

California STEM Learning Initiatives

Preliminary Landscape Analysis

September 2010

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Article I. Introduction

Section 1.01 Purpose

The landscape analysis is designed to identify the most strategic and impactful opportunities for Senate President pro Tem Darrell Steinberg and his staff to consider for successful engagement in STEM education policy in California.

Section 1.02 Approach

Landscape Assessment Research Approach:

- 1) Conducted a national STEM landscape analysis
- 2) Conducted California STEM literature review
- 3) Surveyed landscape to build a first-draft “master list” of California’s existing organizations in STEM or related fields (see Appendix A)
- 4) Reviewed California State policy and the portfolio of existing STEM-related organizations to determine strengths and weaknesses in the four key areas of:
 - a. Instructional Resources
 - b. Postsecondary Pathways
 - c. Teacher & Leader Support Systems
 - d. Data Collection, Management, and Analysis Systems
- 5) Identified gaps and needs where the CA Senate might add unique value
- 6) Prioritized opportunities based on unmet needs and potential for impact

Section 1.03 Assumptions

We kept the following three outcomes in mind throughout this process:

- All students are prepared to be active and engaged citizens in society that is scientifically and technologically rich, complex, and dynamic.
- All students exit the pK12 system ready and able to succeed in postsecondary education or work.
- An increasing numbers and diversity of students realize the benefits and rewards of becoming STEM professionals

Opportunities for the CA Senate were evaluated and prioritized based on the following criteria and assumptions:

- TBD

We also considered the following impact factors:

- Evidence base
- Funding
- Measurability
- Scale
- Feasibility
- Focus on underserved populations
- Leadership

Article III. Landscape Assessment

The California State STEM landscape was analyzed through using the following four pillars, necessary for successful STEM programs and policies:

1. Comprehensive STEM Instructional Resources
2. Postsecondary Pathways
3. Teacher & Leader Support Systems
4. Data Collection, Management, and Analysis Systems

Brief Summary of Key Strengths & Weaknesses:

Overall Strengths	Overall Weaknesses
<p style="text-align: center;">STEM Instructional Resources</p> <ul style="list-style-type: none"> • Adoption of Common Core Standards • Abundant online resources (e.g. Real Game California, an online career exploration program and Stepping into your Future and Stepping into STEM, online academic support programs) • Strong infrastructure of after school programs • Use of end-of-course exams in mathematics and science <p style="text-align: center;">Postsecondary Pathways</p> <ul style="list-style-type: none"> • Use of end of course exams in math and science <p style="text-align: center;">Teacher and Leader Support Systems</p> <ul style="list-style-type: none"> • Robust sets of teacher data: <ul style="list-style-type: none"> ○ The Center for the Future of Teaching and Learning tracks teacher shortages in the state ○ Survey by CSU Center for Teacher Quality of teachers graduating with multiple subject credentials between 2001 and 2007 • Multiple alternative routes to STEM teaching credentials <p style="text-align: center;">Data Collection, Management, and Analysis Systems</p> <ul style="list-style-type: none"> • An emergence of statewide STEM education leaders, including CSLNet, working in conjunction with the California Council on Science and Technology • Numerous innovative programs across the STEM spectrum 	<p style="text-align: center;">STEM Instructional Resources</p> <ul style="list-style-type: none"> • There is a focus on reading and math, but not science education (because of NCLB) <ul style="list-style-type: none"> ○ The California state high school graduation requirements only include 2 years of math (only Algebra 1 is specified) and 2 years of science (biology and physical science). ○ Current science curriculum and assessments make science boring, requiring memorization rather than fun laboratory experiments. <p style="text-align: center;">Postsecondary Pathways</p> <ul style="list-style-type: none"> • There is not an adequate supply of science and math teachers, and the temptation to go into industry (rather than teaching) is great. <ul style="list-style-type: none"> ○ Multiple subject credentials (for all elementary school teachers) don't have a science focus and teachers are not prepared to teach elementary level science. ○ Middle and High School teacher are self-reported not being fully prepared to teach math and science. <p style="text-align: center;">Teacher & Leader Support Systems</p> <ul style="list-style-type: none"> • Poor longitudinal data systems • Scale and reach of CTE programs is weak <p style="text-align: center;">Data Collection, Management, and Analysis Systems</p> <ul style="list-style-type: none"> • High need for remediation in math

Section 3.01 Level 1: Comprehensive STEM Instructional Resources

Innovative, relevant, and engaging instructional resources aligned to the Common Core Standards are widely and freely available to ensure that all students are well prepared in the STEM disciplines and ready for postsecondary education or work.

