, para. 10)

As a result of these new demands, preservice preparation programs have been redesigned at some of the leading CTE teacher education institutions (Joerger & Bremer, 2001), such as University of California-Berkeley and at Virginia Polytechnic Institute. “Each of the universities, in its own way, has begun creating a reform process that focuses on preparing teachers to integrate academic and vocational studies, coordinate school and work-based learning, and articulate secondary and postsecondary studies” (Joerger & Bremer, 2001, p. 4).
Researchers at UC Berkeley identified the following curricular and structural changes that will impact how future single subject CTE teachers are prepared:

- The increase of options for teachers in mathematics and science to participate in pre-service and veteran teachers internships in laboratory settings.
- The expansion of future internships to include participation of full cohorts of student teachers, master teachers, and students who reflect California’s diversity.
- The incorporation of techniques for developing integrated curriculum between academic disciplines.
- The development of project-based learning experiences for pre-service teachers.
- The promotion of skills that enable teachers to sequence projects and project components of increasing complexity in their teacher preparation programs.

(Finch et al., 1999, p. 24)

These learning experiences will prepare aspiring teachers to make meaningful connections between concepts they teach in the classroom and applications outside the classroom (Finch et al., 1999). Zinser (2003) concluded “that to prepare well-qualified workers, teachers need the ability to link learning with workplaces” (p. 5).

**Linked Learning**

California’s high schools have fallen short of achieving the fundamental goal of graduating all students prepared for college and career success. This is especially true of the state’s Latino, African-American, and low-income students, who are less likely to achieve college and career readiness than their more advantaged peers (LaFors &
McGlawn, 2013). Too often students participate in classroom lessons that fail to
differentiate curriculum and instruction by student interest, prior learning and experience,
or ability. Students confront the same tasks daily, often over consecutive years (Good &
McCaslin, 2008). Kemple (2008) found that in urban high schools, too many students
who managed to graduate were unprepared for postsecondary education or the world of
work.

For this reason, educators, researchers and policymakers advocate for high school
learning experiences that addressed the individual capacity and interests of the modern
student in order to increase their opportunities in the labor market. Bloom, Thompson,
and Unterman (2010) conducted a 15-year, random assignment study of Career
Academies (a popular high school reform that combines academics with career
development opportunities) in nine urban high schools around the country. More than
80% of students in the sample were African American or Hispanic. Findings from this
long-term study demonstrated that the career academy model produces sustained
employment and earnings gain, particular among young men (Kemple, 2008).

For nearly 40 years, Career Academies have offered high schools—particularly
those in urban communities—a systemic approach to addressing the challenges young
people face as they confront the demands of high school and prepare for postsecondary
education and the world of work. Each Career Academy typically serves between
150 and 200 students from Grades 9-12. Career Academies are defined by three
distinguishing features: (a) they are organized as small learning communities to create a
more supportive, personalized learning environment; (b) they combine academic and
career and technical curricula around a career theme to enrich teaching and learning; and
(c) they establish partnerships with local employers to provide career awareness and work-based opportunities for students (Kemple, 2008).

These approaches prepare students simultaneously for participation in the labor market and for advanced education. Multiple pathway and career academies reform is both an educational strategy and an outcome goal (Grubb, 2008). These models hold great promise as they engage students with more practice-based learning, keep options open as their career desires change, and create permanent capacities for moving between the labor market and higher education (Grubb, 2008).

Historically, the division between vocational and academic education has also been the division between college-bound and work-bound students, with vocational programs disproportionately drawing students of low academic performance and low socioeconomic status (Grubb, 2008). However, “the days when high schools could be content with preparing some students for college and others just for work have come and gone” (LaFors & McGlawn, 2013, p. 16). Career academies differ from traditional academic and vocational education because they prepare high school students for both college and careers. Academies provide broad information about a field, such as health care, finance, engineering, media, or natural resources. They weave this theme into an academic curriculum that qualifies students for admission to a 4-year college or university. The first career academy appeared in 1969 in Philadelphia, where thousands of students now enroll in academies (CCASN, 2010). Bloom and colleagues (2010) reported encouraging findings from a New York City study, providing clear and reliable evidence that, in roughly 6 years, a large system of small schools of choice (SSC) can be
created and can markedly improve graduation prospects for many disadvantaged students. Specifically:

- By the end of their first year of high school, 58.5 percent of SSC enrollees are on track to graduate in four years compared with 48.5 percent of their non-SSC counterparts, for a difference of 10.0 percentage points. These positive effects are sustained over the next two years.

- By the fourth year of high school, SSCs increase overall graduation rates by 6.8 percentage points, which is roughly one-third the size of the gap in graduation rates between white students and students of color in New York City.

- SSC’s positive effects are seen for a broad range of students, including male high school students of color, whose educational prospects have been historically difficult to improve. (Bloom et al., 2010, p. 3)

Bloom and colleagues found that students in career academies perform better in high school and are more likely to continue into postsecondary education, compared to similar students in the same schools.

A 5-year study by LaFors and McGlawn (2013) was conducted to determine how well California high schools were meeting the challenge of preparing students for success in college and career. LaFors and McGlawn collected stakeholder input, artifacts (including program descriptions, master schedules, course catalogs, graduation requirements, and bell schedules), and student transcript data. Because the study aimed to examine student experience and the implementation of the Linked Learning approach, stakeholder feedback was extensive and included: focus groups, surveys, and interviews.
LaFors and McGlawn’s research led to two primary findings. First, levels of college readiness are too low across the board, and especially low for students of color and low-income students. Second, students who are unprepared for college are also unlikely to be meaningfully prepared for careers (LaFors & McGlawn, 2013).

These outcomes can be traced to specific barriers, including the practice of tracking, a system that directs students into different curricula based on their expected post-high school destinations (Oakes & Saunders, 2008). Low income, African-American and Latino students are more likely to be tracked away from higher level academic coursework and into remedial courses and CTE courses that lack rigor (LaFors & McGlawn, 2013).

Oakes and Guiton (1995) used quantitative and qualitative case study methods in an attempt to understand how educators form tracking decisions. They wanted to clarify the effects of students’ course taking based on what educators thought were the best for students, students’ and parents’ choices, and the constraints and opportunities inherent in schools’ own cultures and the larger social context. Oakes and Guiton wanted to identify factors that contributed to the racial, ethnic, and social class patterns of curriculum participation. They selected three 5-year senior high schools located in adjacent communities within a major West Coast urban center. After analyzing course descriptions, master schedules, student handbooks, and transcript data, the researchers found that economically advantaged Whites and Asians had consistently better access to courses that would lead them to college and higher status jobs, compared with Latinos whose achievement was similar. These advantages came from the type of curriculum offered in the schools and from the placement of these students in high track classes.
within their school (Oakes & Guiton, 1995). Students in CTE tracks are often doubly disadvantaged because their coursework is often not aligned with a particular career path. As a result, they graduate from high school unprepared for college or career (LaFors & McGlawn, 2013).

The 2013 National Assessment of Educational Progress showed that only 26% of the nation’s 12th grade students are proficient or advanced in mathematics, and only 38% are proficient or advanced in reading. For African American and Hispanic students, the numbers are even more dismal: African American and Hispanic students scored the lowest of all groups. These data signify the challenge of ensuring that student success is at the center of every reform initiative going forward (Almond & Miller, 2014).

**History of Linked Learning**

A California-led initiative called Linked Learning offers a promising, systemic approach to reform that is designed to address these challenges and has been touted as a suitable complement to implementing the CCSS (Almond & Miller, 2014). Recognizing the potential large-scale impact of this reform effort, in 2006 the James Irvine Foundation launched ConnectEd: The California Center for College and Career (ConnectEd, 2014) to serve as a statewide hub for innovative practice, policy, and research to expand the number of Linked Learning pathways available to high school students.

California’s Linked Learning approach was implemented in 2008 in response to the fact that nearly one-third of underrepresented students of color were not graduating high school in 4 years (Almond & Miller, 2014). Until this point in time, there were few opportunities for students in similar programs, most notably, California Partnership Academies (Commission on Teacher Credentialing [CTC], 2009). California Partnership
 Academies are career-themed, small learning communities; however, they were available to a limited number of students at a few high schools. The James Irvine Foundation supported the expansion of this career-based approach to teaching and learning. In May 2008, the Linked Learning Alliance was established to build a collective voice and coordinate efforts to ensure California’s young people have access to Linked Learning—programs of study that connect learning in the classroom with real-world applications outside of school. The Alliance complements the practical support provided by ConnectEd and other partners by focusing on the policies that will help advance the field across the state (Linked Learning Alliance, 2013).

According to its proponents, the Linked Learning approach is designed to address these inequities and achieves its goal through four key components: (a) a college-preparatory curriculum, (b) a coherent sequence of rigorous career-related coursework, (c) work-based learning experiences, and (d) student support services. Linked Learning is not a type of school, but it is an approach to teaching and learning that can be implemented through several different high school models, including small learning communities; career academies; charter schools; and small, themed high schools in traditional school districts (LaFors & McGlawn, 2013).

In the Linked Learning approach (formerly known as multiple pathways), high school courses of study connect learning in the classroom with real world applications. The programs integrate strong academic instruction with demanding technical curriculum and field based experiences that prepare students for a full range of postsecondary education options (Hoachlander et al., 2008; LaFors & McGlawn, 2013).
As outlined in *Linked Learning: A Guide to Making High School Work* (Saunders et al., 2013), there are six conditions that provide the foundation for Linked Learning to transform high schools: a commitment to equity; connecting Linked Learning components; a culture of care and respect, grounding in the real world, an environment that works for adults, and redefining success.

A “college-readiness for all” movement is pushing schools to educate all students to “college readiness levels” (Grubb, 2008). “Readiness,” in this case, means that all students are prepared, academically, for some form of postsecondary education for the workforce (such as a certification program) or a university program. College readiness for all is different from a college-for-all strategy. The former accepts that not all students will attend a postsecondary education institution, but that all students must have high-level, high-quality courses—academic and nonacademic. This is consistent with a Linked Learning approach that includes CTE and provides rigorous, engaging, curricular opportunities (Grubb, 2008).

Evidence suggested that Linked Learning programs have the potential to reduce high school dropout rates, as well as increasing students’ earning power when they graduate (Hoachlander et al., 2008; LaFors & McGlawn, 2013). In their quantitative analysis of 12 years of longitudinal data on U.S. students in high school between 1988 and 1992, Bishop and Mane (2004) found similar results in assessing dropout rates. In their study, they assessed the effects of offering upper-secondary students the opportunity to pursue vocational education in high school on completion rates and subsequent earnings. Analysis of international cross-section data found that nations enrolling a large proportion of upper-secondary students in vocational programs have significantly higher
school attendance rates and higher upper-secondary completion rates. They attributed this partly to higher attendance rates in vocational education programs. Bishop and Mane contend that it is possible to mischaracterize claims of reduced dropout rates, as one could predict that just as forcing students to take undesirable courses would increase the risk of their dropping out, students taking courses they are interested in would decrease their dropout rates (Bishop & Mane, 2004). In general, LaFors and McGlawn (2013) discovered that Linked Learning schools outperform their surrounding districts and the state as a whole when it came to graduation rates. LaFors and McGlawn found the following:

For example, at School C, more than 90 percent of all students, low-income students, and Latino students graduated within four years, and more than 80 percent of African-American students graduated on time as well. By contrast, in the surrounding district, just 80 percent of low-income students and 78 percent of Latino students graduated on time. Statewide, the rates are even lower. (p. 7)

While more students are graduating from Linked Learning pathways, it is reasonable to ask how well prepared they are for the future. In California, access to a 4-year college depends on completing the “a-g” course sequence. The “a-g” subjects are history/social science, English, mathematics, laboratory science, language other than English, visual and performing arts, and college-preparatory electives. The University of California system labels them by the letters “a-g” rather than numbers or some other labeling system (University of California, 2010). Through years of research and analysis, Education Trust West (LaFors & McGlawn, 2013) has found that “a-g” data is not always an accurate or
reliable indicator. With that in mind, they conducted their own analysis of actual student transcript data (LaFors & McGlawn, 2013).

LaFors and McGlawn (2013) found that students in Linked Learning pathways had much higher rates of access to “a-g” courses than students at traditional schools. By improving access, these schools are providing their students with a broader range of postsecondary options than typical high schools. These benefits are even more pronounced for the low-income, African-American, and Latino students. To this end, California has embraced Linked Learning. There are currently over 500 California Partnership Academies, National Academy Foundation academies, more than 300 career pathways, themed charter schools, Big Picture Schools and other high school academies (Farnan & LaPlante, 2010). What they all have in common is a commitment for the following 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) have a laser-like focus on improving achievement so that all students leave high school ready for a range of postsecondary options (Farnan et al., 2014).

Grubb (2008) noted that student engagement increases in environments where they can have some autonomy in selecting methods and courses that interest them, and where they can plan an active role in learning. The Linked Learning approach meets this need, as it replaces a monolithic curriculum with students’ choices, including the choice for theme-based schools and the choice for projects and internship experiences. The Linked Learning movement has capitalized on the 15 industry sectors in California, and they guide the development of career academies in the state. They are (a) Agriculture;
(b) Arts, Media, and Entertainment; (c) Building and Environmental Design;
(d) Education, Child Development and Family Services; (e) Energy and Utilities;
(f) Engineering; (g) Fashion Design, Manufacturing and Production; (h) Finance and Business; (i) Health Science and Medical Technology; (j) Hospitality, Tourism, and Recreation; (k) Information Technology; (l) Manufacturing; (m) Marketing, Sales, and Service; (n) Public Services; and (o) Transportation (Hoachlander et al., 2008).

Students in Linked Learning programs of study not only benefit from the rigor of the “a-g” coursework, but may fare better in science and English courses than students in traditional high school settings (Gentry, Peters, & Mann, 2007). Additionally, a balance of one CTE credit to every two academic credits has been shown to minimize the risk of dropping out of high school (Plank, 2001).

Linked Learning themes are at the center of a coherent system of student engagement, curriculum, resources, and learning (Saunders et al., 2013). These themed career academies are designed around four guiding principles. First, the Linked Learning approach is designed around a rigorous academic and technical core to prepare all students for college and career; it is never a choice between one or the other (Hoachlander et al., 2008). Second, the programs connect academic core curriculum with real world applications. The programs alter how curriculum is taught without lowering expectations about what is taught. Third, these programs of study provide a variety of postsecondary opportunities. And lastly, Linked Learning programs are based on accountability. They contributed to increased student proficiency, not only in core content areas, but also in critical thinking and problem solving (Hoachlander et al., 2008).
Theme strategies at Linked Learning sites should lead to students exploring many options for postsecondary study and careers. Under the best circumstances, these common themes draw together the varied interests of students (Saunders et al., 2013).

As noted in a recent policy brief from the Alliance for Excellence in Education (2010), students in California (and nationally) are not graduating high school prepared for both college and career. A recent analysis by the CDE concludes that the Linked Learning approach can deeply transform the state’s high schools (Forbes, 2011). This is demonstrated by the Legislative support for Linked Learning:

- **Assembly Bill 790 (2011)**—Establishes the Linked Learning Pilot Program.
- **Assembly Bill 1304 (2011)**—Authorizes the Commission on Teacher Credentialing to create a Recognition of Study: Linked Learning.
- **Senate Bill 5 (2007)**—Implements recommendation’s from the Task Force on Educator Excellence. Authorizes professional preparation programs for teachers to include up to 2 years (or two-fifths of a 5-year program) of professional preparation, raising the 1-year limit imposed in 1970.
- **Senate Bill 118 (2013)**—Provides that the California Workforce Investment Board is responsible for assisting the Governor in the alignment of the education and workforce investment systems to the needs of the twenty-first century workforce.
- **Senate Bill 594 (2013)**—Provides three new tools to finance the development of career pathways through these public-private partnerships. Programs serving economically disadvantaged students in school districts with high dropout rates will be given priority for funding.
• Senate Bill 1458 (2012)—Expands accountability criteria for California public schools to include factors to measure college and career readiness, and alters the way California’s Academic Performance Index (API) is calculated.

• Senate Bill 1070 (2012)—Extends funding for California’s Career Technical pathway Program and specifies funding priority for Linked Learning pathways.

A Linked Learning approach will require a new kind of teacher, one who has strong workplace skills, as well as academic background, and who has the pedagogical knowledge to teach English Language Learners (Oakes & Saunders, 2008). Linked Learning schools and pathways benefit from expert teachers who are prepared to implement high school reform based on collaborative, interdisciplinary instructional models (Farnan & LaPlante, 2010). According to Bruijn and Leeman (2011), Linked Learning instruction requires that teachers know how to stimulate the acquisition and use of a new way of thinking based on vocational theory. Teachers must master key concepts, combined with specific ways of thinking, in order to effectively deliver integrated instruction. Further, approaches will differ according to the structural characteristics of the vocation involved (Bruijn & Leeman, 2011). These reforms have the potential to create a pedagogical shift in the way teachers are prepared.

Teacher preparation and professional development for this approach to teacher credentialing, coined the Linked Learning Lens, would require major retooling of preparation and professional development programs (Oakes & Saunders, 2008). The Linked Learning Lens focuses on teacher collaboration, engaging students through interdisciplinary project-based learning, authentic application of rigorous academic
learning to the pathway theme and the workplace, and knowledge of what it means for students to be college and career ready (Farnan & LaPlante, 2010).

Currently, a statewide network of universities offers the Graduate Certificate in Linked Learning. Participating institutions include the California State Universities at East Bay, Fresno, Los Angeles, Long Beach, Sacramento, San Bernardino, and San Diego; Claremont Graduate University; and University of California at Los Angeles (Farnan & LaPlante, 2010). These programs will provide acquisition to necessary knowledge and key proficiencies needed by Linked Learning teachers, including not only the interdisciplinary and project-based pedagogical expertise, but also the development of professional dispositions related to equity and diversity.

The Linked Learning and Teaching Framework (“Framework”) was developed by ConnectEd to define the key characteristics of students and adult learning and teaching practice within the Linked Learning pathways and illustrates how these characteristics might be observed in the behaviors of teacher and learners, both inside and beyond the classroom. The Framework includes the Behaviors of Learning and Teaching (BLT) Continuum, which describes the behaviors of students, teachers, and industry partners in developing the Linked Learning behaviors that dramatically improve student motivation, engagement and empowerment, understanding, and achievement. In addition, the Framework provides information regarding Communities of Practice (COP), which describes the progress of pathway teacher teams in developing the practices necessary for creating high-quality, outcome-aligned assessments and units of instruction, and for building a collaborative and accountable pathway culture (ConnectEd, 2014).
The interdisciplinary, collaborative structures, and culture of Linked Learning pathways directly support the new twenty-first century standards, as well as the College, Career, and Life readiness standards for the modern student (Achieve, Inc., 2013). Economic reality reflects converging expectations. Education is both more valued and more necessary than ever before. The bottom line is that today ALL high school graduates need to be prepared for some postsecondary education and/or training. While academic preparation alone is not enough to ensure postsecondary readiness, it is clear that it is an essential part of readiness for college, careers, and life in the twenty-first century (Achieve, Inc., 2013).

Much of the work to define college and career readiness to date has focused on the content knowledge and skills high school graduates must possess in English and mathematics—including, but not limited to, reading, writing communications, teamwork, critical thinking, and problem solving (Lombardi, Conley, Seburn, & Downs, 2012). College and career readiness is a multidimensional construct that includes academic preparation and noncognitive factors previously shown to affect college outcomes, which include, motivation, engagement, and self-efficacy (Lombardi et al., 2012). In their study, Lombardi and colleagues (2012) examined the psychometric properties of the key cognitive strategies (KCS) within the CollegeCareerReady™ School Diagnostic, a self-report measure of critical thinking skills intended for high school students. Using a cross-validation approach, an exploratory factor analysis was conducted with a randomly selected portion of the sample \( n = 516 \) and resulted in five reliable factors: (a) problem formulation, (b) research, (c) interpretation, (d) communication, and (e) precision/accuracy. A confirmatory factor analysis was conducted with the remaining sample...
(n = 808). Of course, readiness depends on more than knowledge and skills in English and math, but these core disciplines undergird other academic and technical courses and are considered essential by employers and colleges alike.

In their research to address the multidimensional nature of college and career readiness, Lombardi and colleagues (2012) developed a comprehensive model with four keys: (a) key cognitive strategies (KCS), (b) key content knowledge, (c) key learning skills and techniques, and (d) key transition knowledge and skills. Utilizing a cross-validation approach, an exploratory factor analysis was conducted with a randomly selected portion of the sample. A confirmatory factor analysis was conducted with the remaining sample.

Similarly, twenty-first century standards focus on learning and innovation, information, media, and technology, and life and career skills (Partnership for 21st Century Skills, 2014a, 2014b, 2014d). The Linked Learning Behaviors for Learning and Teaching (BLTs) directly support collaboration, student-directed learning, outcome-focused goal setting, relevant work that matters, and rigorous and integrated work that challenges (ConnectEd, 2014). All of these complex approaches and changes to instruction will require that teachers have a common language, quality indicators, and relevant support (ConnectEd, 2014). This will require accelerated teacher learning and skill development, which is essential to implementing the necessary shifts in instruction, curriculum, and assessment (Rustique & Stam, 2012). Teachers of the new CCSS will need extensive support and professional development in order to reach this same level of capacity as their Linked Learning colleagues (Rustique & Stam, 2012). Throughout the
Linked Learning Communities of Practice, there exists a strong support system to assist teachers in developing and implementing high quality practices (ConnectEd, 2014).

The Common Core State Standards (CCSS) Initiative defined what each student should know and be able to do from kindergarten through 12th grade in order to graduate high school and succeed in entry level, credit-bearing academic college courses, as well as entry-level jobs and workforce training programs (Rustique & Stam, 2012). The implementation of the new CCSS will require teachers to make similar shifts in instruction as required by Linked Learning. Before the common standards were established, Linked Learning was taking hold as a strategy for high school reform in California. Many teachers in Linked Learning pathways are already engaged in making the necessary changes to instruction, curriculum, and assessment through project-based learning (Rustique & Stam, 2012). Students taught in Linked Learning classrooms have already benefitted from the shift in pedagogy. As Rustique and Stam (2012) assert, “Students in Linked Learning pathways won’t have to wait for the Common Core alignment or assessments to get the opportunity to show what they already know and are able to do for college and career readiness” (p. 7).

Linked Learning and the CCSS are mutually supportive of each other in four ways:

1. shared student learning outcomes, with an emphasis on higher order thinking skills; 2. compatible approaches to interdisciplinary curriculum, instruction, and performance-based assessment; 3. real-world integration and application of academic and technical skills and knowledge; and 4. students assessment through authentic demonstration of learning. (Rustique & Stam, 2012, p. 2)
The important ways in which Linked Learning connects with the CCSS, including a common vision for college and career readiness; compatible approaches to instruction, curriculum, and assessment; and a shared emphasis on the relevant and real world application of learning, puts teachers implementing Linked Learning in an advantageous position. Teachers, administrators, and superintendents seeking a solution for secondary education reform that engages students would be well advised to consider the Linked Learning approach (Rustique & Stam, 2012).

**Organizational Change and Educational Reform**

It is no exaggeration to say that dealing with change is endemic to postmodern society. On the other hand, we have an educational system that is fundamentally conservative (Fullan, 1990). The way that teachers are trained, the way that schools are organized, the way that the educational hierarchy operates, and the way the education is treated by policymakers results in a system that is more likely to retain the status quo than to change. When change is attempted under such circumstances, it results in defensiveness, superficiality, or first order change at best (Marzano & Waters, 2009).

Since the advent of a national effort to improve the United States’ most challenged high poverty schools, the capacity, technology, and policy to support the scale of school reform have expanded dramatically. The roots of this movement can be traced back to 1965, when Title I of the Elementary and Secondary Education Act was implemented by Lyndon B. Johnson and his “War on Poverty” (Borman, 2005). Along with emerging systems of social programs of the 1962, Title 1 was the major educational initiative designed to close the achievement gap between poor children and their more advantaged peers.
In 1991, President George Bush announced the creation of a private sector organization called the New American Schools Development Corporation (NAS), which was intended to support the creation of whole-school restructuring models for the next century (Borman, 2005). Utilizing a business model, NAS received proposals that would enable all students to achieve in core academic subjects. The NAS funded 11 out of 700 proposals for 3 years for development and testing and helped to create a market for comprehensive school reform (CSR; Borman, 2005). In 1998, Congress initiated the Comprehensive School Reform Program (CSRP), which awarded funding through a competitive process. In 1998, the U.S. Department of Education defined comprehensive school reform as innovative programs that include all of the following elements: coordination of resources; effective, research-based methods and strategies; comprehensive design with aligned components; professional development; measurable goals and benchmarks; support within the school; parental and community involvement; external technical support and assistance; and evaluation strategies (Slavin, 2007).

A significant funding source for CSR programs has been Title I. In 2002, with the reauthorization of Title I as the No Child Left Behind Act (NCLB), the CSRP and Title I came together under the same legislation (Borman, 2005). At the core of the No Child Left Behind Act were a number of measures designed to drive broad gains in student achievement and to hold states and schools more accountable for student progress. They represented significant changes to the education landscape (DOE, 2001). There is no question that No Child Left Behind has brought about unprecedented changes, not only in public schools but also in society. Its demands have transformed teacher preparation
programs, curriculum design, textbooks, parent expectations and relationships with schools and student expectations about learning (Wheatley & Frieze, 2007).

However, not only has NCLB not turned around many of the most troubled schools in urban districts, it may have incapacitated them even more (Hemmings, 2012). Hemmings (2012) asserted that the problem with school reform is that it typically relies on externally prescribed changes in curriculum, accountability measures, and instructional methods rather than focusing on deeper more consequential internal organization dynamics. Organizational dynamics, especially those related to school visions, structures, and moral orders, ultimately make or break school reforms (Hemmings, 2012).

“To lead profound change is to shift the inner place from which a system operates” (Sharmer, 2010, p. 377). As Sharmer (2012) asserted, change within systems can only occur collaboratively, which serves as an indicator that in order to enact meaningful reform in education, key stakeholders should all be involved in the process. According to the report by the Collaborative Communications Group (CCG, 2006), the most important condition that needs to exist before change can occur is the establishment of quality relationships among stakeholders, in this case, teachers with colleagues and teachers with students. Members must trust one another and be willing to collaborate (Wohlstetter, Mallow, Chau, & Pohemus, 2003). Such trust is facilitated by open communication and information flow.

The new problem of change is determining what it would take to make the educational system a learning organization—dealing with change as a normal part of its work, not just in relation to the latest policy, but as a way of life (Fullan, 1990). Fullan
(1990) asserted that the reason we need learning organization is related to the discovery that change in complex systems is nonlinear—full of surprises. Yet, new mindsets can help us “manage the unknowable” (Fullan, 1990, p. 4).

In order for public schools to close the achievement gap, second order systemic change is necessary (Waters, Marzano, & McNulty, 2003). This calls for significant changes in values, beliefs, culture, and behavior at all levels of the system. Second order change is difficult for most organizations to achieve, and especially difficult for them to move from a focus on structures to a focus on effectiveness. In education, systemic change requires that it pervade all levels of the system: classrooms, building, district, community, state government, and federal government. It must include the nature of the learning experiences and the governance system. Marzano (2012) noted that second order change in education requires a shift in the way that individuals think about the nature of teaching and learning, such as with the implementation of the CCSS.

At a policy level, growing concerns about educational equity and economic performance exist (Fullan, 1990). The restructuring movement places a renewed focus on the education of all students, especially those who have been ineffectively served in the past. Poverty, racism, and social and person problems all make the equity and excellence agenda more serious (Fullan, 1990).

Education in the United States is a decentralized system composed of highly variable practices, programs, and school contexts. Teaching is highly complex and is typical designed and implemented by teachers who have traditionally enjoyed a great deal of autonomy and independence from regular inspection (Borman, 2005). The principal goals and products of education and whether they should be centered around creativity,
knowledge of basic facts, or sound moral judgment are constantly open to differing opinions and debate. Borman (2005) questions whether such a diffuse system with uncertain technology and goals can be served by centralized efforts to implement educational reform. Fullan (2000) asserted that system reform in education requires that leadership is evident at all levels of the system—teacher leaders, principals, district administrators, and government.

Research suggests that decentralized management reforms have produced changes in classroom practice and higher student achievement in some schools (Wohlstetter et al., 2003). Wohlstetter and colleagues (2003) noted, however, that many schools do not have the capacity to improve on their own. A new approach to school reform—school networks—relies on collaboration between schools. They found that when school networks created structures that decentralize power and distributed organization resources, they also enhance school capacity for reform.

This concept of decentralized management, which focuses on restructuring the organization and motivating stakeholders, offers a new perspective on the elements useful for enhancing organizational capacity and ultimately improving schools and education (Wohlstetter et al., 2003). As stated by Hemmings (2012), the most successful urban schools have implemented site-based management of their visions, structures, cultures, and moral order. Hemmings based her findings on a 3-year, longitudinal study of a low-performing urban public high school in the Midwest. She collected field notes, principal and teacher writings, and data artifacts. Good and McCaslin (2008) agree that in moving forward, teachers need to be a part of what education will become. Changing too much too quickly will destabilize the teaching force. Good and McCaslin found that
some new teachers left the profession due to clashes with more experienced peers.

Reforming teacher preparation programs that teach educators how to adapt in learning environments is critical to the future success of new teachers (Good & McCaslin, 2008).

In the last two decades, there have been various calls for reform in teacher education programs to address the needs of students from culturally and linguistically diverse background and students with disabilities (Dykes et al., 2012). The state of teacher education requires teacher educators to scrutinize teacher education in relation to the pressures of high stakes testing, the growth of alternative certification programs, the lack of funding, and the increasing diversity of the student population. While these obstacles seem insurmountable, teacher educators maintain hope and work to provide an education that prepares teacher candidates with the tools needed in the twenty-first century (Dykes et al., 2012).

The reform movement needs to address the teacher preparation aspect, as well as the retention of new teachers. While there are a number of high quality teacher education programs in California that teach exemplary principles (Darling-Hammond et al., 2001), there are numerous concerns regarding teacher retention that need to be addressed in reform efforts. Darling-Hammond and colleagues (2001) described the main issues: noncompetitive teacher salaries, dismal working conditions (especially in impoverished communities), dysfunctional personnel practices, licensing policies that create unnecessary barriers, inadequate recruitment procedures, overreliance on emergency and short term teaching positions, and inadequate support for new teachers.

No large-scale reform will happen in the absence of a strong teaching profession (Fullan, 2000). Darling-Hammond and colleagues (2001) noted that staffing schools
for teaching and learning is complex. The outcomes of organizing teaching in highly specialized organizations are counterproductive for both teachers and students. For example, many of the typical problems in urban high schools occur because teachers do not have time to address the many academic and personal needs of the 180 or so students they see each day. Personal attention can be difficult to sustain in a school of 2,000 or 3,000 students. Student responses to this impersonal environment range from alienation expressed as violence, truancy, pregnancy, and dropping out to underachievement and disengagement from school (Darling-Hammond et al., 2001).

Another dilemma that Fullan (2000) noted is that large-scale reform takes time (high schools average 6 years for successful reform measures), and sustainability is a concern. Successful reforms can be fragile, easily undone by a change in leadership. Fullan identified eight areas that consistently played a role in large-scale reform:

(a) upgrading the system context, including policies and requirements for teachers;
(b) coherence making, which involves aligning individuals into cohesive networks;
(c) cross-over structures (agencies and institutions that play a role in implementation);
(d) downward investment, in the form of allocating resources to increase the capacity of people to make improvements; (e) investment in quality materials; (f) integrate pressure and support (best accomplished through professional learning communities); (g) building capacity at the site level; and (h) work with systems to harness the interactive capabilities.

But making connections is not the whole story. Networks need to evolve into intentional working relationships where new knowledge, practices, courage, and commitment can develop. From these relationships, emergence becomes possible.
Emergence is the process by which all large-scale change happens on this planet. As separate, local efforts connect and strengthen their interactions and interdependencies, a system of influence develops—a powerful cultural shift that influences behaviors and defines accepted practices (Wheatley & Frieze, 2007). To allow for more intensive, focused approaches to learning, states and districts must loosen rigid time requirements for the teaching of specific subject areas and reduce the number of instructional mandates that accrue over time (Darling-Hammond et al., 2001).

Fullan (2000) concludes that large-scale reform cannot be achieved if teachers identify with only their own classroom, or if principals identify with only their own school. The same is true for districts that only identify with their own districts, and similarly for states not concerned for the good of the country as a whole. Large-scale reform cannot be achieved unless educators and the public commit to being shareholders with a stake in the success of the system as a whole (Fullan, 2000).

Borman (2005) asserted that there have been distinct stages of development in the national reform movement. First, the early implementation of Title 1 was characterized by intergovernmental conflict, poor implementation, and a lack of research-based and practitioner-based knowledge of how to develop effective educational interventions for disadvantaged students. A second stage, during the 1970s and 1980s, was marked by the development of increasingly specific policies to guide the Title 1 program’s implementation, growing bureaucratic cooperation between federal and local authorities in implementing the policies, and improved access for disadvantaged students to the supplemental resources (Borman, 2005). Beginning in the 1990s, the current stage emerged in which the scaling up of research proven programs and practices has been
increasingly regarded as key to improving the effectiveness of high-poverty schools. Today’s reform efforts continue to articulate top-down educational standards, which dictated many of the changes in the content of schooling. However, the process of reform is in marked contrast to the earlier states of Title 1.