LANDSCAPE ASSESSMENT			OPPORTUNITIES
TOPIC	STRENGTHS	WEAKNESSES	
Access to Programming	<ul style="list-style-type: none"> Science education has improved in California over the past few years, but more improvements are necessary.¹ Due to the No Child Left Behind (NCLB) Act there is a focus on math education, especially in the lower grades.¹ The entrance requirements for school in the UC system include 3 years of math (only Algebra 1 and 2, and geometry) and 2 years of lab science (chosen from biology and physical science). Regional STEM Service-Learning Initiative, MESA, Project Lead the Way, California Space Authority, After-School STEM Schools; Citizen Schools 	<ul style="list-style-type: none"> Due to the No Child Left Behind (NCLB) Act there is a focus on reading and math, causing science education to be de-emphasized.¹ Overall student achievement in math and science is improving, based on state tests, but California scores below the national averages on national math and science test in 4th and 8th grade.² The California state high school graduation requirements only include 2 years of math (only Algebra 1 is specified) and 2 years of science (biology and physical science). This is not enough to be college- and career-ready.³ 	<p><u>Disseminate and Share Promising Programs:</u></p> <ul style="list-style-type: none"> Convene a state wide symposium of promising practice in the state, focusing on science in grades K-6.¹ <ul style="list-style-type: none"> Use California STEM Learning Network (CSLNet) to promote the finding of the symposium.¹ <p><u>Science Laboratory Partnerships:</u></p> <ul style="list-style-type: none"> Establish partnership with California’s many laboratories to allow teachers and students to engage with working scientists. <p><u>Raise High School Graduation Requirements</u></p> <ul style="list-style-type: none"> California should require a rigorous core including three year of math (Algebra 1 and 2 and geometry) and three years of science (biology, chemistry and physics) and align high school graduation requirement with UC admissions requirements.

¹ California Council on Science and Technology. “The Preparation of Elementary School Teachers to Teach Science in California” (April, 2010) <http://www.ccst.us/publications/2010/2010K-6.pdf>

² Margaret Gaston: The Current Status of STEM Teaching and Learning in California presented at “Creating a Well-prepared Science, Technology, Engineering and Mathematics (STEM) Workforce: How Do We Get from Here to There?” (April 2009) Symposium Summary Held February 2, 2009 Sacramento California. <http://www.ccst.us/publications/2009/2009CalTAC.pdf>

³ Achieve www.achieve.org

LANDSCAPE ASSESSMENT			OPPORTUNITIES
TOPIC	STRENGTHS	WEAKNESSES	
Common Core Standards	<ul style="list-style-type: none"> California has adopted the Common Core. The California Department of Education has standards in place for effective science programs.¹ There is a consensus on the value of “inquiry-based” science education.⁴ “Inquiry-based” science education “fosters an aptitude for critical thinking and problem-solving that precisely matches the workforce skills that U.S. business and industry need and want.”⁴ 	<ul style="list-style-type: none"> Even though there is a consensus on the importance of “inquiry based science education, “most current science education across the United States [and in California] falls far short of inquiry-based science education standards.”⁴ <ul style="list-style-type: none"> Current science curriculum and assessments make science boring, requiring memorization rather than fun laboratory experiments. 	<p><u>Take a Leadership Role in Common Core Standards:</u></p> <ul style="list-style-type: none"> Ensure that the new science standards are inquiry – based.¹ Ensure the new science standards make science more exciting.⁵ Give the best teachers in the state a voice in helping to design the new standards.⁴

⁴ Bruce Alberts: Progress in Science and Math Education Requires Empowering Our Best Teachers presented at “Creating a Well-prepared Science, Technology, Engineering and Mathematics (STEM) Workforce: How Do We Get from Here to There?” (April 2009) Symposium Summary Held February 2, 2009 Sacramento California. <http://www.ccst.us/publications/2009/2009CaITAC.pdf>