Marzano, Waters, and McNulty (2005) described that most schools reforms are short lived. They described two types of change; one being incremental and superficial while the other type of change is more of a transformational effort, known as second order change. Second order change implies a fundamental or significant break with past and current practices intended to make dramatic differences in the current situation. Second order changes require new knowledge and skills for successful implementation. Second order change requires transforming the way an entire school runs to meet the needs of their students. Marzano and colleagues (2005) gave an example of second-order change as one that exceeds the needs of the achievement gap in under achieving schools to use innovative instructional strategies. The Linked Learning Lens approach is an example of such innovation and a replicable program. The Linked Learning Lens approach to teacher preparation follows the tenets of second order change, as it addresses the need for new knowledge and skills for the successful implementation of Linked Learning programs in schools.

Rather than policy mandates or flexibility alone, growing consortiums of replicable programs are helping to guide school change (Borman, 2005). Replicable programs that utilize the Linked Learning Lens are well positioned to help in this reform effort. However, practical matters, including cost, should be considered along with careful analyses of the local context in which the program is to be implemented. Borman
(2005) noted that if teachers do not accept the changes that the model suggests, it is not likely to succeed in improving practices and is not likely to affect student outcomes. In addition, in identifying strategies for replication, one must consider the overall quality, quantity, and effect size of the program.

Stringfield, Ross, and Smith (1996) noted that lasting, widespread reform requires that individual schools continually revitalize themselves. They asserted that most schools need help in this ongoing process of improvement, both from administrators within education systems and from specialists in teaching and learning from outside the system. Johnson and Uline (2005) verified that state and federal accountability further highlighted the need for effective education leaders in reform movements. Since the culture of schools varies widely, it is important that schools have choices in designs for improvement. Teachers who have the chance to explore different designs and work as a group will often have a heightened investment in the successful implementation of the design and the transformation process as a whole (Stringfield et al., 1996). Research by Johnson and Uline confirmed that the culture of the school must invite teachers to take risks and explore approaches that will likely increase student achievement.

Beckhard (2006) described that the development of an organization involves creating a strategic plan for improvement, as well as identifying and securing the resources necessary to carry out the change. Schein (2010) defined an effective organization as one that can adapt and cope with a changing environment.

Hemmings (2012) contends that in order for effective urban public school reform to take place, the four R’s of a framework of reform are essential. They are:
- **Re-envisioning:** Re-envisioning entails the construction of sound visions that can be translated into school-wide educational goals and practical classroom aims. It is guided by four practical questions: Who needs to be involved? What visions, goals, and practices should be embraced? How should planning proceed? What are the best strategies for implementation? The principal, teachers, and other people most directly affected by school operations must be involved.

- **Reculturation:** Reculturation is the production of positive school cultures that enable principals and teachers to construct and sustain professional roles, promote strong identification with schools, reinforce effective schooling practices, and support mutually supportive relations.

- **Restructuring:** Restructuring is making school structures conducive for the fulfillment of desired educational ends. It is accomplished through professionalization of leadership and instructional roles and responsibilities within the autonomous domains of administrative and classroom activity structures; the adoption of effective technologies; scheduling that enables collaboration; institutionalization of progressive tracking structures that support underperforming students; and implementation of democratic governance characterized by shared decision-making and teacher leadership.

- **Remoralization:** Remoralization are concerted efforts to build relational trust so that morally purposeful communication can occur and role relationships are guided by ethical criteria related to respect, competence, personal regard for others, and integrity. It entails rejuvenation of and collective allegiance to a
moral order characterized by strong ethical commitments to worthwhile
curriculum, proper pedagogy and good character. (Hemmings, 2012, p. 201)

Schlechty (2011) developed a program of action that focused on adaptations
necessary to create an engagement-focused school. These standards include: (a) patterns
of engagement; (b) student achievement; (c) content and substance; (d) organization of
knowledge; (e) product focus; (f) clear and compelling standards; (g) a safe environment;
(h) affirmation; (i) affiliation; (j) novelty and variety; (k) choice; and (l) authenticity.
Schlechty noted that planning for student engagement can be time-consuming, but he
asserted that in today’s world there is a demand for men and women who think, reason,
and use their minds well, and the complaint is that schools are not producing enough
citizens who can do so.

It is a daunting task to reform high schools. Saunders (2013) affirms that
practitioners of Linked Learning have identified four important caveats that educators,
policymakers, the public, and any other stakeholders interested in transforming high
schools must keep in mind: (a) Linked Learning sites form part of a larger system that
must identify and prioritize the same goal-providing all students with the skills, abilities,
and tools needed for success in the adult world; (b) educators and policy makers must
be aware that these schools did not develop into Linked Learning sites overnight;
(c) safeguards must be in place to ensure a pathway is not set aside for only high- or
low-achieving students; and (d) Linked Learning must not be viewed as the “silver bullet”
to correct all that is wrong with public high schools.

Linked Learning students will be in a position to succeed under the new state
standards. Through both Linked Learning and the Common Core, students are offered a
rigorous academic experience that challenges them and puts them on the path to obtaining
the skills and knowledge they will need for college, career, and life. Linked Learning, at
its best, reflects at the school level the kind of society we envision for our children: a
place where opportunity and success are accessible and attainable for all (Saunders,
2013).
CHAPTER 3—METHODS

The research question that this study attempts to answer is whether or not preservice teachers who obtain a credential through the Linked Learning Lens Single Subject Credential Program are better prepared to meet the needs of the twenty-first century student than those who are prepared through a traditional credential program of study. Through the Linked Learning Lens approach, the skills embedded in their teaching pedagogy would include the following: learning and innovation skills; information, media and technology skills; and life and career skills. These skills are cited elsewhere (Microsoft Partners in Learning, 2013; Silva, 2009) but the Partnership for 21st Century Skills (2014a, 2014b, 2014d) provides a comprehensive look at these skills as student learning outcomes.

As described in Chapter 1, the Linked Learning field, through career academies and pathway programs, brings a sharp focus to preparing all students for both college and career. The focus is on engaged learning that integrates academics with career technical courses and authentic work-based learning. As cited in Chapter 2, the Behaviors of Learning and Teaching (BLT) Continuum describes teaching and learning strategies that dramatically improve student motivation, engagement and empowerment, understanding, and achievement (ConnectEd, 2014). Preparing new teachers to teach effectively in pathways/career academies and for success in the twenty-first century requires rethinking teacher preparation. What is happening in teacher preparation programs that are infusing a Linked Learning Lens into their Single Subject Credential Program provides an opportunity to examine an avenue to well-prepared teachers for twenty-first century students.
In light of the growing body of evidence regarding the benefits of the Linked Learning approach, it is important to understand the barriers that impeded establishing career academies, career and technical education (CTE) integration with academic content, and other reform measures. For more than two decades, virtually all state accountability systems have required local schools to engage in a regular process of improvement planning and to file school improvement plans with state education offices (G. Duncan & Murnane, 2011). Research shows that local planning efforts proceed as follows: First, local school-improvement teams look at data from state accountability systems. Secondly, school-improvement teams theorize about the root causes of any gaps in performance indicators. Finally, school-improvement teams enumerate the actions to be taken to achieve performance goals. Thus, most school improvement plans are internally focused and do not emphasize the kinds of external reforms, such as Linked Learning and CTE integration (G. Duncan & Murnane, 2011).

The differences in first- and second-order change provide a plausible explanation for the failed innovations chronicled by Cuban (2013). Perhaps these attempts at reform and innovation represented second-order changes in education, but were managed and led in a manner more appropriate to first-order change. Marzano and colleagues (2005) found that in order for second-order change to be successful, seven responsibilities of the leadership in charge of the change must be evident. They are (a) knowledge of curriculum, instruction, and assessment; (b) optimizer; (c) intellectual stimulation; (d) change agent; (e) monitoring and evaluation; (f) flexibility; and (g) ideals and beliefs. These leadership characteristics provide insight into what is necessary for innovative practices to be implemented. As Marzano and colleagues stated, “One does not engage in
second-order change by simply talking about it” (p. 72). Leadership responsibilities are critical, as research shows that some stakeholders might perceive that an environment is deteriorating as a result of an innovation (Marzano et al., 2005).

Implementing the Linked Learning approach and gaining stakeholder support requires planning, leadership, and time (U.S. Department of Labor, 2000). Furthermore, for true second-order change to take place, a change in beliefs must occur (Marzano et al., 2005). This is especially important given the attitudes and beliefs that many educators and policymakers have about vocational education, as cited in Chapters 1 and 2. Other reforms associated with the Linked Learning approach, such as continuous collaboration and planning among pathway teachers, potentially poses a challenge to how educators think about traditional school schedules and development of a master schedule (Stern, 2009). Implications exist regarding new approaches to teacher credentialing, including new credential requirements in the Linked Learning Lens program.

**Purpose of the Study**

The purpose of the study is to determine whether the Linked Learning Lens (LLL) Credential Program had an impact on the teacher candidates’ attitudes and knowledge related to twenty-first century skills and knowledge and preparation of students for both college and career, as compared to preservice teacher candidates not in the LLL Credential Program.

**Methodology**

Using survey data, the study proposes to analyze the difference between the LLL Credential teacher candidates (n = 13) and the non-LLL Credential teacher candidates (n = 12) and the impact on the teacher candidates’ attitudes and knowledge, using a
survey. Additionally, faculty syllabi will be analyzed to compare curriculum, assignments, and assessments between the two programs of study.

**Research Design**

The design selected for this investigation was a cross-sectional, mixed methods design. The teacher candidates who participated in this study were selected in order to ascertain whether participation in the LLL Credential Program had an impact on the teacher candidates’ attitudes and knowledge. Comparing groups is necessary to document the differences, if any, in their perception of their teacher preparation experience. Cross-sectional designs involve collecting data at one point in time from groups different in experience. This information was gathered using survey research and syllabi comparison. Andres (2012) explained that survey research is multifaceted and versatile, offering varying degrees of breadth and depth of a research topic, depending on the approach taken and the degree of structure associated with each approach. Andres went on to explain that survey research is usually limited to questions of description, behavior, attitudes, and opinions and is intended to generalize or be transferred in some ways beyond the original sample.

When considering which survey format(s) to employ, it is important to distinguish between two perspectives. The first perspective is that of *mixed modes* (Dillman, 2000). In a mixed mode approach, more than one survey format or mode is utilized with the goal of enhancing response rates. Each survey format has advantages and disadvantages, and potential respondents may vary in the preference of one format over the other (Andres, 2012). Survey studies generally come in one of two designs—cross-sectional and longitudinal. The key difference is the number of times the survey is administered (Gay,
Mills, & Airasian, 2012). Several studies have revealed that the nature and quality of the responses may vary according to the format employed. As a result, data collected in one format may contradict data collected in another format (Dillman, 2000). Due to factors of sample size and time constraints, this researcher chose a cross-sectional survey design.

Mixed methods research strives to transcend the barriers of qualitative and quantitative research. The goal is to design studies that employ at least one qualitative and one quantitative method and related data analyses appropriate to the purpose and context of the study (Andres, 2012). True mixed methods research is more than having two or more methods in a research project. Analyses from mixed methods designs attempt to integrate the findings from the methods employed, resulting in research findings that should be greater than the sum of its parts (Andres, 2012).

The question that guides this research leads to the hypothesis that candidates in a LLL Credentialing Program will have an experience that is different from candidates in a traditional credentialing program, leading to differences in attitudes and knowledge about how to prepare students for academic, career, and life success in the twenty-first century. (See Appendix A for the Linked Learning Lens crosswalk between California’s Teacher Preparation Expectations and the skills and proficiencies needed for teachers in pathway programs.) The Linked Learning Lens differs from traditional credentialing in the areas that include the following: understanding of teaching and learning (e.g., engaged learning), understanding ways of making learning relevant and authentic, an expanded definition of equity, understanding of both teacher and student collaboration, understanding ways to provide various and personalized supports for students in their learning, understanding the various roles of classroom teachers, understanding how to
support students in preparing for the world of work, and knowing how to use technology to promote student learning. In summary, the guiding question will be answered by employing the mixed methods tradition (Creswell & Plano Clark, 2011), using a survey and syllabi comparison.

**Data Collection and Analysis**

This study relies on two sources of data: a survey of preservice teacher credential candidates and an analysis of syllabi used by faculty in Linked Learning and traditional teacher preparation programs. This section on data collection begins with a description of the teacher candidate survey and concludes with a discussion of the use of the syllabi for data collection.

Punch (2003) asserted that the survey has long been a central strategy in social research. Surveys include cross-sectional and longitudinal studies using questionnaires for data collection, with the intent of generalizing from a sample to a population (Creswell, 2003). However, the term *survey* itself is very broad, covering many different types and used in many different contexts. Surveys can be quantitative or qualitative. One hallmark of survey research is a concern with representative sampling (Krosnick, 1999). Even in the best academic surveys, there are significant biases in the demographic and attitudinal composition of samples obtained. Given the exploratory nature of this study, the survey does not rely on a probability sample and relies solely on responses from credential candidates in a single teacher preparation program. Consequently, it is important to recognize the inherent limitations of nonprobability sampling methods and to refrain from drawing conclusions about a broader population when interpreting results from this small, nonprobability sample (Krosnick, 1999).
The researcher visited two cohorts, one of a traditional credential program and one of a Linked Learning credential program. A general overview of the study was provided for all participants in order to provide clarification of the intent of the study. Informed Consents were distributed to every candidate in each cohort class, with the directive that if the candidate wanted to participate in the study, that the Informed Consent should be filled out and then placed in an envelope (see Appendix B). At that time, the researcher left the room while the envelope was passed around in the classroom. The cohort professors collected the Informed Consent documents in order to maintain participant anonymity and delivered the documents to the researcher. Participants who expressed an interest in the study were sent an email link to the survey.

**Survey Research Sample**

This study analyzed responses from preservice teachers who are enrolled in two cohorts in a Single Subject Teaching Credential Program at a large southwestern state university in 2013-2014. At this university, preservice teacher candidates participated in their program of study in a cohort model. Cohort models reflect small learning communities of practice. Approximately half of these preservice teacher candidates were in a Linked Learning cohort designed to provide a different credentialing experience than the preservice teacher candidates in the traditional cohort. Their responses reflected their attitudes and perceptions of how well the teacher education program had prepared them to address the needs of twenty-first century learners. This represents a sample of students enrolled in the program during one academic year.
Survey Design

The researcher developed the survey and field-tested it with eight secondary school teachers, each possessing a minimum of 5 years of teaching experience. Survey questions were designed based on research in the areas of teacher preparation, student engagement, and twenty-first century skills and abilities. In addition, each question in some way focused on an element fundamental to the Linked Learning approach. For example, survey question five addressed collaboration, which is central to both teacher and student processes and strategies in the Linked Learning approach. The survey was developed to examine preservice teacher candidates’ reflections as a means to understanding how they conceptualized what they had learned in their coursework as related to their confidence in putting their knowledge into practice.

The first question about engaging students relates to the Framework for 21st Century’s Creativity and Innovation Skills (Partnership for 21st Century Skills, 2014a). The Framework describes the use of a wide range of strategies, such as brainstorming, group work, and evaluation of ideas, as well as the ability to communicate effectively to others.

The importance of student engagement is highlighted in a recent Gallup study (Microsoft Partners in Learning, 2014). Respondents reported that students who often used twenty-first century skills in their last year of high school were more likely to have had greater student aspiration and engagement, and student aspiration and engagement are positively correlated to work quality later in life. Furthermore, results of the Gallup study suggested that those who have high twenty-first century skill development are twice as
likely to have higher work quality compared with those who had low skill development. Student engagement and a sense of purpose are critical components for student success.

Schlechty (2011) asserted that when students are engaged, they related to the tasks they are involved with in different ways than when then are ritually compliant. They are more committed to the task, and there is a qualitative difference between the level of effort that engaged students are prepared to invest in their work and the level of effort of those who are only compliant. Schlechty noted that engagement has become increasingly important because it is so integrally related to effort. The U.S. democracy and economy depend on citizens who have learned to think, reason, reflect, solve problems, and create. Twenty-first century skills require students to participate in much more complex learning tasks. Engagement is more likely to produce the levels of persistence and commitment required to sustain the kind of effort needed to learn at higher levels (Schlechty, 2011).

Student engagement or lack thereof has been a persistent plague of traditional education (Schlechty, 2011). Although students may have high aspirations, they often find school boring and become disengaged. Zhao (2012) asserted when children learn what they want to learn and begin to take responsibility for their own learning they can truly stay engaged. Allowing students the freedom to choose what they want to learn, they have to take the initiative to decide what to do. This leads to commitment to learning (Zhao, 2012). Traditional schools tend to demand conformity and obedience, which leads to disengagement (Zhao, 2012).

For the second question regarding making learning relevant and authentic, the Framework describes the need for students to be able to navigate the complex life and work environments in the globally competitive information age (Partnership for 21st
Century Skills, 2014d). Included are the skills of goal setting, balancing short and long-term goals, and being able to utilize time and manage workload. Newmann, King, and Carmichael (2007) concluded that authentic instruction enhances equal educational opportunities. Their research found that authentic instruction and assignments bring significant benefits to students from any racial, ethnic, or socioeconomic group, or gender. This is also true of students with mild to moderate learning disabilities within inclusive classes. Students with disabilities who received higher levels of authentic pedagogy produced more authentic work. Additionally, they found that authentic instruction could help reduce the link between students’ social backgrounds and academic achievement.

As Schlechty (2011) noted, authenticity has to do with genuineness. Activities that respond to the need for authenticity accept the world of students as a resource rather than a problem.

Schlechty (2011) advised that educators should consider the following questions when making decisions regarding how they will deal with issues related to authenticity:

- What are the qualities and characteristics of those students to whom other students look for leadership and approval? Are they, for example, social stars, star athletes, or outstanding academic performers?
- What is the posture of parents toward the school?
- Do parents consistently enforce the pursuit of high performance standards for their children, and are they attentive to reports regarding that performance?
- Are the students participants in non-school organizations and groups that either reinforce or undermine engagement in schoolwork? (pp. 95-98)
Zhao (2012) supported authenticity in student work as a key indicator of the product-oriented learning. He defined authenticity as “the degree to which the final product or service serves a genuine purpose, solves a real problem, meets a genuine need of others or is personally meaningful” (p. 247). Zhao asserts that when students were engaged in product-oriented learning, mastery of content or skills increased.

The third survey question asked for teacher candidates to describe their understanding of equity in the classroom and preparedness to develop equitable lesson plans. As noted in the Framework for 21st Century Learning (Partnership for 21st Century Skills, 2014d), it is important for teachers to be culturally responsive, which is a crucial component of an equity-based approach. Kozleski (2013) described that culturally responsive teaching connects students’ cultural knowledge, prior experiences, and performance styles to academic knowledge in ways that legitimize what students already know. Equally important is the way that instruction is facilitated. Kozleski asserted that equitable classrooms are organized into communities that are designed to encourage academic and cultural excellence, where students learn to facilitate their own learning. This kind of classroom requires explicit teaching around social interactions so that students learn to assume leadership, feel comfortable with differences of opinion, and accept that they may need to help to be successful (Kozleski, 2013). One of the hallmark characteristics of an equitable classroom is having high expectations for all students. Expecting that each student can be engaged and can achieve at a high level is tantamount for equity and success. Teachers need to participate in reforming the educational system so that it becomes more inclusive.
Schlechty (2011) noted that equity and excellence are mutually supportive values. He asserted that every child could learn more given the opportunity to have schoolwork that is engaging. He emphasized that educators need to ask the right questions to ensure equity: “Is it just? Is it fair? Is it reasonable? Is it theoretically and empirically defensible? Is it right?” (p. 136). Education is a social institution that contains expressions of values and beliefs. Educators must ensure that every child, every day, is engaged in meaningful work that results in the child’s learning something that is important. This concept is fundamental in teacher preparation.

The fourth survey question asked for teacher candidates to describe their ability to identify specific supports and resources for students. Almost 5% of all students in our nation’s public schools are classified as having specific learning disabilities (Learning Disabilities Association of America [LDA], 2014). Success for these students requires a focus on individual achievement, progress, and learning. Congress has added new provisions to federal education laws—the Individuals with Disabilities Education Act (IDEA, 2004) and the No Child Left Behind Act (NCLB; DOE, 2001)—that are designed to encourage school districts to provide additional support for struggling students. Despite obstacles, research indicated that teachers can help these students learn how to learn. It is important for teachers to know how to accommodate their needs and differentiate instruction.

Student diversity should be viewed as an asset, to be embraced and fostered in the classroom environment. For example, as Borrero and Bird (2009) pointed out, focusing on a students’ deficits is not simply a case of seeing the proverbial half-empty glass. The consequences of such an approach are far-reaching and cumulative. Teachers must focus
on students’ strengths, and it is wrong to assume that underachievers have no strengths. Borrero and Bird (2009) noted that differentiation is the key to ensuring that all students are learning. They asserted that taking into account a student’s culture is key to differentiation, which should incorporate life experiences as well. Borrero and Bird believe that teachers can provide rich learning opportunities by acknowledging, respecting, and promoting the value of students’ diverse backgrounds in class.

The fifth survey question asked for teacher candidates to describe their readiness to collaborate with their colleagues. This is an especially pertinent question in light of the implementation of the Common Core State Standards (CCSS). In the past, a characteristic of American education was teacher isolation. Teachers may not have sufficient opportunities to work together to examine work and structure interventions within their classrooms (Phillips & Hughes, 2012). Darling-Hammond (2006) noted the importance of preparing teachers as classroom researchers and expert collaborators who can learn from one another, as the range of knowledge for teaching has grown so expansive that it cannot be mastered by any individual. The implementation of the CCSS presents a great opportunity for teacher collaboration, and by collaborating with each other, teachers can find the best ways to help their students reach these higher expectations while still maintaining individual styles and flexibility. Collaboration is at the heart of Linked Learning—within pathways, between pathways and external partners, between schools and districts and postsecondary education partners (ConnectEd, 2014).

When educators having unique knowledge of a child operate in isolation, the child’s educational experience becomes fragmented, and the child’s needs may go unmet (Goddard, Goddard, & Tschannen-Moran, 2007). Conversely, when teachers have
opportunities to engage in professional discourse, they can build upon their unique content, pedagogical, and experiential knowledge to improve instruction. Goddard and colleagues (2007) found that teachers who worked on teams reported more skill variety, knowledge of student performance, contact with parents, and knowledge of other teachers’ work. Goddard and colleagues asserted that when teachers work together, there is a “tighter connection between teachers’ work and student outcomes” (p. 881).

These benefits are supported by the research of Honigsfeld and Dove (2010), which states that there are considerable benefits of collaboration between teachers, including: greater continuity of instruction; more carefully aligned curriculum that yields adaptations; more differentiated instruction; effectively coordinated interventions for students at risk; more focus on their linguistic needs (level of English Proficiency); more focus on their academic needs; frontloading as necessary; greater understanding of their school behaviors and sociocultural needs; and more empathy from all teachers.

The sixth survey question asked for the teacher candidates to describe the various roles of the classroom teacher. According to Phillip and Hughes (2012), adopting the CCSS extends the teacher’s role as coach, carefully designing activities to build specific skills, providing constructive feedback, and continually modifying lessons based on student understanding. According to the Eton Institute (2012), the twenty-first century teacher acts more as a facilitator, coach, and mentor in a student-centered classroom. Schlechty (2011) stated that most teachers have been taught to think of their role as bureaucrats, instead of as designers. Teachers are taught to speak of goals, objectives, and pacing guides, rather than motives, needs, and values. Traditional teacher preparation programs suggest that the first step in lesson planning design is to identify the learning
objective, then secondly select activities and materials. Schlechty argues that students’ motives and needs should be the first step in lesson design. Schlechty asserted that this is the approach necessary to increase student engagement.

D. Brown (2007) mentioned that teachers can play many roles in the course of teaching, and this might facilitate learning. He asserted that their ability to carry these out effectively would depend to a large extent on the rapport they establish with their students and, of course, their own level of knowledge and skills. Schlechty (2011) researched the various roles of teachers in highly engaging classroom. He noted that effective teachers assumed different roles throughout a class session, including those of being a leader, designer, and instructional guide.

The seventh survey question regarding how to support students preparing for the world of work correlated directly to the Framework for 21st Century Learning (Partnership for 21st Century Skills, 2014d). The ability to adapt to change, manage time and goals, and work independently are important characteristics of a twenty-first century student. Additionally, twenty-first century learners should be able to interact effectively with others, participate actively, as well as knowing how to present oneself professionally and with proper etiquette. Linked Learning programs routinely include work-based experiences as part of the curriculum. As Zhao (2012) notes, “The traditional education paradigm reduces the possibility of cultivating uniqueness” (p. 175). Giving students the opportunity to experience a work-based internship enables them to discover and pursue their strengths.

Four major trends are impacting students, which need to be addressed to assure that our nation, and our students, are prepared to meet the challenges of the near and
distant future (Daggett, 2005). The four challenges are globalization, changing demographics, technology, and changing values and attitudes. Daggett (2005) asserted that these trends cannot be ignored in education as we prepare young people for a world of work.

The eighth survey question asked for the teacher candidates to describe ways to use technology to promote student learning. As described by the Partnership for 21st Century Skills (2014b), people

live in a technology and media-suffused environment, . . . including: 1) access to an abundance of information, 2) rapid changes in technological tools, and 3) the ability to collaborate and make individual contributions on an unprecedented scale. To be effective in the 21st century, citizens and workers must be able to exhibit . . . critical thinking skills related to information, media, and technology. (para. 1)

However, researchers asserted that the skills necessary for success in school and the workplace are the abilities to use technology as a tool to research, organize, evaluate, and communicate information. Additionally, a key aspect of Information, Communications and Technology (ICT) Literacy is the ability to “apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies” (Partnership for 21st Century Skills, 2014c, para. 3). U.S. Secretary of Education, Arne Duncan (2010), stated, “In the 21st century, educators must be given and be prepared to use technology tools; they must be collaborators in learning-constantly seeking knowledge and acquiring new skills along with their students” (para. 27).
Researchers at Walden University (2010) conducted a study on the connection between K-12 technology use and twenty-first century skills (Kaplan & Steffens, 2010). Their findings indicated that there is great disparity in the amount of time teachers spend using technology as an instructional tool.

Researchers used the following criteria to segment teachers into technology usage categories:

- **Frequent users** spend 31 percent—or more—of their class time using technology to support learning.

- **Moderate users** spend 21 percent to 30 percent of their class time using technology to support learning.

- **Sporadic users** spend 11 percent to 20 percent of their class time using technology to support learning.

- **Infrequent users** spend 10 percent or less of their class time using technology to support learning. (Kaplan & Steffens, 2010, para. 2)

The results indicated that the largest segment of teachers (34%) is infrequent users.

Despite the debates about technology use and twenty-first century skills, Kaplan and Steffens’ (2010) findings demonstrated that it was not a lack of teacher access that factored into their low usage, but instead the biggest barrier is that many teachers’ belief that technology is not necessary for student learning—their core work. The results also indicated that preservice programs do not yet prepare teachers well for this new world of technology and innovation. Kaplan and Steffens asserted that the most important implication of the research is that teachers’ use of technology for classroom instruction makes a significant difference in improving perceived student outcomes. This does not
mean students are using technology wisely. Teachers have a vital role to play at the intersection of technology and twenty-first century skills—guiding young minds toward constructive educational purposes.

**Syllabi**

Syllabi offer one of the most important and concrete sources of information for a researcher about the learning objectives that faculty use to define essential knowledge and skills for students in their courses. In most university courses, the syllabus serves as the principal tool for course planning. Stark (2000) defines the course syllabus as an academic plan “purposefully constructed to facilitate student learning” (p. 413). According to Parkes and Harris (2012), the course syllabus has three major purposes: (a) as a contract between the instructor and student; (b) as a permanent record of what took place in a classroom; and (c) as a learning tool. Syllabi can be highly diverse in terms of content, organization, and length. As unique documents, they reflect an instructor’s attitudes, beliefs, and feelings about teaching, course subject matter, appropriate methods of student evaluations, and other instructional elements (Wikle & Fagin, 2013). A well-constructed syllabus enables students to see how individual course elements fit within the overall pattern of a course and its objectives.

It would be expected that in teacher credentialing programs at universities in California, course syllabi would incorporate the California Standards for the Teaching Profession. These standards are:

- Engaging and Supporting All Students in Learning
- Creating and Maintaining Effective Environments for Student Learning
- Understanding and Organizing Subject Matter for Student Learning
Syllabi comparison will provide data on the knowledge of the Linked Learning Lens candidates versus traditional candidates, while also providing data on the knowledge and attitudes about preparing twenty-first century success between the two groups of candidates.

In order to compare the syllabi of a Linked Learning teacher preparation program with that of a traditional teacher preparation program, it is beneficial to know what is expected of a Linked Learning teacher. As noted on the ConnectEd (2014) website, Linked Learning teachers are trained to develop coursework that 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 Linked Learning 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 (ConnectEd., 2014).

**Instruments and Procedures**

Each teacher candidate was asked to take an online survey of eight items. The questions included opportunities to describe an understanding of teaching and learning (e.g., engaged learning), an understanding of making learning relevant, an understanding of equity in the classroom learning environment, an understanding of teacher
collaboration, an understanding of how to support students in their learning, an understanding of how to use technology effectively in teaching and learning an understanding of the various roles of classroom teachers, and their understanding of preparing students for the world of work.

Survey reminders were sent at 3 weeks for those not completed, and at 6 weeks the online survey tool closed. All the surveys were collected and quantitatively analyzed for statistical significance, and narrative responses were qualitatively examined for trends.

The syllabi from eight courses were analyzed, four from a Linked Learning approach and four from a traditional (non-Linked Learning) approach. The courses included Educational Psychology, Secondary English Methods, Humanistic and Social Foundations of Teaching, and Secondary Reading Methods.

Analysis of Data

The researcher must be prepared to spend substantial time on the data analysis phase of a survey. The analysis of qualitative research involves aiming to understand the big picture—by using the data to describe the phenomenon and what it means. Both quantitative and qualitative analysis involves labeling and coding all of the data in order that similarities and differences can be recognized. To evaluate statistical differences between groups, quantitative methods analyses was used.

Limitations

As in other studies, this study had a number of potential limitations. First, the group of teacher candidates was limited to one university and the sample size was small. As a result, the findings may be different if the data were collected from teacher candidates from different universities in other states or in other systems. Second, the
implementation of the Linked Learning Lens approach was relatively new and therefore the experience of the faculty in its implementation was varied. Third, biased context results from the placement of survey questions in a particular order so that the respondent is already thinking along certain lines on the basis of previous questions is a consideration.

Krosnick (1999) asserted that questionnaire pretesting has limitations. What constitutes a “problem” in the survey interview is often defined loosely, so there is potential for considerable variance across interviewers in terms of what is reported. Most importantly is that researchers want to know what went on in respondents’ minds when answering questions, and interviewers are not well positioned to characterize such processes (Krosnick, 1999).

Finally, the sample size may be too small to make generalizations about the effectiveness of the Linked Learning Lens approach. Because of the newness of this approach, this study was considered exploratory. Subsequent research could be designed to build on this initial study and its data.

The researcher’s background in Linked Learning programs could be considered a limitation for the following reasons: (a) the researcher is a novice; (b) the researcher’s prior experiences with Linked Learning may affect the researcher’s perceptions; and (c) the researcher’s personal biases regarding Linked Learning may impact the researcher’s perceptions. However, the researcher utilized a number of strategies to alleviate these limitations. Survey results were collected from different preservice teacher groups (LLL and traditional).
CHAPTER 4—PRESENTATION AND ANALYSIS OF THE DATA

The purpose of this exploratory study was to examine a teacher credentialing program in a large southwestern university that prepares teacher education candidates to teach in secondary schools that are implementing reforms associated with the Linked Learning field. The importance of this work rests in the growing understanding that a Linked Learning approach requires a new kind of teacher, one who has strong workplace skills as well as academic background, and who has the pedagogical knowledge to teach English Language Learners (Oakes & Saunders, 2008). In addition, the importance is highlighted by a growing body of research that points to the success of the Linked Learning approach to high school reform in preparing all students for both college and career.

A variety of organization change models and Linked Learning program models provided a means of studying the preparation of prospective teachers through both traditional and nontraditional (i.e., Linked Learning) programs. Analysis of the data was guided by the following essential question: Is there a difference between preservice teachers who obtain a teaching credential through a Linked Learning Lens in the Single Subject Credential Program and those who are prepared through a traditional credential program of study? Subsume under that question is the following: Are credential candidates who are prepared through a Linked Learning Lens in the Single Subject Credential Program better prepared that those prepared through a traditional program of study to meet the needs of the twenty-first century student?

These questions serve as a foundation for examining two different teacher preparation cohorts with the Single Subject Credential Program at a large southwestern
university. The program offers both Linked Learning and traditional teacher preparation cohorts. Mixed methods were used to gather data for this study. The researcher developed a survey (see Appendix C) to gather information from preservice teacher candidates, both in the Linked Learning and the traditional (non-Linked Learning) program. A total of 33 preservice teacher candidates from both cohorts completed an Informed Consent document. Out of the 33 candidates, 28 completed the survey; however, three of the candidates did not identify affiliation with either the Linked Learning or traditional program and, therefore, were left out of the final data analysis. The final breakdown of the cohort groups were represented as Linked Learning credential candidates \((n = 13)\) and traditional credential candidates \((n = 12)\). Content areas were distributed across cohorts; of all candidates, 6 were candidates in the subject area of math, 3 represented candidates in the subject area of science, 10 represented candidates in the subject area of English, and 4 represented candidates in the subject area of the social sciences. Two candidates did not identify subject area.

Questions on the survey allowed for Likert scaled responses. This quantitative research method was descriptive, establishing associations between variables, as well as qualitative responses with specific examples that were analyzed for trends. Syllabi from both programs were analyzed for similarities and differences.