⁵ California Council on Science and Technology, and The Center for the Future of Teaching and Learning. “Critical Path Analysis of California’s Science and Mathematics Teacher Preparation System.” (March 2007) <http://www.ccst.us/publications/2007/2007TCPA.pdf>

LANDSCAPE ASSESSMENT			OPPORTUNITIES
TOPIC	STRENGTHS	WEAKNESSES	
Assessments	<ul style="list-style-type: none"> • Math <ul style="list-style-type: none"> ○ California administers Math Standards Tests (with 65 multiple choice questions) in grades 2 -6. ○ In grade seven, students either take the Algebra I exam or a seventh grade math standards exam. ○ California administers end-of-course exams in General Math (8th and 9th grade only), Algebra I and II, geometry, Integrated Math 1 -3, and summative high school math (grade 9 – 11 only) • Science <ul style="list-style-type: none"> ○ California administers Science Standards Tests (with 60 multiple choice questions) in grades 5, 8 and 10. ○ California administers end-of-course exams in Biology, Chemistry, Physics, Earth Science and Integrated/Coordinated Science 1 -4 ○ Tenth graders take a Science Standards Tests (with 60 multiple choice questions) in Life Science as well as appropriate end of course exams. 	<ul style="list-style-type: none"> • Current science assessments drive “science education away from inquiry-based standards and aspirations, because it is both cheaper and more efficient to test for knowledge of science terminology, rather than true understanding and ability...Memorizing definitions instead of discovering and exploring explanations for natural phenomena makes science boring and drives students — and thus potential scientists and innovators — away from these classes. ‘Real science is exciting! ... and completely different from the tests and textbooks.’”⁴ 	<p><u>Take a Leadership Role in New Assessments:</u></p> <ul style="list-style-type: none"> • Ensure the new science assessments (created through common core) make science more exciting.⁴ <ul style="list-style-type: none"> ○ Multiple types of assessments, not based on memorization of definitions. • Give the best teachers in the state a voice in helping to design the new assessments.⁴
Online Resources	<ul style="list-style-type: none"> • Real Game California – online career exploration program • Stepping into your Future and Stepping into STEM – online academic support programs. 		

LANDSCAPE ASSESSMENT			OPPORTUNITIES
TOPIC	STRENGTHS	WEAKNESSES	
Evaluate Instructional Resources			<p><u>Conduct a Formal Evaluation of STEM Supports</u></p> <ul style="list-style-type: none"> CA should partner with a STEM focused organization (possibly the California Council on Science and Technology) to conduct an annual review of STEM supports for teachers and leaders in California.

Suggested Interview Organizations:

- California Council on Science and Technology (CCST)

Initial Brainstorm of Questions:

- What is the CCST's perspective on the CA STEM landscape and what could be done to drive the greatest outcomes in this environment?
- What are the plans for math and science assessment implementation of the Common Core?

Section 3.02 Level 2: pK12 Pathways and Postsecondary Success

Well-articulated, academically rigorous, and workforce relevant pathways to postsecondary success in STEM professions are visible, accessible, attractive, and attainable to all students.

LANDSCAPE ASSESSMENT			OPPORTUNITIES
TOPIC	STRENGTHS	WEAKNESSES	
State Policy	<ul style="list-style-type: none"> CA adopted Common Core standards CA is a member of The Partnership for Assessment of Readiness for College and Careers (PARCC) which was recently awarded \$170M in federal funding <ul style="list-style-type: none"> PARCC will test students' ability to read complex text, complete research projects, excel at classroom speaking and listening assignments, and work with digital media. PARCC will also replace the one end-of-year high stakes accountability test with a series of assessments throughout the year. 	<ul style="list-style-type: none"> CA is not a member of Complete College America Alliance of the States State high school graduation requirements do not align to college and career entrance requirements; Local school districts have the authority and responsibility for establishing high school graduation requirements 	<p><u>Join Complete College America:</u></p> <ul style="list-style-type: none"> Advocate for CA to join Complete College America and specifically set a state level STEM graduation goal (<i>no goals found on UC Regent website, Cal State, or CA Community College Network</i>) <p><u>Align High School Graduation Requirements to College and Career Ready Requirements</u></p> <ul style="list-style-type: none"> Aligned high school graduation requirements will prepare more students to be ready for rigorous STEM disciplines in postsecondary education
STEM Schools	<ul style="list-style-type: none"> All around supportive state policies for charter schools (ranked 3rd in nation by National Alliance for Public Charter Schools) Over 800 charter schools in CA representing ~8% of total schools in state Nationally leading STEM schools such as High Tech High # of charter schools focused on STEM less than ~15% (based on data provided in RTTT application) 	<ul style="list-style-type: none"> Evidence of gathering best practices from successful STEM charter schools and dissemination back into mainstream schools? Effectiveness of charter schools varies dramatically throughout state STEM schools do not appear to be a focus of the newly launched statewide California STEM Learning Network (more focus is put on after school and virtual learning) 	<p><u>Increase STEM Charter Schools and Share Best Practices:</u></p> <ul style="list-style-type: none"> Encourage continued development of STEM focused charter schools Gather best practices from effective STEM charter schools and infuse these strategies into main stream schools