**Statistical Analysis of Survey Respondents**

*T*-tests were performed to compare the responses of the Linked Learning Cohort and the Traditional cohort. Table 1 has the mean and standard deviation for each survey item. Responses where the two cohorts showed statistically significant differences \((p < 0.05)\) are shown with an asterisk.
Table 1

Comparison of Survey Responses of Linked Learning Teacher Candidates and Traditional (Nonlinked Learning) Teacher Candidates

<table>
<thead>
<tr>
<th>Survey questions</th>
<th>Linked learning</th>
<th>Traditional</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>Mean diff.</th>
<th>Std. error diff.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel prepared to teach for student engagement</td>
<td>13</td>
<td>3.15</td>
<td>.555</td>
<td>12</td>
<td>3.17</td>
<td>.835</td>
<td>-0.046</td>
<td>23</td>
<td>-0.013</td>
<td>23</td>
<td>-0.013</td>
<td>0.281</td>
</tr>
<tr>
<td>I understand how to actively engage students for learning</td>
<td>13</td>
<td>3.08</td>
<td>.494</td>
<td>12</td>
<td>3.17</td>
<td>.937</td>
<td>-0.303</td>
<td>23</td>
<td>-0.090</td>
<td>23</td>
<td>-0.090</td>
<td>0.296</td>
</tr>
<tr>
<td>I feel prepared to make learning relevant</td>
<td>13</td>
<td>3.31</td>
<td>.630</td>
<td>12</td>
<td>3.25</td>
<td>.622</td>
<td>0.230</td>
<td>23</td>
<td>0.058</td>
<td>23</td>
<td>0.058</td>
<td>0.251</td>
</tr>
<tr>
<td>I understand what is meant by authentic learning</td>
<td>13</td>
<td>3.23</td>
<td>.599</td>
<td>12</td>
<td>3.08</td>
<td>.669</td>
<td>0.582</td>
<td>23</td>
<td>0.147</td>
<td>23</td>
<td>0.147</td>
<td>0.254</td>
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<tr>
<td>I understand the issues of equity in a classroom</td>
<td>13</td>
<td>3.15</td>
<td>.689</td>
<td>12</td>
<td>3.25</td>
<td>.754</td>
<td>-0.333</td>
<td>23</td>
<td>-0.096</td>
<td>23</td>
<td>-0.096</td>
<td>0.288</td>
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<tr>
<td>I feel prepared to develop lessons that are equitable</td>
<td>13</td>
<td>2.92</td>
<td>.760</td>
<td>12</td>
<td>3.33</td>
<td>.778</td>
<td>-1.333</td>
<td>23</td>
<td>-0.410</td>
<td>23</td>
<td>-0.410</td>
<td>0.308</td>
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<tr>
<td>I feel prepared to identify specific supports for individual students</td>
<td>13</td>
<td>2.92</td>
<td>.494</td>
<td>12</td>
<td>2.83</td>
<td>.577</td>
<td>0.19</td>
<td>23</td>
<td>0.090</td>
<td>23</td>
<td>0.090</td>
<td>0.214</td>
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<td>I understand how to obtain and provide resources for students</td>
<td>13</td>
<td>2.77</td>
<td>.599</td>
<td>12</td>
<td>2.42</td>
<td>.900</td>
<td>1.161</td>
<td>23</td>
<td>0.353</td>
<td>23</td>
<td>0.353</td>
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<td>I feel prepared to collaborate with my colleagues</td>
<td>13</td>
<td>3.46</td>
<td>.660</td>
<td>12</td>
<td>3.33</td>
<td>.651</td>
<td>0.488</td>
<td>23</td>
<td>0.128</td>
<td>23</td>
<td>0.128</td>
<td>0.263</td>
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<td>I understand how collaboration can help me professionally</td>
<td>13</td>
<td>3.85</td>
<td>.376</td>
<td>12</td>
<td>3.33</td>
<td>.651</td>
<td>2.436</td>
<td>23</td>
<td>0.513</td>
<td>23</td>
<td>0.513</td>
<td>0.210</td>
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<tr>
<td>I understand the various roles of the classroom teacher</td>
<td>13</td>
<td>3.23</td>
<td>.439</td>
<td>12</td>
<td>3.58</td>
<td>.669</td>
<td>-1.571</td>
<td>23</td>
<td>-0.353</td>
<td>23</td>
<td>-0.353</td>
<td>0.224</td>
</tr>
<tr>
<td>I feel prepared to assume different roles as a teacher</td>
<td>13</td>
<td>3.15</td>
<td>.555</td>
<td>12</td>
<td>3.42</td>
<td>.669</td>
<td>-1.073</td>
<td>23</td>
<td>-0.263</td>
<td>23</td>
<td>-0.263</td>
<td>0.245</td>
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<tr>
<td>I understand the concept of preparing students for the world of work</td>
<td>13</td>
<td>3.54</td>
<td>.519</td>
<td>12</td>
<td>3.42</td>
<td>.669</td>
<td>0.511</td>
<td>23</td>
<td>0.122</td>
<td>23</td>
<td>0.122</td>
<td>0.238</td>
</tr>
<tr>
<td>I know how to design lessons to support students in preparing for the world of work</td>
<td>13</td>
<td>3.15</td>
<td>.689</td>
<td>12</td>
<td>2.92</td>
<td>.793</td>
<td>0.800</td>
<td>23</td>
<td>0.237</td>
<td>23</td>
<td>0.237</td>
<td>0.296</td>
</tr>
<tr>
<td>I know how to use technology to promote student learning</td>
<td>13</td>
<td>3.31</td>
<td>.630</td>
<td>12</td>
<td>3.08</td>
<td>.900</td>
<td>0.727</td>
<td>23</td>
<td>0.224</td>
<td>23</td>
<td>0.224</td>
<td>0.309</td>
</tr>
<tr>
<td>I know how to use technology to effectively engage students</td>
<td>13</td>
<td>3.15</td>
<td>.555</td>
<td>12</td>
<td>3.00</td>
<td>.953</td>
<td>0.498</td>
<td>23</td>
<td>0.154</td>
<td>23</td>
<td>0.154</td>
<td>0.309</td>
</tr>
</tbody>
</table>

*Indicates difference between group was statistically significant at \( p < .05 \).
The data reflect cohort members’ answers based on a Likert response scale. One question that resulted in a statistically significant different response between the two cohorts pertained to the understanding of how teacher collaboration can be helpful professionally, \( t(23) = 2.44, p < .05 \). While there are slight variations in the quantitative results for other responses, there was no other statistical significance demonstrated. This is due, in part, to the small sample size.

**Coding of Qualitative Data**

Preservice teacher candidates’ narrative responses were coded. Findings were grouped within eight categories and are listed in Tables 2, 3, 4, 5, 6, 7, 8, and 9. Corresponding samples of the narrative statements provided by candidates are also included in these tables. Examination of the narrative responses revealed both connections and disconnections between university coursework and how prepared the candidates believed they were to teach. Relationships between the categories and themes that evolved during further analysis are included in the discussion section. The phrases in the tables are raw, qualitative data and, as such, represent direct quotes from the survey.

**Trends in Qualitative Responses**

In order to better understand the relationships between the survey questions and candidates’ narrative responses, it is beneficial to align them to the Framework for 21st Century Learning (Partnership for 21st Century Skills, 2014a, 2014b, 2014c, 2014d) and the Common Core State Standards (CDE, 2013).
Table 2

Summary of Student Engagement Findings From Free Responses

*Pre-service teacher education courses were valuable in preparing me for student engagement*

Linked Learning Cohort Responses:
- I would ask cognitively demanding questions and provide wait time for all students to think and respond.
- I feel prepared to connect students’ interests to an assignment.
- I would allow students to pair-share in order to facilitate further thinking about a topic.
- I would allow students some choice in assignments.
- I would design mock trials and debates to engage students.
- I would put students into work groups with each member having a defined task.

Traditional Cohort Responses:
- I would allow students to participate in discussions, feel valued with their input through encouragement and validation.
- I know how to build rapport with students to understand how to effectively teach content according to their learning styles.
- I know how to make materials relatable to students.
- I would have students lead class discussions.

Table 3

Summary of Relevant and Authentic Learning Findings From Free Responses

*Preservice teacher education courses were valuable in preparing me for relevant and authentic learning*

Linked Learning Cohort Responses:
- I would provide real life examples that students can see as potentially useful in their current life.
- I can connect lessons to their lives and to current events.
- I know how to make learning relevant by having students reflect on their past, present and future.
- I know how to use students’ cultural backgrounds as a means of learning.

Traditional Cohort Responses:
- I know how to use examples from students’ experiences.
- A relevant learning experience may include creating lessons for students based on cultural diversity.
- I would create a mock election that coincides with current elections that analyze voter efficacy and the election system.
Table 4

**Summary of Equity Findings From Free Responses**

Preservice teacher education courses were valuable in preparing me for equity in the classroom

Linked Learning Cohort Responses:
- I know how to provide students with support classes and tutoring.
- I am aware of IEPs, Special Education, Advanced Placement, and 504 plans.
- I believe in providing every student the opportunity to participate in extracurricular activities and events.
- Differentiating instruction for students with additional learning needs such as IEPs and ELL is critical.

Traditional Cohort Responses:
- This is probably one of my weakest areas of teaching and one that I struggle with; teaching to the top of the class as well as those that are lower.
- Some students have learning disabilities that require them to have more time on a test or process information differently.
- I know how to use SDAIE strategies to support English Language Learners.

Table 5

**Summary of Student Support Findings From Free Responses**

Preservice teacher education courses were valuable in preparing me for supporting students in the classroom

Linked Learning Cohort Responses:
- I am prepared to provide extra scaffolding for students who need it.
- I know to seat students with visual processing disorders or impairments at the front of the room.
- I know to allot more time for assignments for students with processing issues.
- I know how to provide individualized support to a student by allowing the use of instructional aids.
- I am prepared to talk to students about their specific needs and problems in my classroom.

Traditional Cohort Responses:
- Other than helping after class, I know that I have not been introduced to resources at my school.
- I have not tried to access resources at my school.
- I announce that I am available before and after school for anything a student needs.
- I know how to find relevant literature in a student’s home language.
- I would create an after school tutoring group to support struggling students.
Table 6

Summary of Teacher Collaboration Findings From Free Responses

Preservice teacher education courses were valuable in preparing me for teacher collaboration

Linked Learning Cohort Responses:
- I know that collaboration can lead to cross-curricular learning for students, which is more authentic learning.
- At a Linked Learning/PBL school, collaboration is essential. As a team, colleagues are required to work together to plan instruction.
- I know the value of teachers from different classrooms coming together to construct a lesson plan that connects to each class.
- Multiple perspectives bring new ideas.

Traditional Cohort Responses:
- I know lesson planning together can be helpful to anticipate student responses.
- I believe collaboration fuels student and school success; it allows teachers to grow professionally and team up.
- Collaboration helps you to know you are not the only one struggling.
- I can learn teaching methods from colleagues.
- Collaboration is beneficial for teachers as we begin to move into a new era of project-based learning.

Table 7

Summary of Roles of Teachers’ Findings From Free Responses

Preservice teacher education courses were valuable in preparing me to understand the roles of teachers

Linked Learning Cohort Responses:
- Teachers are communicators; teachers act as a pillar of support for students to feel safe in the classroom environment.
- One example of a teacher’s role is mentor.
- A teacher has the role of being a motivator: to assist students in always trying their best at all times.
- Teachers are instructors to students, colleagues, and facilitators.
- One of the roles of a teacher is to help students develop not only as good students, but as good people.

Traditional Cohort Responses:
- Teachers are babysitters, maids, psychologists, mediators, facilitators, educators, and life coaches.
- A teacher needs to be a good example.
- Teachers should model responsibility.
- A teacher is a mandated reporter.
- Teach students about respect for all others.
Table 8  
**Summary of Preparing Students for the World of Work Findings From Free Responses**

Preservice teacher education courses were valuable in preparing me to understand how to prepare students for the world of work.

Linked Learning Cohort Responses:
- I know how to teach students to prioritize time and create schedules.
- I believe that teaching students how to collaborate is a major factor of preparing students for the world of work.
- I can provide students with information about job fairs and potential internships.
- It isn’t enough to teach the material, teachers need to teach the application of the material to real world examples.
- I make assignments relatable to the real world and to future career options.
- Teach students how to work in groups, meet deadlines, and work with people they may not like.
- Teach students how to write a resume and business letters.

Traditional Cohort Responses:
- This is difficult for me; I try to encourage better group work and perseverance by stating that it will help students in the world of work.
- I would teach students interpersonal communication skills, so they can communicate effectively with peers.
- I believe real world application of theories that allow the students to experience what it is like to be in the profession.
- I teach lessons on creating resumes and preparing for mock interviews.

Table 9  
**Summary of Use of Technology Findings From Free Responses**

Preservice teacher education courses were valuable in preparing me to understand how to prepare students for using of technology.

Linked Learning Cohort Responses:
- I would incorporate tablet use in my lessons.
- I would use Instagram to make historically relevant posts.
- I would utilize different kinds of multimedia during lessons to engage students, including video clips, music, and alternate forms of literature.
- I model writing for students using a document camera.
- I know how to use Power Point and Prezi presentation software.
- I use computers for research.

Traditional Cohort Responses:
- I allow students in my classroom to participate in online discussions.
- I plan to use QR codes to engage students in interactive quizzes.
- I would teach the development of webpages to create long-lasting portfolios.
- I use videos to teach abstract concepts, such as DNA Replication.
The first question about engaging students relates to the Framework’s Creativity and Innovation Skills (Partnership for 21st Century Skills, 2014a). The survey responses for this question highlighted techniques used by Linked Learning teacher candidates to enhance communication in the classroom by connecting prior knowledge, group work, mock trials and debates, all of which require the development of interpersonal communication skills. The use of student choice in lesson development lends to engagement and creativity of individual students, allowing them to act on creative ideas and make tangible contributions. The responses from the traditional cohort candidates demonstrated their ability to engage students through lessons that are relevant and student-centered.

For the second question regarding making learning relevant and authentic, the Framework described the need for students to be able to navigate the complex life and work environments in the globally competitive information age (Partnership for 21st Century Skills, 2014d). The free response section for this survey question reflected the ability of the Linked Learning teacher candidates to use relevant lessons that connect students to the world of work and provide real life problems in their lesson design. The responses from the traditional cohort candidates verified their knowledge of the importance of including students’ culture with lesson design.

The third survey question asked for teacher candidates to describe their understanding of equity in the classroom and preparedness to develop equitable lesson plans. Teacher candidates from both cohorts acknowledged the need to provide resources and use specific strategies to ensure equity. However, the Linked Learning cohort responses were more specific for groups of students in the classroom, such as English
Language Learners and Special Education students. As the Linked Learning cohort responses indicated, differentiation of instruction, as well as providing extracurricular activities to include all students can provide more access and equity in the classroom environment.

The fourth survey question asked for teacher candidates to describe their ability to identify specific supports and resources for students. It is important for teachers to know how to accommodate students’ needs and differentiate instruction. The Linked Learning candidates readily identified numerous strategies to provide individualized support, including ELL strategies, resources for Special Education students, scaffolding, and identifying when to utilize Instructional Assistants in the classroom. These specific interventions varied from the more generalized responses of the traditional cohort.

The fifth survey question asked for teacher candidates to describe their readiness to collaborate with their colleagues. The free responses for this question from the Linked Learning cohort were statistically significant in the survey analysis. For example, there were significant differences between the two cohorts on the benefits of teacher collaboration; the responses of the Linked Learning cohort tended to be student centered, as opposed to the responses of the traditional cohort, which tended to be teacher centered. The Linked Learning cohort responses saw collaboration as a benefit to students, as well as themselves, while the traditional cohort members saw collaboration as a benefit to themselves as teachers and also for moral support.

The sixth survey question asked for the teacher candidates to describe the various roles of the classroom teacher. The free responses from the Linked Learning teacher
candidates and the traditional candidates verified their beliefs in their roles as classroom teachers.

The seventh survey question regarding how to support students preparing for the world of work correlates directly to the Framework for 21st Century Learning (Partnership for 21st Century Skills, 2014d). The ability to adapt to change, manage time and goals, and work independently are important characteristics of a twenty-first century student. The Linked Learning teacher candidates’ responses were aligned with these skills, addressing the need to teach time management, collaboration, resume and interviewing skills, and creating relevant lessons. Several respondents in the traditional cohort expressed “difficulty” in this area. One noticeable difference between the Linked Learning cohort responses and the traditional responses was the Linked Learning cohorts’ knowledge of internships as an important experience for students. In contrast, the traditional cohort responses included having students conduct research on careers, as opposed to experiencing a career firsthand.

The eighth survey question asked for the teacher candidates to describe ways to use technology to promote student learning. Survey respondents from both cohorts seemed to understand the value of access to technology, based on their collective responses regarding the tools of technology, such as Smartboards, computers, and presentation software, such as Powerpoint and Prezi.

**Syllabi**

Once all data were obtained and examined, the syllabi from eight courses were analyzed, four from a Linked Learning approach and four from a traditional (non-Linked Learning) approach. The courses included Educational Psychology, Secondary English
Methods. Syllabi were examined for similarities and differences.