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">CTE</p>	<ul style="list-style-type: none"> • Impact and effectiveness of California Partnership Academies (CPAs) • Work based learning opportunities through California's 74 Regional Occupational Centers and Programs (ROCPs) which serve every district • Momentum towards creating a “Multiple Pathways” approach to transforming high schools • ConnectEd Linked Learning – one of CA’s primary initiatives to transform high schools through connecting college prep academics with real –world experience in an array of fields 	<ul style="list-style-type: none"> • Scale of CPAs (~500 statewide); the number of students enrolled in CPAs represents less than 3 percent of the nearly two million high school students enrolled in California’s high schools. • The 7,650 CTE courses that the UC has approved for a-g, represent more than 25 percent of the total number of CTE courses statewide. Although an additional 920 ROCP courses have been UC approved, most CTE courses are still not eligible for UC approval, and very few are in core areas, such as English, mathematics, and history/social science. 	<p><u>Expand CTE Opportunities and Linkages:</u></p> <ul style="list-style-type: none"> ○ Expand CPAs to provide CTE opportunities to more of CA’s students ○ Allow California Partnership Academies to include students for four years rather than the current three years. ○ Advocate for stronger linkages between high school CTE courses and postsecondary schools to promote system coherence ○ Create stronger ties between CTE and “academic” instruction ensuring that CTE courses foster the achievement of academic standards (especially in STEM) and meet high industry standards ○ Pilot and expand “multiple pathways” approach and encourage multiple STEM focused pathway offerings
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">After School Programming</p>	<ul style="list-style-type: none"> • Well developed after school infrastructure across the state • Proposition 49, passed by the voters in 2002, created the nation’s largest after-school system, providing \$550 million annually to support programs at more than 4,000 schools, prioritizing services in those schools with the highest need <ul style="list-style-type: none"> ○ Example: High quality extended day program in middle schools, such as Citizen Schools, where 25% of Citizen Schools California apprenticeships were STEM focused • Momentum to build upon after school programming strength by adding summer programming to combat summer learning loss that disproportionately impact minority and low income students 	<ul style="list-style-type: none"> • Out of 4,000 programs offered for after school programming, it is unclear how many are STEM focused and which are achieving the best results 	<p><u>Encourage STEM Focus in After School Programs:</u></p> <ul style="list-style-type: none"> ○ Leverage the strong after school infrastructure in place as a vehicle for increasing scale and consistency of STEM instructional time

Remediation & Achievement Gap	<ul style="list-style-type: none"> • 84 percent of entering community colleges students can't do college-level math • The most recent (fall 2008) results of California State University's (CSU) Early Assessment Program indicate that even students eligible for CSU needed remediation, as only about 62.8 percent of entering freshmen were proficient in mathematics • Persistent achievement gaps remain and the Latino achievement gap is particularly worrisome for CA 	<p><u>Decrease the Need for Remediation in Math:</u></p> <ul style="list-style-type: none"> ○ Increase effort to identify and prevent remediation (early intervention) ○ Strengthen pathways from community college to career and continued postsecondary education (from remedial courses)
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Suggested Interview Organizations:

- Connected Ed Linked Learning
- California STEM Learning Network
- Jack O'Connell, State Superintendent of Public Instruction California Department of Education – lead report on “Multiple Pathways” to CA State Legislature
- The California Space Education and Workforce Institute (CSEWI) – who collaborated to produce the “California STEM Collaborative Action Plan” in 2008. May be interesting to get their thoughts on what can be done now in 2010.