**Similarities Between Linked Learning and Traditional Program Syllabi**

The Linked Learning Lens approach is not represented in all coursework of preservice teacher candidates’ entire program of study, and, therefore, those particular syllabi were not analyzed. The syllabi analyzed represented coursework of the respective programs that delineated traditional and Linked Learning courses. For that reason, two of the six standards of the California Standards for the Teaching Profession are not evident in these particular syllabi. The following bullets show key similarities between the Linked Learning and traditional cohort syllabi. One of the most important similarities between the two reflects common expectations of the California Standards for the Teaching Profession (Commission on Teacher Credentialing, 2009) that are required for each California Single Subject Credential Program. Of the six standards, four were represented in both program syllabi. The absence of Standards Two and Six are expected, as the researcher did not examine all syllabi from all coursework of the credentialing program. The standards that were evident are denoted as the following:

**Standard One: Engaging and Supporting All Students in Learning**

- Syllabi stated the need to connect students’ prior knowledge, life experience, and interests with learning goals. Additionally, facilitating learning experiences that promote autonomy, interaction, and choice were components.
Standard Three: Understanding and Organizing Subject Matter for Student Learning

- Syllabi outlined the development of instructional strategies that are appropriate to the subject matter, as well as using materials, resources, and technologies to make subject matter accessible.

Standard Four: Planning Instruction and Designing Learning Experiences

- Syllabi detailed the development of activities and materials for student learning, as well as drawing on and valuing students’ backgrounds and interests.

Standard Five: Assessing Student Learning

- Syllabi identified using multiple sources of information to assess student learning and using the results of assessments to guide instruction.

**Differences Between Linked Learning and Traditional Program Syllabi**

The following bullets show key differences between the Linked Learning and traditional cohort syllabi. Differences reflect curriculum that infuses elements of the Linked Learning Lens (see Appendix A) into the Linked Learning credential cohort. These areas of competencies were addressed differently in the coursework between the two cohorts, with the exception of career and technical education (CTE) and work-based externships. These two specific competencies were only addressed in the Linked Learning coursework. The bulleted items reflect competencies that emerged from analysis of syllabi from both programs, with specific assignments and coursework denoting the differences as discussed below:

- Reading competency: Specific assignments regarding reading required that preservice teachers demonstrate the ability to design literacy lessons that
accessed background knowledge and access to relevant literature for their teaching assignment. This would include the ability of a teacher prepared through the Linked Learning approach to be able to make judgments about what is relevant literature for their particular student population. For example, a teacher in a school that has a predominantly Hispanic student population would know to make relevant literature choices that reflect the cultural background of the students. This is especially critical in the implementation of the Common Core State Standards, which demands relevance and rigor in reading. These very specific competencies were not addressed in the traditional course syllabi.

- **Student engagement:** Linked Learning teacher candidates are trained to effectively engage students in a range of collaborative discussions with diverse partners, building on others’ ideas and expressing their own clearly. This is in direct alignment with the Partnership for 21st Century Skills that stated that the ability to communicate new ideas to others effectively is essential for students to be prepared for the future. It was clearly stated in the Linked Learning English Language Arts Methods syllabi that teacher candidates should know what to include in curricula informed by a twenty-first century skills perspective.

- **Writing competency:** The Linked Learning preservice teachers were expected to be able to help students design autobiographical literacy projects, a relevant perspective that individualizes the assignment. Other assignments may include student writing narratives to develop real or imagined experiences or
events using effective technique, descriptive details, and clear event
sequences. The Linked Learning approach helps students make the
connection between what they are learning in school and the real world. This
is especially important with the increased rigor of the Common Core State
Standards for writing across curriculum. The outcome is supposed to reflect
relevance and connectedness to the students’ lives. These very specific
competencies were not addressed in the traditional course syllabi.

- Lesson design: The course competency of lesson design in the Linked
  Learning syllabi focused on the de-centralization of the role of the teacher and
  focused on lesson relevance. For example, it was explicitly stated in the
  Linked Learning syllabi from the Methods course that teachers should pay
  special attention to analyzing the needs of the learner in lesson design.
  Lessons should reflect the teacher’s understanding of the critical nature of
  adolescent development. This attention to relevant lesson design was not
  specified in the traditional course syllabi. The non-Linked Learning syllabi
  focused on preservice teacher candidates working in groups to plan lessons.
  The groups were not interdisciplinary in nature, as they were in the Linked
  Learning course. The designing of lessons, as opposed to lesson planning, is
  a key component necessary for student engagement (Schlechty, 2011).
  Designing lessons begins with students’ needs in mind, instead of lesson
  planning, which begins with identification of standards objectives and goals.

- Assessment design: The Linked Learning syllabi focused on backward design
  and assessment relevance, with a heavy emphasis on project based learning
assessments and deliverables. For example, it was explicitly stated in the Linked Learning syllabi from the Methods course that teachers should be able to design authentic assessment tools that reflect a knowledge and understanding of various human and technological communication modalities that facilitate learning. The traditional course syllabi focused mainly on the development of rubrics for assessments; and while rubric design might have been incorporated into the Linked Learning coursework, it was not the main focus of an assessment.

- **Career and Technical Education:** The Linked Learning syllabi included the expectation that teacher candidates have an understanding of the California Technical Education Standards and how these standards can be met through interdisciplinary, project-based learning. For example, in the Humanistic and Social Aspects of Teaching course, the Linked Learning syllabi included assigned evaluations of the CCTE Project-Based Learning Showcase for the local school district. The traditional course syllabi did not include this expectation.

- **Work-based Externships:** The Linked Learning syllabi for the Humanistic and Social Aspects of Teaching provided the most notable difference between all of the courses and syllabi. The entire course is designed around several different externship experiences, including business/industry partners and community organizations. The syllabi for the same course taught in the traditional cohort did not include the externship experiences.
CHAPTER 5—CONCLUSIONS AND RECOMMENDATIONS

A brief review of this study is provided to frame the discussion as a context for the conclusions and recommendations.

**Background of the Study**

Each year, more than 100,000 new teachers enter classrooms across America, struggling with varying levels of preparedness (Darling-Hammond & Baratz-Snowden, 2005). The need for teachers is stimulated by an influx of new students due in part to new immigrants. To complicate this matter, the demand for teachers is uneven, with the most acute need in locations serving poor, minority youth in urban areas and, in particular, in California (Bragg, 2007). Education reform to address this problem in the past has ushered in changes in standards, assessment, curriculum, and teacher evaluation. Most recently, the focus has turned to teachers and to the preparation of these professionals, who are the most powerful in-school influence on student performance (CAEP, 2013). A debate over the quality of teacher education programs has been ongoing for nearly 100 years (Metzler, 2009). Darling-Hammond (2006) probed the problem of how programs of teacher preparation can confront the problems of learning how to teach.

U.S. Secretary of Education Arne Duncan (2009) stated that to make the American dream of equal educational opportunity a reality, it is necessary “to recruit, reward, train, learn from, and honor a new generation of talented teachers” (para. 13). He acknowledged that today’s teachers are asked to achieve significant academic growth for all students at the same time they are asked to instruct students with increasingly diverse needs. The Partnership for 21st Century Skills (2008) started the dialogue around how
twenty-first century knowledge and skills can be appropriately embedded in teacher preparation programs, including developing a blueprint for building the models, tools, resource base, and capacity to support this reform effort.

The biggest wave of reform in teacher education began with *A Nation at Risk*, which proclaimed strong and unambiguous warnings about the continuing failure of public schools (Metzler, 2009). Metzler (2009) pointed out that part of that failure was due to identifiable weaknesses in the academic qualifications and training of teachers. Now publically implicated as major contributors to the poor performance of public schools, teacher educators had little choice but to respond to this call by reforming their programs quickly and significantly. That response has been ongoing for over 25 years and will no doubt continue as long as substandard teacher preparation is viewed as a major contributor to failing schools. As the major producer of teachers for public schools, university teacher education programs cannot avoid being linked to those failing schools (Metzler, 2009).

Amid many contentious debates about teacher education policy, a single consensus resounds among its critics: teacher education is broken and needs to be fixed (Cochran-Smith, Piazza, & Power, 2013). U.S. Secretary of Education Arne Duncan (2009) suggested that nearly all schools of education are “doing a mediocre job” (para. 3) of preparing graduates to teach effectively. A. Duncan asserted that the goal is for every teacher to receive high-quality preparation and support, so that every student can have the education they deserve.

A highly skilled teaching force results from developing well-prepared teachers from recruitment through preparation. Darling-Hammond (2006) asserted that the most
difficult aspect of constructing a teacher education program is organizing prospective teachers’ experiences so that they can use their knowledge in skillful ways in the classroom. In preparing teachers, it is important to distinguish between teacher quality and teaching quality. Teacher quality might be thought of as a combination of personal traits, skills, and understandings that an individual brings to teaching. Research conducted by Darling-Hammond (2012) found the following qualities to be important:

- strong content knowledge related to what is to be taught;
- knowledge of how to teach others (content pedagogy) and skill in implementing productive instructional practices;
- understanding of learners and their development, including how to support students who have learning differences;
- general abilities to organize and explain ideas, as well as to observe and think diagnostically; and
- adaptive expertise that allows teachers to make judgments about what is likely to work in a given context in response to students’ needs. (p. 3)

These qualities are embodied in the standards adopted by the National Board for Professional Teaching Standards. As these standards have been built into licensing and preparation requirements, they have provided a means to develop a stronger foundation for effective teaching (Darling-Hammond, 2012). As Darling-Hammond (2012) explained, teaching quality refers to strong instruction that enables a wide range of students to learn. Such instruction meets the demands of the discipline, the goals of instruction, and the needs of students.
It is increasingly clear that schools must become more adept at helping a wide range of learners be academically successful. In the past, schools varied the curriculum and standards for different learners, but today’s students are being asked to master the same curriculum regardless of the starting points, prior experiences, and English language proficiency (Darling-Hammond et al., 2001). Only teachers who are both knowledgeable in their content areas and extremely skillful in a wide range of teaching methods can respond appropriately to diverse students’ needs and enable them to succeed.

Adding to the need for well-prepared teachers to meet the needs of a diverse student population, increasing consideration is being given to programs of study that prepare teachers to teach in promising new models of pathways and career academies (Farnan & LaPlante, 2010). Teacher preparation programs must provide a foundation for continual learning about teaching and develop a greater focus on creating high-quality, authentic learning experiences (Retallick & Miller, 2010).

According to Retallick and Miller (2010), high school teachers need to be able to help students make the connections between what they are learning in class and its application in the world of work. This is a major focus of the Linked Learning approach, a California-based approach to high school transformation in curriculum and instruction that integrates strong core academics, demanding career and technical education (CTE), and real world experience (Bishop & Mane 2004; Gentry et al., 2005; Hoachlander et al., 2008; Hudson & Laird, 2009). The Linked Learning approach simultaneously prepares students for participation in the labor market and for advanced education, for both college and career.
In the Linked Learning approach, students receive a personally relevant, wholly engaging, college-focused academic and career-based curriculum with real-world learning opportunities (Hoachlander et al., 2008). This approach is designed to ensure that students graduate from high school well prepared to enter a 2- or 4-year college or university or apprenticeship. In addition, it exposes students to a range of college and career opportunities.

**Statement of the Problem**

As reported by California State Superintendent Tom Torlakson’s Task Force on Educator Excellence (CDE, 2012), there is growing recognition that expert teachers are perhaps the most significant resource for improving student learning. However, the majority of current teacher preparation programs are preparing Single Subject teachers for the traditional high school, not new reform models in secondary education. Furthermore, they are not preparing teachers to participate effectively in reforms that a growing body of research indicates are narrowing, if not eliminating, what has been a persistent achievement gap in high schools (G. Duncan & Murnane, 2011; Hoachlander et al., 2008; Packard et al., 2010).

California’s high schools have fallen short of achieving the fundamental goal of graduating all students prepared for college and career success. This is especially true of the state’s Latino, African-American, and low-income students, who are less likely to achieve college and career readiness than their more advantaged peers (LaFors & McGlawn, 2013). Gándara (2008) found that immigrants and English learners are the students who are most likely to drop out of school. Although completion rates of some ethnic groups are improving, Latino students appear to be making little progress toward
earning college degrees. Pathway programs could benefit all students while diminishing
the preparation and outcome gaps between high-status students and immigrant and
English learner students (Gándara, 2008). There are numerous reasons why English
learner students perform so poorly in school, including poorly prepared teachers.

Darling-Hammond and colleagues (2005) advocated for the stronger preparation
of teachers—especially for teachers in schools serving low-income students of color.
They argued that teachers need to know how children learn and how to make materials
accessible to a wide range of students to be successful. Their studies found positive
effects of teacher education and certification on student achievement. The challenge is
how to change practices in teacher preparation programs to facilitate the integration of
Linked Learning and twenty-first century skills in today’s high schools (Kolderie, 2007;
Partnership for 21st Century Skills, 2008; Rustique & Stam, 2012; Saunders et al., 2013).

The question posed in this research, then, is the following: Do teachers prepared
in a Linked Learning credentialing program better meet the needs of the twenty-first
century learner? (Partnership for 21st Century Skills, 2008). An increasing number of
universities across the state have teacher preparation programs that incorporate a Linked
Learning perspective in the state-approved Single Subject Credential Program. These
programs are developing (a) replicable models for Single Subject Credential Programs
that will prepare new teachers to participate as professional educators in Linked Learning
pathways and schools; and (b) a network of teacher preparation institutions throughout
the state that are collaborating to implement these models. Student teaching occurs in
partnership with and at Linked Learning sites so that credential candidates not only learn
about the Linked Learning approach in their coursework, but also directly experience and
fully engage with it in their clinical experiences as pre-service teachers (Almond & Miller, 2014).

**Study Design**

The design selected for this investigation was a cross-sectional, mixed methods design. A survey tool was designed to collect data in order to analyze (a) the differences between the Linked Learning Lens (LLL) Credential teacher candidates and the non-LLL Credential teacher candidates, and (b) the impact on the teacher candidates’ attitudes and knowledge. The teacher candidates who participated in this study were selected in order to ascertain whether participation in the LLL Credential Program had an impact on the teacher candidates’ attitudes and knowledge when compared to teacher candidates prepared through the traditional credentialing program. Comparing groups is necessary to document the differences, if any, in perceived preparation.

Cross-sectional designs involve collecting data at one point in time from groups different in experience. This information was gathered using survey research and examination of syllabi. Creswell (2003) confirmed that using more than one method could provide insight through different levels of analysis. The use of concurrent procedures allows the researcher to converge quantitative and qualitative data to provide a comprehensive analysis of the research problem. Using this design, the researcher collected both forms of data at the same time during the study and then integrated the information in the interpretation of the overall results.

Andres (2012) explained that survey research is multifaceted and versatile, offering varying degrees of breadth and depth of a research topic, depending on the approach taken and the degree of structure associated with each approach. Andres further
explained that survey research is usually limited to questions of description, behavior, attitudes, and opinions and is intended to generalize or be transferred in some ways beyond the original sample. Creswell (2003) noted that this quantitative approach is used primarily for developing knowledge with a predetermined instrument that yields statistical data.

When considering which survey format(s) to employ, it is important to distinguish between two perspectives. The first perspective is that of *mixed modes* (Dillman, 2000). In a mixed mode approach, more than one survey format or mode is utilized with the goal of enhancing response rates. Each survey format has advantages and disadvantages, and potential respondents may vary in the preference of one format over the other (Andres, 2012). Survey studies generally come in one of two designs—cross-sectional and longitudinal. The key difference is the number of times the survey is administered (Gay et al., 2012). Several studies have revealed that the nature and quality of the responses may vary according to the format employed. As a result, data collected in one format may contradict data collected in another format (Dillman, 2000).

In developing the survey, the question that guided the research is based on ascertaining whether the candidates in a LLL Credential program had a credentialing experience that was different from candidates in a traditional credentialing program. The survey was designed to include the following: understanding of teaching and learning (e.g., engaged learning), understanding ways of making learning relevant and authentic, an expanded definition of equity, understanding of both teacher and student collaboration, understanding ways to provide various and personalized supports for students in their learning, understanding the various roles of classroom teachers, understanding how to
support students in preparing for the world of work, and knowing how to use technology to promote student learning.

Despite its importance, the syllabus has been virtually ignored in research (Thompson, 2007). While much has been written about the syllabus, the literature has been largely prescriptive in nature. A syllabus has many functions in a course, and those functions can vary depending on the personality of the instructor designing it. However, at the very minimum, it should represent an agreement between instructor and student regarding the nature and guidelines of a course. It is in many ways a promise of what the semester holds—what the expectations are for assignments, timelines and evaluation of assignments. The syllabus also offers students information about the teacher. The syllabi serve an important role as a communication document (Thompson, 2007).

This study design used a mixed methods approach in order to transcend the barriers of qualitative and quantitative research. The goal was to design a study that employed at least one qualitative and one quantitative method and related data analyses appropriate to the purpose and context of the study. True mixed methods research is more than having two or more methods in a research project. Analyses from mixed methods designs attempt to integrate the findings from the methods employed, resulting in research findings that should be greater than the sum of its parts (Andres, 2012). Creswell (2003) explained that the mixed methods approach tends to be based on the researcher making pragmatic claims through a collection of both quantitative and qualitative data sequentially.
Purpose of the Study

The purpose of this study examined a Single Subject Credential Program at a large university in the southwestern United States. The university has worked diligently for 6 years to create reforms that include curriculum and course revisions, development of new school partnerships, and development of new assignments. The research question that this study answered was whether or not preservice teachers who obtain a credential through the LLL Single Subject Credential Program are better prepared than preservice teacher candidates prepared through a traditional Single Subject Credential Program to meet the needs of the twenty-first century student. Related to this is the following question: do the knowledge, skills, and abilities of new teachers prepared in a Single Subject Credential Program designed to prepare new teachers to teach effectively in Linked Learning environments differ from the knowledge, skills, and abilities of new teachers prepared in a traditional Single Subject Credentialing Program?

Findings

It is important to explicate the statistical significance of the quantitative data in a mixed methods study, and also where there are notable differences, albeit not statistically significant differences, from the narrative response portion of survey data. It is not altogether surprising that there was limited significance between the groups, due to the small sample size. All candidates have curriculum that focuses on content related to the survey questions, such as student engagement, equity, and supporting student learning. The survey questions and candidates’ narrative responses were aligned to the Framework for 21st Century Learning (Partnership for 21st Century Skills, 2014a, 2014b, 2014c, 2014d) and the Common Core State Standards (CCSS; CDE, 2013).
In the analysis of the quantitative data from the survey, there was only one question that resulted in a statistically significant different response between the Linked Learning cohort and the traditional cohort responses. The question asked if the teacher candidate understood how collaboration could help them professionally, $t(23) = 2.44$, $p < .05$. It is important to acknowledge this difference of the Linked Learning teacher candidates with regard to the value of teacher collaboration. Collaboration raises the capacity of all educators to effectively engage and educate students. Studies show that teachers strongly support greater collaboration in schools. In 2009, MetLife conducted a study of 1,003 public school teachers in grades K-12. Survey results showed 67% of teachers believed that greater collaboration would have a major impact on improving student achievement (MetLife, 2010). Research demonstrated that educators feel more collaboration will increase collegial trust, job satisfaction, teacher success in the classroom, and student responsibility (Fullan, 1990; MetLife, 2010).

When teachers collaborate, they share experiences and knowledge that can promote learning for instructional improvement. Looking at it from the perspective of organizational change theory, collaboration is a form of lateral coordination that can improve organizational performance by fostering creativity and integration around specific problems (Goddard et al., 2007). Goddard and colleagues (2007) concluded that the involvement of teachers in the selection of instructional methods is important. They found that teachers believed so strongly in the importance of sharing instructional strategies and ideas that they often made time during nonschool hours to meet in teams to discuss these issues.
Research studies have reported positive outcomes of collaboration for teachers including improved efficacy, more positive attitudes towards teaching, and higher levels of trust (Goddard et al., 2007). Goddard and colleagues (2007) found that teacher collaboration may improve schools’ ability to foster student achievement. This is due to many facets of collaboration, including formal and informal configurations. For example, when educators having unique knowledge of a child operate in isolation, the child’s educational experience becomes fragmented, and the child’s needs may go unmet. Conversely, when teachers have opportunities to engage in professional discourse, they can build upon their unique content, pedagogical, and experiential knowledge to improve instruction (Goddard et al., 2007). Goddard and colleagues determined that the benefits to students are presumed to result from the positive changes experienced by teachers. For example, teachers’ sense of increased efficacy and improved knowledge base as a result of collaboration. The Linked Learning approach encourages educators to collaborate and interact with each other and the community. Research has demonstrated that teachers who share a common philosophy and curricular focus, collaborate, and have structured opportunities to learn and work with other teachers are generally more effective that those who do not have those experiences (Alliance for Excellent Education, 2010).

**Narrative Survey Responses**

While the candidate responses to the other survey questions did not show quantitatively significant differences, their narrative responses highlight qualitative differences, as described in this section.

The first survey question about engaging students relates to the Framework’s Creativity and Innovation Skills (Partnership for 21st Century Skills, 2014a). The
Framework describes the use of a wide range of strategies, such as brainstorming, group work, and evaluation of ideas, as well as the ability to communicate effectively to others. The ability to communicate was ranked among the top five applied skills reported by employers as “very important.” Teamwork and collaboration skills ranked second in importance for all new entrants to the workforce, and critical thinking and problem solving skills ranked as “most important” among employers (Partnership for 21st Century Skills, 2006). In order for students to be able to bring these attributes to the workplace, they must first be engaged as learners in the classroom. As Schlechty (2011) noted, four components are always present when students are engaged:

1. The engaged student is attentive and focused on the tasks associated with the work being done.

2. The engaged student is committed. He or she voluntarily uses time, attention, and effort to support the activity called for by the task.

3. The engaged student is persistent.

4. The engaged student finds meaning and value in the tasks that make up the work.

The survey responses for this question described techniques used by Linked Learning teacher candidates to enhance engagement in the classroom by connecting prior knowledge, group work, mock trials and debates, all which require the development of interpersonal communication skills. The use of student choice in lesson development leads to engagement and creativity of individual students, allowing them to act on creative ideas and make tangible contributions. The responses from the traditional cohort
candidates demonstrated their ability to engage students through lessons that are relevant and student-centered.

One would expect to see both cohorts of teacher candidates respond to this survey question about student engagement in accordance with the California Teaching Performance Expectations (CTE, 2013), specifically TPE 5: Student Engagement. All candidates prepared in an accredited teacher credentialing programs are expected to be able to ensure the active and equitable participation of all students, along with other expectations of engagement. Schlechty (2011) stressed the importance of student engagement; he noted that when students are engaged, they are related to the tasks they are involved with in a different way than when they are ritually compliant. This leads to commitment to the work at hand and more investment in their success.

For the second survey question regarding making learning relevant and authentic, the Framework describes the need for students to be able to navigate the complex life and work environments in the globally competitive information age (Partnership for 21st Century Skills, 2014d). Included are the skills of goal setting, balancing short and long term goals, and being able to utilize time and manage workload. Both cohort groups expressed confidence in their ability to make learning relevant and authentic. The Linked Learning teacher candidates stated that they knew how to design relevant lessons that connect students to the world of work and provide real life problems, especially aligned with the rigor of the Common Core State Standards. Because work-based learning is a key element in the Linked Learning approach, these responses indicate that Linked Learning credential candidates understand the importance of this aspect of the approach.
As Schlechty (2011) discussed in his research on student engagement and authentic learning, “if learning is to be retained and made transferable, the tasks must have meaning to the learner” (p. 37). The responses from the traditional cohort candidates verified their knowledge of the importance of including students’ culture with lesson design. Schlechty stated that authenticity has to do with genuineness. Lessons that satisfy the need for authenticity accept the students’ investment in the situation as the most important concern. Lessons that respond to the need for authenticity accept the world of students as a resource rather than a problem.

The third survey question asked teacher candidates to describe their understanding of equity in the classroom and preparedness to develop equitable lesson plans. Teacher candidates from both cohorts acknowledged the need to provide resources and use specific strategies to ensure equity. However, the Linked Learning cohort responses were more specific for groups of students in the classroom, such as English Language Learners and Special Education students. While the difference in the responses were not statistically significant, it is important to notice the differences in the specificity of their comments. In the LLL cohort, candidates articulate that developing human capital is an ongoing process that provides teachers with resources and support systems long before a teacher enters the classroom. Combined with extra attention focused on teacher collaboration, it is not surprising that Linked Learning experiences provided teacher candidates with specific strategies to address the needs of all of the students in their classrooms.

Research on conditions of equity in schools found that Linked Learning pathway programs were often drawn to the promise of the Linked Learning approach out of
concerns for equity (Saunders et al., 2013). Saunders and colleagues (2013) found that Linked Learning programs used desired student outcomes as the school’s starting point to shape the curriculum and structures intentionally to support this equity-based purpose. Schlechty (2011) asserted that equity and excellence are mutually supportive values. He concluded that it is imperative that teachers be willing to take the time to define what needs to be learned and be prepared to act when they notice a child is not achieving, and they must be prepared to be held accountable for their actions—or lack of action. Only then will equity be commonplace in the classroom environment.

The fourth survey question asked teacher candidates to describe their ability to identify specific supports and resources for students. It is important for teachers to know how to accommodate student needs and differentiate instruction. The Linked Learning candidates readily identified numerous strategies to provide individualized support, including ELL strategies, resources for Special Education students, scaffolding, and identifying when to utilize Instructional Assistants in the classroom. These specific interventions varied from the more generalized responses of the traditional cohort, where the responses were limited to a focus on after-school programs.

One of the key components of a Linked Learning environment is attention to the individual needs of students (Saunders et al., 2013). Saunders and colleagues (2013) found the curriculum and school structures in Linked Learning schools were informed by the desire to create supportive and caring relationships combined with a commitment to high expectations.

The fifth survey question asked teacher candidates to describe their readiness to collaborate with colleagues. The free responses for this question from the Linked
Learning cohort were statistically significant in the survey analysis. The Linked Learning cohort responses saw collaboration as a benefit to students, including the outcome of more authentic learning. The Linked Learning responses described the benefits of teachers working as a team to design lessons, stating, “multiple perspectives bring new ideas.” They also articulated the value of teacher collaboration resulting in cross-curricular, interdisciplinary learning for students. The traditional cohort candidates saw collaboration as a benefit to themselves as professionals and also for moral support, stating, “Collaboration helps you to know you are not the only one struggling.”

When teachers collaborate, they share experiences and knowledge that can promote learning for instructional improvement (Goddard et al., 2007). Collaboration can help teachers solve educational problems, which in turn can benefit students academically. Goddard and colleagues (2007) found a positive link between student achievement on high-stakes assessments and teacher collaboration. However, they noted that the relationship between teacher collaboration and student achievement may be indirect. Perhaps the most important outcome of teacher collaboration may be that teachers learn how to improve their instructional practice. The Partnership for 21st Century Skills (2014d) noted teacher collaboration as one of the guiding recommendations in the area of curriculum for twenty-first century learners. They explained that educators should initiate meaningful partnerships with key stakeholders, content developers, and curriculum providers to ensure a wide range of instructional products that are designed to produce twenty-first century skills outcomes.

Furthermore, they included collaboration as a key component in their guiding recommendations in the area of instruction, stating that educators should develop
personal learning communities where they are able to reflect, refine, and improve twenty-first century skills. A collaborative, project-based approach, which is a central Linked Learning instructional strategy, ensures that students develop higher order thinking skills, effective communication skills, and knowledge of technology that students will need for twenty-first century careers and the global environment.

The sixth survey question asked teacher candidates to describe the various roles of the classroom teacher. The adoption of the CCSS requires that the role of teachers evolve, extending the teacher’s role as coach, lesson designer, and evaluator of learning (Phillip & Hughes, 2012). When implementing the CCSS, content-area teachers should know how to create language objectives, as well as their content objectives, in order to meet the learning needs of English Learners in the classes. This is important in the increasingly diverse student populations that teachers encounter today. D. Brown (2007) asserted that teachers can play many roles in the course of teaching, and their ability to carry these out would depend to a large extent on their own level of knowledge and skills. The free responses from the Linked Learning teacher candidates verified their beliefs in their roles to be mentors, instructors, and motivators. Their responses were positive and confident, also indicating that they had an important role in focusing on the whole child (i.e., helping students develop as “good people”), not just academics. The traditional cohort responses tended to be more generalized, but also articulating awareness of being good models and examples.

It is important for teachers to have positive perspectives regarding their roles as teachers. In the twenty-first century classroom, teachers are facilitators of student learning and creators of classroom environments. The success of students is dependent
on a teacher who is fully aware of the group dynamics of a classroom. The teacher who knows what role to play at any given moment is critical to student achievement; knowing when to be the prompter, the controller, the resource, the assessor, the participant, and the tutor requires that the teachers shift roles within the given context of the classroom.

The seventh survey question regarding how to support students preparing for the world of work correlates directly to the Framework for 21st Century Learning (Partnership for 21st Century Skills, 2014d). The ability to adapt to change, manage time and goals, and work independently are important characteristics of a twenty-first century student. The Linked Learning teacher candidates’ responses were aligned with these skills, addressing the need to teach time management, collaboration, resume and interviewing skills, and creating relevant lessons. Several respondents in the traditional cohort expressed “difficulty” in this area. One noticeable difference between the Linked Learning cohort responses and the traditional responses was the Linked Learning cohorts’ knowledge of internships as an important experience for students. In contrast, the traditional cohort responses included having students conduct research on careers, as opposed to experiencing a career firsthand.

This is clearly a distinction in the preparation of the Linked Learning cohort and the traditional cohort. The premise of the Linked Learning model is the linking of core academic content with technical education and real-world applications. The work-based learning opportunities are an integral element of the approach that may begin with mentoring or job shadowing and evolve into internships or apprenticeships. Washor and Mojkowski (2013) asserted that internships are a popular way of providing leaving-to-learn opportunities. They concluded that internships are essential learning experiences
for all students. Zhao (2012) contended that mentoring is an essential element of personalized learning, helping to guide, inspire, and facilitate students’ learning.

The eighth survey question asked teacher candidates to describe ways to use technology to promote student learning. Survey respondents from both cohorts seemed to understand the value of access to technology, based on their collective responses regarding the tools of technology, such as Smartboards, computers, and presentation software, such as Powerpoint and Prezi. However, it could be argued that utilizing these software programs does not necessarily constitute using technology. Zhao (2012) argued that opportunities brought about by recent development of technology have almost been completely missed in education. For example, he stated that massive amounts of money are spent on software programs that offer nothing more than a prescribed presentation platform, instead of using it to support student creation.

Digital technology can be used as a tool for creating books, movies, and other forms of art and all sorts of products and services. Technology can be used as a communication tool, making it possible for students to learn with experts from around the world. It could be concluded that the survey results did not capture the depth of candidates’ knowledge about the use of technology, but that they responded by listing the software and tools that they would use to support instruction and learning. It would require further questioning to discern the depth of the understanding of technology use among the candidates in both cohorts.

**Syllabi Comparison**

In comparing the syllabi of traditional teacher preparation methodology courses to syllabi of courses taught through the LLL, the researcher noted several differences.
Preservice teacher candidates in the Linked Learning certificate programs are expected to have an understanding not only of the CCSS, but also the California Technical Education Standards and how these standards can be met through Linked Learning interdisciplinary, project-based learning. The main areas of difference included the competencies of reading, writing, student engagement, lesson design, and assessment design, as well as knowledge of CTE, and work-based externships. These areas of competencies were addressed differently in the coursework between the two cohorts, with the exception of CTE and work-based externships. These two specific competencies were only addressed in the Linked Learning coursework.

In 2014, the James Irvine Foundation completed a 5-year evaluation of the Linked Learning Initiative (Guha et al., 2014). Their findings substantiated that the districts that were successful in aligning Linked Learning with the CCSS showed that those efforts paid off with a greater share of pathway students experiencing rigorous, integrated, and relevant instruction. This correlates to the course competencies of reading and writing in the Linked Learning syllabi, as these teachers would be prepared to teach the CCSS, but do so through the lens of Linked Learning. According to the data from the James Irvine Foundation study, students who were taught in Linked Learning classes that were implementing the CCSS were 14% more likely to be challenged to understand a difficult topic, 10% more likely to be asked difficult questions in class, 15% more likely to be able to apply what they learned in class to the world of work, and 10% more likely to be able to draw connections between what they learned in class and the real world (Guha et al., 2014).
This aligns with the assignments from the Linked Learning courses, where relevant lesson design was a key element in all coursework. The syllabi course competency regarding student engagement represented a notable difference between the Linked Learning course syllabi and the traditional syllabi. This is evident due to the expectation that the Linked Learning candidates could meet the requirements and demonstrate efficacy in specific assignments and activities of the course. In the Linked Learning syllabi, attention was focused on the design of lessons that allowed for student engagement. Conversely, the traditional syllabi focused more on the reading of case studies throughout the courses and on lesson planning, but did not have evidence of assignments related to the direct engagement of students in the learning. As Schlechty (2011) emphasized in his research on student engagement, designing versus planning lessons is a critical difference when preparing students for the world of work. Notably, designing begins with the needs of the students in mind. Planning, on the other hand, begins with goals, objectives, and activities. Designing lessons embraces values and emotions, while planning is instrumental, embracing logic and order. Schlechty asserted that designing lessons emphasizes divergent thinking and invites invention, while planning emphasizes convergent thinking and seeks to limit alternatives. This is the premise of Linked Learning-engaging students in the world of learning and work. As Washor and Mojkowski (2013) pointed out, until schools deal with students’ lack of engagement and estrangement from their schools, they will continue to overlook talent, waste energy on compliance, and force students to fit into an increasingly archaic learning system.
The Linked Learning preparation of preservice teachers has the potential to encourage teachers to embrace the notion that if the classroom environment is not inviting and exciting, no rewards, either intrinsic or extrinsic, will suffice to offset the negative and suppressive effects of a hostile or sterile learning environment (Schlechty, 2011). If the school environment is not supportive of the design of engaging work, the fundamental problem of how to improve schools will remain as perplexing and stagnant today as it was decades ago. The Linked Learning experience has the potential to transform students’ high school experiences. It is imperative to better prepare teachers to be leaders in an educational reform movement that has the promise of positive outcomes in student achievement. In addition, Linked Learning candidates experienced how cross-disciplinary collaboration can lead to rigorous academic projects and lesson design that engages students, advances student achievement, and reveals how learning in all disciplines is applied in real-world problem solving.