Initial Brainstorm of Questions:

- What percentage of after school programs are focused on STEM? Are they spread equitably throughout the state?
- Where does California currently have the greatest existing STEM capacity that can be leveraged to drive state-wide progress and increased STEM completion rates?
- Does California have a STEM completion goal?
- What is the approximate percentage of charter schools focused on STEM?
- How can quality CTE programs be expanded in this fiscal environment?
- What is the current state of the “Multiple Pathways” approach to reforming high schools in light of budget constraints?

Section 3.03 Level 3: Teacher and Leader Supports

Performance analysis and support systems are implemented to ensure that current and future teachers and leaders have the capacity to provide every student with effective STEM learning experiences.

LANDSCAPE ASSESSMENT			OPPORTUNITIES
TOPIC	STRENGTHS	WEAKNESSES	
Supply and Demand	<ul style="list-style-type: none"> California works with the Center for the Future of Teaching and Learning to track teacher shortages in the state. 	<ul style="list-style-type: none"> Once an adequate supply of math and science teachers are trained, California needs to “do a better job in ensuring that they end up in the classroom. The temptation to work in business or industry, for financial and other reasons, is strong.”² It is expected that CA will need 33,000 math and science teachers from 2007 – 2017 – supply does not meet demand.⁵ 	<p><u>Work with California’s Community Colleges:</u></p> <ul style="list-style-type: none"> High schools, community colleges and four-year universities should work together to ensure transfer aligned programs of study to allow future STEM teachers a seamless transfer.¹ Community colleges play a large role in preparing California’s elementary school teachers “65% of teachers earning multiple subject credentials had completed their lower-division coursework at community colleges with 37% of these receiving CSU credit toward their subject matter preparation.”¹
Financial Incentives	<ul style="list-style-type: none"> According to the National Council on Teacher Quality – California does provide differential pay for shortage subject areas.⁶ 	<ul style="list-style-type: none"> It is up to local districts what subject earn differential pay and the amount earned.⁶ 	<p><u>Standardized Differential Pay Across California</u></p> <ul style="list-style-type: none"> Ensure that differential pay for STEM subjects is enough to attract candidates into the teaching profession, rather than taking a (high paying) industry job.
Teacher Certification	<ul style="list-style-type: none"> Requirements to be certified as a teacher in California <ul style="list-style-type: none"> Secondary Level – Single Subject Credential – To be certified to teach science at the secondary level, teacher candidates must “take and pass the appropriate subject matter examinations or obtain verification of completion of subject-matter course work from the Commission on Teacher Credentialing.” Is a slightly higher standard than in other subjects. 	<ul style="list-style-type: none"> Most K-6 grade teachers hold multiple subject credentials, rather specialized STEM credentials. Requirements to be certified as a teacher in California <ul style="list-style-type: none"> Elementary Level – Multi-Subject Credential – To be certified to teach elementary schools there are no specific math or science requirements. 	<p><u>Establish Elementary Level Science Teaching Credentials:</u></p> <ul style="list-style-type: none"> “By 2011, the California Commission on Teacher Credentialing should align the multi-subject science course requirements with single subject science requirements; UC and CSU should pilot this approach in their respective Cal-Teach/SMI and MSTI. The California Community College System Chancellor’s Office should develop system-wide articulation agreements with the CSU in particular, focusing on lower division requirements for multiple subject teachers.”¹

⁶ National Council on Teacher Quality. Teacher Policy Yearbook 2009: California. (2010). <http://www.nctq.org/stpy09/> (accessed August 2010).

LANDSCAPE ASSESSMENT			OPPORTUNITIES
TOPIC	STRENGTHS	WEAKNESSES	
Preparation Programs	<ul style="list-style-type: none"> Survey by CSU Center for Teacher Quality of teaching graduating with multiple subject credentials between 2001 and 2007. SB 1209, passed in 2006, “included several provisions that simplified the process of earning a teaching credential, which may help encourage more individuals to consider entering the profession. The legislation streamlined testing requirements for prospective teacher candidates and made it easier for teachers who hold credentials from outside the state to earn a credential in California.”¹ According to the CA RTTT application, CSU is working with ConnectED to help prepare STEM teachers. 	<ul style="list-style-type: none"> Teacher prep varies by program, but in multiple subjects credentials there is lack of focus on science.¹ Entry level science courses are not designed for prospective teachers.¹ Science classes available to prospective teachers are not aligned with content they will be required to teach.¹ In a survey of over 12,500 first year teachers completed by The California State University Center for Teacher Quality, the teachers overwhelmingly reported being better prepared to teach math and reading then science.¹ In a survey of by The California State University Center for Teacher Quality, experienced teachers “reported higher self-assessments of proficiency in reading and math, but nearly identical levels in science as first-year teachers.”¹ The National Council on Teacher Quality ranks California as “partially meeting the goal of Teacher Preparation in Mathematics.” Stating “California should require teacher preparation programs to provide mathematics content that is specifically geared to the needs of elementary teachers.”⁵ 	<p><u>Take a Leadership Role in Common Core Standards:</u></p> <ul style="list-style-type: none"> Ensure that the new science and math standards are incorporated into teacher preparation programs.¹ <p><u>Improve Recruitment:</u></p> <ul style="list-style-type: none"> Use multiple, comprehensive, recruitment approaches to attract candidates into the teaching profession.¹ <p><u>Leverage Successful Programs:</u></p> <ul style="list-style-type: none"> Leverage existing successful programs, including “interactive web-based materials, immersive science by connecting to community stakeholders (parents, teachers, community centers, etc.), informal learning experiences (museums, science centers, etc.)”.¹ <p><u>Take Advantage of Rich Data:</u></p> <ul style="list-style-type: none"> Use data and research from the (California based) Center for the Future of Teaching and Learning (CFTL) to ensure that California’s preparation programs have all the components necessary to prepare successful elementary science teachers.¹ Replicate the work of the CSU Center for Teacher Quality in other preparation programs.¹ Use the CSU survey results to improve teacher preparation programs. <p><u>Replicate Successful Programs:</u></p> <ul style="list-style-type: none"> The California Council on Science and Technology identified 9 programs as “promising” in preparing K-6 teachers in science with a multiple-subject credential. <ul style="list-style-type: none"> Community College - Cerritos College ; CSU - Cal Poly/SLO ; Chico State; Cal State Fullerton; UC - UC Irvine; UC Riverside; UC Santa Cruz ; and Private/Independent - Chapman University; Stanford University

LANDSCAPE ASSESSMENT			OPPORTUNITIES
TOPIC	STRENGTHS	WEAKNESSES	
Preparation Programs (con't)		<ul style="list-style-type: none"> • According to a 2007 survey of Bay Area schools, 80% of elementary school teachers reported spending 60 minute or less per week on science, included in this number are the 16% that reported spending no time on science at all.¹ • CA has 17,500 science teachers and 22,500 math teachers in middle and HS – not all these teachers are fully prepared. According to a 2007 study – <ul style="list-style-type: none"> ○ 10% of all science and math MS teachers were underprepared (lacking a subject specific teaching credential) and 30% of 1st and 2nd year math science teachers were underprepared. 9% of teacher with a science or math credential teach out of subject. ○ 9% of all science and 12% math of all HS teachers were underprepared (lacking a subject specific teaching credential) and 35% of 1st and 2nd year science teachers and 40% of 1st and 2nd year math teachers were underprepared.⁶ 	

LANDSCAPE ASSESSMENT			OPPORTUNITIES
TOPIC	STRENGTHS	WEAKNESSES	
Teacher Alternative Route Programs	<ul style="list-style-type: none"> • In the 2007-2008 school year, multiple subject credentials accounted for only 22% of internship credentials (compared to 49% of all credentials that year) indicating that alternative routes are more focused on single subject credentials.¹ <ul style="list-style-type: none"> ○ Single subject credentials are more focused on specific area (i.e. science) than the broad multi-subject credential. ○ Internships are more content focused than the traditional routes • California has over 68 alternative route programs in place (internships), and was designated by the National Center for Alternative Certification to be one of three states with “the most prolific alternate routes.” 		
Evaluation Systems	<ul style="list-style-type: none"> • Center for the Future of Teaching and Learning (CFTL) – tracks teachers shortages and distribution. 		

LANDSCAPE ASSESSMENT			OPPORTUNITIES
TOPIC	STRENGTHS	WEAKNESSES	
Professional Development	<ul style="list-style-type: none"> • There are 27 separate Professional Development programs listed on the California STEM inventory. • California Space Authority offer high quality professional development opportunities for teacher. • The California Subject Matter Project (CSMP) – statewide professional development projects in nine subjects including math and science. • Intel Math – teacher training. • Industry Initiatives for Science and Math – Summer Fellowships for Teachers • Intel Teach – project based PD • MIND Research Institute ST Math – software based math PD 	<ul style="list-style-type: none"> • Not enough PD opportunities for STEM teachers, not enough deep subject matter PD.⁴ 	

Suggested Interview Organizations:

- Center for the Future of Teaching and Learning

Initial Brainstorm of Questions:

- What data is tracked and how is it used?
- Are there plans to expand the data that is tracked?
- Are there any formal evaluations of professional development programs?

Section 3.04 Level 4: Data Collection, Management, and Analysis Systems

Technology driven data systems collect, display, and analyze multiple sources of meaningful student data to support and create results oriented, outcomes driven cultures of continuous improvement

LANDSCAPE ASSESSMENT			OPPORTUNITIES
TOPIC	STRENGTHS	WEAKNESSES	
State Data Systems	<ul style="list-style-type: none"> CA meets 8/10 Data Quality Campaign (DQC) essential elements CA is projected to meet all 12 elements of the America Competes Act by 2012 with the completion and implementation of 3 systems: <ul style="list-style-type: none"> California Longitudinal Pupil Achievement Data System (CALPADS), a statewide longitudinal system that tracks K-12 students and eventually links students from preK-20 California Longitudinal Teacher Integrated Data Education System (CALTIDES), which coordinates teacher authorization and teacher preparation data California Partnership for Achieving Student Success program (Cal-PASS), which is a voluntary data sharing network of CA's schools, colleges, and universities CA provided a strong plan in their RTTT application for access and use of data, including use to improve instruction and use of data to equitably distribute effective teachers to high-poverty school and in hard to staff subjects such as STEM 	<ul style="list-style-type: none"> Missing DQC essential elements are: <ul style="list-style-type: none"> Student-level transcript information, including information on courses completed and grades earned The ability to match student records between the P-12 and postsecondary systems CA meet 0/10 Data Quality Campaign actions to ensure effective data use CA currently only meets 5/12 America Competes Act elements (significant points were lost in RTTT application due to this) It is unclear if CA will still be able to meet their aggressive data system improvement goals without RTTT funding 	<p><u>Improve Data Systems:</u></p> <ul style="list-style-type: none"> CA could seek alternative funders, such as the Gates foundation, to continue to implement the activities and goals that were outlined in their RTTT application for data systems and support instruction

LANDSCAPE ASSESSMENT			
TOPIC	STRENGTHS	WEAKNESSES	OPPORTUNITIES
Use of Technology & Innovation to Enable STEM Teaching	<ul style="list-style-type: none"> CA has strong technical infrastructure and resources including: <ul style="list-style-type: none"> California Virtual Campus K20 California Educational Technology Collaborative California STEM Innovation Network (CSINet) – eportfolio program Mind Research Institute “ST Math Program” HP Catalyst Initiative 	<ul style="list-style-type: none"> Scale, reach, and impact of these programs is unclear 	<p><u>Leverage Technology to Enable STEM Teaching and Ensure Equal Exposure and Access:</u></p> <ul style="list-style-type: none"> Ensure students state-wide have equal awareness and access to technology tools to enhance their STEM learning

Suggested Interview Organizations:

- See above list under technology

Initial Brainstorm of Questions:

- Determine scale and reach of programs
- How can they be further leveraged to increase state-wide impact?

Article III. Potential Priorities for CA Senate

TBD...

Championing STEM in the State Assembly

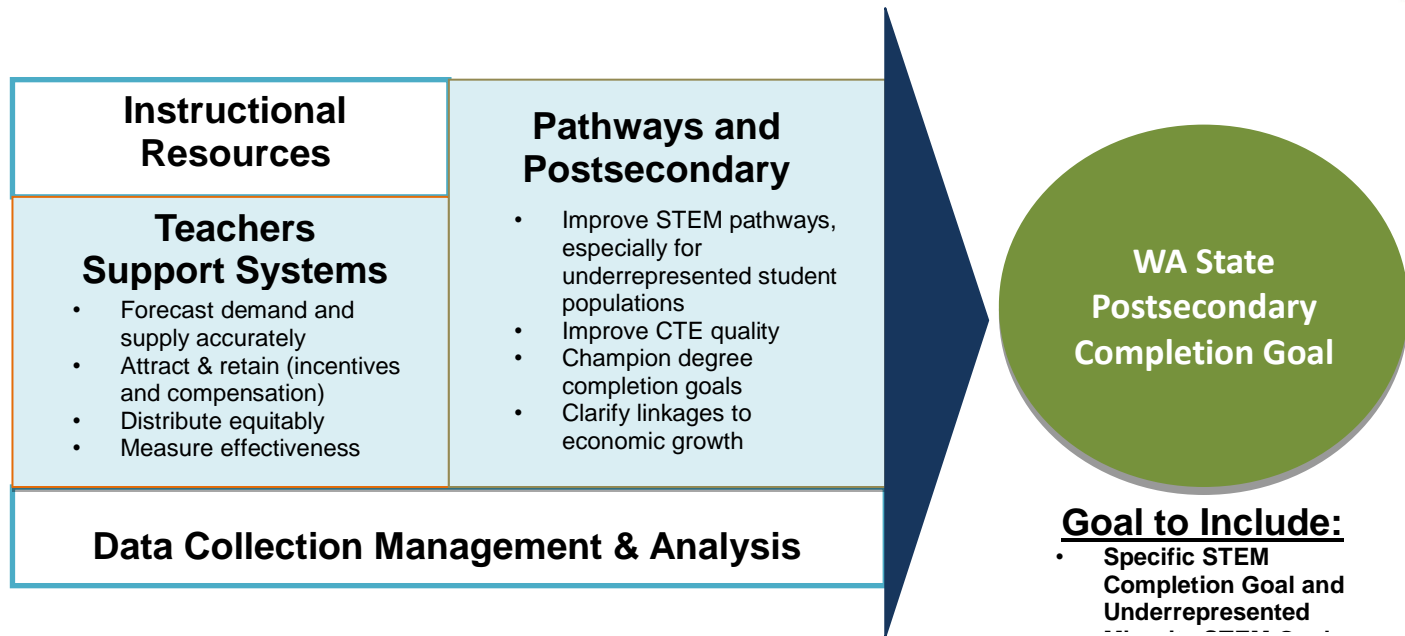
- Understand the nuances of STEM education, including its different forms, guiding principles and potential impact.
- Champion STEM education in the State Assembly by speaking to its benefits and impact.

Championing STEM in the State Assembly, Convening Partners and Driving State-level STEM Policy

- Understand the nuances of STEM education, including its different forms, guiding principles, and potential impact.
- Champion STEM education in the State Assembly by speaking to its benefits and impact.
- Meet with and convene key state STEM education partners to understand STEM dynamics in CA and signal interest in supporting it as a priority in the State Assembly.
- Aggressively drive State-level STEM Policy in the State Assembly.

Championing STEM in the State Assembly, Convening Partners, Driving State-level STEM Policy and Hosting State STEM Education Summit

- Understand the nuances of STEM education, including its different forms, guiding principles, and potential impact.
- Champion STEM education in the State Assembly by speaking to its benefits and impact.
- Meet with and convene key state STEM education partners to understand STEM dynamics in CA and signal interest in supporting it as a priority in the State Assembly.
- Aggressively drive State-level STEM Policy in the State Assembly.
- Host a State-wide STEM Education Summit to convene partners and promote STEM.



Article IV. Suggested Next Steps

Task	Priority
	High
	High
	Medium
	Medium
	Low

Table 12: Types of California’s Charter Schools, 2009–10

Types of California Charter Schools	Number of Schools (n=810)
Curriculum Type	
Traditional	226
Performing/Fine Arts	96
Technology	65
Science/Mathematics	35
Vocational	26
Montessori	21
Other Specialty	486
Because some schools fall into more than one category, the total in this section is more than 810.	
Instructional Strategy	
Site-based instruction	626
Independent study	152
Combination of site-based instruction and independent study	32
Source of Funding	
Directly funded (i.e., funded by State)	577
Locally funded (i.e., funded through a district)	219
Not in funding model	14

Article VIII. Sources Consulted

In addition to the source cited here, additional information was provided by the following individuals:

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