The competency of lesson design in the Linked Learning syllabi focused on the de-centralization of the role of the teacher and focused on lesson relevance. As reported by the California Linked Learning District Initiative, lesson relevance helps to answer the simple questions asked by so many students every day: “Why do I need to learn this?” (ConnectEd, 2014). In the twenty-first century, with access to factual information increasingly easy and instantaneous, high schools must transform themselves to student-centered communities of integrative learning that develop twenty-first century employability skills grounded in rigorous and relevant academic and technical content. Linked Learning weaves together the academic and technical rigor, real world relevance, and relationships students need to success in high school and beyond (ConnectEd, 2014).
The competency of assessment design in the Linked Learning syllabi focused on backward design and assessment relevance, with a heavy emphasis on project-based learning assessments and deliverables. Linked Learning design and concepts are closely aligned with the CCSS and the Smarter Balanced Assessment. Students in Linked Learning courses are more likely to be better prepared than their peer group in traditional courses based on the adaptive summative assessments benchmarked to college and career readiness that is the driving force behind Linked Learning curriculum development (ConnectEd, 2014). Linked Learning connects, supports, and aligns with the CCSS in several ways, including the following: (a) aligned goals and approaches for college and career readiness; (b) real-world integration and application of academic and technical skills and knowledge; and (c) student performance assessments that demonstrate authentic learning (Rustique & Stam, 2012).

The Linked Learning syllabi included the expectation that teacher candidates have an understanding of the California Technical Education Standards and how these standards can be met through interdisciplinary, project-based learning. Linked Learning teachers are trained to develop coursework that 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 Linked Learning 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 (ConnectEd, 2014). Grubb (2008) noted how the Linked Learning approach could make
use of various strategies to deliver curriculum and engage English learner students. Curriculum that integrates college-preparatory and career technical education has the potential to benefit immigrant and English learners.

One of the most compelling differences between the syllabi of the Linked Learning courses and those of the traditional cohort was the presence of work-based learning through student teacher externships. The Linked Learning syllabus for the Humanistic and Social Aspects of Teaching course provided the most notable difference between all of the courses and syllabi. The entire course is designed around two different externship experiences, including business/industry partners and community organizations. Externships are short-term experiences, usually only lasting a few days, they are unpaid, and students do not receive credit for the experience. Externships are beneficial by providing practical experiences and insights and usually involve job shadowing, as opposed to a hands-on experience. Externship experiences are followed by a reflective practice, where teacher candidates describe the details of the externship, as well as making the connections between the externship and instruction, including how it enhanced their subject-matter goals.

**Summary of Research Findings and Future Research**

This study emerges at a moment when policymakers, researchers, and educators have identified the high school years as the point of greatest need within the education system. Far too many students drop out of high school unprepared for the world of work. The results of this study provided a snapshot of the potential to better prepare teachers for engaging students in academics and career preparedness through the Linked Learning approach.
Linked Learning preservice teacher candidates made reference to feelings of adequacy and confidence in their abilities to teach effectively in Linked Learning pathway programs. Their responses indicated that they understood how to effectively engage students in learning and design lessons with real-world applications. They responded that they could design lessons that are relevant and meaningful. They understand the value of teacher collaboration, especially as it relates to their growth as a professional, as well as benefits for students. Recent reforms efforts in education have included an emphasis on increasing teacher collaboration. Research studies have reported positive outcomes of collaboration for teachers including improved efficacy, more positive attitudes towards teaching, and higher levels of trust (Goddard et al., 2007). As stated earlier in this chapter and worth reiterating, Goddard and colleagues (2007) found that teacher collaboration may improve schools’ ability to foster student achievement. This is due to many facets of collaboration, including formal and informal configurations. For example, when educators having unique knowledge of a child operate in isolation, the child’s educational experience becomes fragmented, and the child’s needs may go unmet. Conversely, when teachers have opportunities to engage in professional discourse, they can build upon their unique content, pedagogical, and experiential knowledge to improve instruction (Goddard et al., 2007). Goddard and colleagues determined that the benefits to students are presumed to result from the positive changes experienced by teachers. For example, teachers’ sense of increased efficacy and improved knowledge base as a result of collaboration.

The Linked Learning approach can be delivered in a number of ways, but all of them require teachers to open their practice and collaborate with their peers. The
movement from an isolated classroom environment to a shared, collaborative approach can be daunting—and collaborating effectively involves training and practice.

As Fullan (2001) explained, “The big problems of the day are complex, rife with paradoxes and dilemmas. For these problems, there are no once-and-for-all answers” (p. 73). His view is appropriate given that education often relies on the same approaches to persistent problems year after year. Witness the decades-old problem of the achievement gap between children from poverty versus children not from poverty (Marzano et al., 2005). In spite of decades of attention, the problem persists. This demonstrates the need for Second Order change, which cannot be approached hesitantly. Marzano and colleagues (2005) asserted that Second Order change calls for decisive, swift action. Fullan (2001) agreed, stating, “I’m increasingly persuaded that schools that go slow and a little at a time end up doing so little that they succeed in only upsetting everything without accruing the benefits of change” (p. 8). To successfully implement a second-order change initiative, change agents must ratchet up idealism, energy, and enthusiasm (Marzano et al., 2005). Program developers must be willing to live through a period of frustration in order for program implementation to come to fruition. This is especially true in an era where educational reformers push their efforts, not into human learning, but into the way human learning is organized. Teachers who are prepared through LLL credentialing programs have specific coursework to help them address how students learn, addressing this concern.

The days when high schools could be content with preparing some students just for college and others for work are antiquated and not serving students well, nor society. High schools must change so that all students exit with opportunities to participate in the
range of postsecondary options, both college and career (LaFors & McGlawn, 2013). The Linked Learning approach does not guarantee postsecondary success; however, it provides students with expanded access to postsecondary opportunities. The exposure through Linked Learning may be enough to begin the process of real reform (Grubb, 2008).

For Linked Learning approaches to succeed in schools, they must be led by well-trained teachers. The California State Universities have responded to this reform measure by developing and implementing LLL teacher credentialing programs at some of their campuses that have the capability of educating teachers to better prepare twenty-first century students for the world of college and career. The results from this study, while exploratory, hold the promise that these new credentialing programs are working to meet this demand.

The success of the trail-blazing individuals and institutions will rest ultimately on a crucial fund of political will (Little, 1993). Whatever the current shortcomings of the proposed reform of teacher preparation and teacher practices, there is sufficient knowledge to move forward; we have “the knowledge, methods, assessment strategies to transform our classrooms into engaging, critical and creative sites of intellectual growth and personal development” (Little, 1993, p. 141). The preparation of Linked Learning teachers is critical to the success of work-based learning and real-world applications. Teachers need to be proficient in developing partnerships with businesses willing to host students, able to make strong connections between the placement and coursework, and skilled in navigating the logistical and legal requirements of running such a program.
These skills, not typically covered in traditional teacher preparation programs, are part of the outcomes in the LLL approach.

Teachers are perhaps the single most influential people in improving student learning. Improving teacher preparation programs has long been underutilized as a strategic lever to improve student outcomes. In the coming years, it will be essential to California to have a strategic plan for reconstructing their education system, and teacher education must be a part of it (CDE, 2012). This new approach to teaching may be in its early stages, but Linked Learning credential candidates are learning how to create interdisciplinary projects, work-based learning opportunities, and rigorous college prep courses.

Future research that could be utilized to inform changes in teacher preparation programs includes further analysis of LLL Credential Programs at other California State University (CSU) campuses. This would also increase the sample size to allow for better comparisons. Comparing and contrasting Linked Learning teacher education programs at other CSUs might provide insight as to the challenges of implementing such programs, such as ensuring that university professors are experts in the field of Linked Learning, developing curriculum that provides practical lessons for preservice teacher candidates, and seeking out quality externship experiences for teacher candidates. Further research should include survey delivery and analysis after teacher candidates have completed their field experiences, as well as after they graduate from their credentialing program.

Further investigation of this topic might explore the barriers that stymie the efforts to integrate vocational and academic education (Bruijn & Leeman, 2011; Grubb et al., 1991), especially as it relates to funding. In addition, further examination of the benefits
of professional instruction (i.e., instruction within which students assume the role of apprentice with the teacher as a mentor) through Linked Learning is warranted (Gentry et al., 2005). Finally, additional study of the factors related to preparation of Linked Learning teachers presented in this review of literature may support meaningful reforms essential to high school improvement, where educational equity is a central value, especially for poor and minority students and others who are traditionally considered at risk in today’s educational system.

**Limitations**

Generalizations of the results of this study are limited for several reasons. This study focused on a single university teacher preparation program. The university is located in an urban setting within a large city in the western region of the United States. The results may not be applicable to sites that do not mimic this sample.

This is an exploratory study and the sample size was small. Additionally, the implementation of the Linked Learning approach is relatively new and therefore the experience of the faculty in its implementation will be varied. Furthermore, one faculty member involved in this study taught in both the traditional credentialing program and the Linked Learning credentialing program, which could have created bias.

A limitation of this study was the timing of the delivery of the survey. Due to variables that could not be controlled, the survey was given to the teacher candidates in both cohorts at the end of the fall semester, before they had completed their field experience. The results may be different if the survey had been administered later in their program.
REFERENCES


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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, & 7)**
  • Diversity (TPEs 7 & 11)
  • Intra-disciplinary and inter-disciplinary cooperation and collaboration
  • Innovation
  • Industry and postsecondary education partnerships
  • Focus on learning vs. focus on teaching (TPEs 2, 3, 4, 5, & 8)
  • Willingness and ability to assume leadership roles (TPE 12)
  • Importance of a personalized learning environment where each student is known well by adults and his/her learning needs are known and supported (TPEs 8 & 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 & 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 & 9)
  • Address state academic and CTE standards (TPEs 1 & 9)
  • Incorporate skills from the SCANS Report
—Teachers will *practice pedagogy* that
  * Incorporates industry-based applications
  * Reflects a student-centered teaching approach (TPE 2, 4, 5, 6, 7, & 8)
  * Emphasize integrated problem-/project-based learning
  * Includes differentiated instruction (TPEs 4, 5, 6, & 7)
  * Demonstrates a research-based instructional model
  * Utilizes information provided by formative and summative assessments (TPEs 3 & 8)

*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

Informed Consent

Hello,

You are being invited to participate in a study of Reforming Teacher Preparation for 21st Century Students at San Diego State University. The purpose of the Reforming Teacher Preparation for 21st Century Students research is to investigate how different approaches to the credentialing of preservice teachers impacts preparedness. Such a study advances awareness and understanding of the specific norms, values, symbols, and artifacts that serve as the foundation for a learning culture supportive of effective teacher preparation for 21st Century students.

This study will explore the disparities of current teacher preparation programs in preparing Single Subject teachers for the traditional high school, not new reform models in secondary education. This research will help to understand the processes, syllabi, and lessons learned by teachers in credentialing programs at San Diego State University.

The researcher is Ms. Sheila Krotz, an Educational Leadership doctoral student at San Diego State University. She has been an educator for over 29 years, and currently serves as the Medical Pathway Director at San Ysidro High School. The findings of the research will be used to create an exploratory study that other researchers can use for further investigation and that educational leaders and policy makers can use to improve teacher preparation programs at the university level. The faculty supervisor for this study is Nancy Farnan, Ph.D. Dr. Farnan is the Interim Associate Dean for Faculty Development, Research, & Special Projects at San Diego State University. Dr. Farnan is the project lead on a collaborative initiative to prepare teachers to teach in career academies in the secondary school reform field of Linked Learning.

The research includes surveys and focus groups. You will be asked to contribute to this study by completing a survey, lasting approximately 15 minutes. If you self-select, you may be invited to participate in a focus group. The focus group will take place in a private location on your school campus. Focus groups will be audiotaped to ensure the accuracy of all responses. Handwritten notes will be taken for subjects who choose not to be audiotaped. Examples of questions include: 1) How will you as a teacher ensure student engagement? 2) How will you make learning relevant while preparing students for the world of work? You can choose not to answer the questions you are uncomfortable answering. You will be allowed to skip questions that cause discomfort and continue with participation. Your participation is voluntary and there is no penalty if you choose not to participate or choose to discontinue participation. The research
involves minimal risk to the participants (less than or equal to that encountered in daily life at school).

You may experience the following difficulties, as follows: You may feel uncomfortable talking about his/her feelings about the school environment or may become tired or frustrated when trying to complete the assigned tasks. If that should occur, you may discontinue participation, either temporarily or permanently. You can also choose not to answer the questions you are uncomfortable with answering.

The researcher does not foresee any other discomforts or risks associated with this data collection. There are no experimental variables and there is no compensation for participation in this study.

You will have contributed to a study that could be of benefit to educational leaders and policymakers. You may also learn about aspects of teacher preparation during your participation in this study. Your name will be coded to match data collected. All names in work published by the researchers will be pseudonyms. Interviews will be audiotaped and transcribed. If you choose not to be audiotaped, you can still participate in the study and handwritten notes will be taken. Quotes from the observations and interviews may be used for publication of findings but no participant will be identified by name. Your participation will remain confidential (this means that we will conceal your identity and only codes will be used on interview forms and notes we take) except as required by law. The researcher does not believe there are any conflicts of interest, and the participant does not waive any legal right by participating in this study.

You may contact the researcher with questions by email (sheila.krotz@gmail.com). It is suggested that you keep a copy of this consent form for your records.

Participation in this study is voluntary. Your choice of whether or not to participate will not influence your future relations with San Diego State University. If you decide to participate, you are free to withdraw your consent and to stop your participation at any time without penalty or loss of benefits to which you are allowed.

If you have any questions about your rights as a participant in this study, you may contact the Division of Research Affairs at San Diego State University (telephone: (619) 594-6622; email: irb@mail.sdsu.edu).

The San Diego State University Institutional Review Board has approved this consent form, as signified by the Boards’ stamps. The consent form must be reviewed annually and expires on the date indicated on the stamps.

Your signature below indicates that you have read the information in this document and have had a chance to ask any questions you have about the study. Your signature also indicates that you agree to be in the study and have been told that you can change your mind and withdraw your consent to participate at any time. Your signature also indicates
that you consent to the use of audiotapes and understand how the tapes will be used for this study. If you choose not to be audiotaped, you can still participate in the study and handwritten notes will be taken. You have been given a copy of this consent form. You have been told that by signing this consent form you are not giving up any of your legal rights.

Name of Participant (please print)__________________________________________

______________________________________________          __________________
Signature of Participant Date
APPENDIX C

Survey Questions

Thank you for taking time to complete this survey.

Your participation will help in the analysis of teacher preparation programs.

Your participation is voluntary and anonymous.

1. The first two items focus on student engagement:
   - I feel prepared to teach for student engagement
   - I understand how to actively engage students for learning
   Please give one example of how to actively engage students in learning:

2. The next two items focus making learning relevant and authentic:
   - I feel prepared to make learning relevant
   - I understand what is meant by authentic learning
   Please give one example of a relevant learning experience for students:

3. The next two items focus on equity:
   - I understand the issues of equity in a classroom
   - I feel prepared to develop lessons that are equitable
   Please give one example of how schools can support equity for all students:

4. The next two items focus on how schools can provide support for all students to be successful:
   - I feel prepared to identify specific supports for individual students
   - I understand how to obtain and provide resources for students
   Please give one example of providing individualized support to a student:
5. The next two items focus on understanding of teacher collaboration:
   - I feel prepared to collaborate with my colleagues
   - I understand how collaboration can help me professionally

   Please give one example of how collaboration is beneficial:

6. The next two items focus on the various roles of classroom teachers:
   - I understand the various roles of the classroom teacher
   - I feel prepared to assume different roles as a teacher

   Please give one example of a teacher’s role:

7. The next two items focus on preparing student for the world of work:
   - I understand the concept of preparing students for the world of work
   - I know how to design lessons to support students in preparing for the world of work

   Please give one example of a how to support students preparing for the world of work:

8. The next two items focus on ways to use technology effectively in teaching and learning:
   - I know how to use technology to promote student learning
   - I know how to use technology to effectively engage students

   Please give one example of how you would use technology to engage students: