What Educational Resources Do Students Need to Meet California's Educational Content Standards? A Textual Analysis of California's Educational Content Standards and Their Implications for Basic Educational Conditions and Resources

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More than a decade and a half ago when *A Nation at Risk* decried "a rising tide of mediocrity" within the American school system, an educational reform movement took hold throughout the country. Academic standards have dominated this movement in an effort to delineate what American students ought to be learning and to ensure that schools' as well as students' performance can be measured. The premise undergirding the standards movement is that *all* children can achieve at high levels; all we need to do is raise the bar and they will leap over it. Coupled with the development of standards and the push to measure performance, many states, including California, have also begun to hold their schools and students accountable for such measured performance. Not only are the expectations raised for our children, but so too are the stakes. But are higher standards and stiffer accountability enough to ensure that *all* children achieve at high levels? Can we be sure that all students and schools – particularly those in low-income minority communities – enjoy the necessary support, conditions, and resources to succeed? This paper addresses this potentially missing link in this standards-based reform and accountability scheme: the provision of necessary educational conditions and resources to ensure that all children in California have an opportunity to achieve at the high levels prescribed by the state.

The primary elements of the standards-based reform strategy as it has been enacted in most states are threefold: (1) the state sets broad and high minimum "content standards" that describe the knowledge, skills, and abilities that schools are expected to teach and students are expected to learn in core academic content areas, such as math, science, reading, and social studies; (2) the state similarly sets "performance standards" which provide explicit definitions of what students must know to demonstrate a mastery of the content standards; and (3) the state fairly and accurately assesses whether students have attained those standards. This strategy has been endorsed by a broad coalition of policy-makers, local communities, educators, business leaders, and the federal government. To date, 49 states, including California, currently have approved content and/or performance standards in major curriculum areas (Education Week Supplement Jan. 13, 2000, 62-63).

Some commentators, however, including some of the early champions of standards-based reform, felt that this strategy was incomplete without providing students with the necessary educational conditions and resources to meet the world-class standards (O'Day and Smith 1993; Darling-Hammond 1992-93). Consequently, these commentators have pressured policy-makers to adopt "opportunity-to-learn (OTL)" or "school delivery" standards that would identify the conditions and level of resources necessary to teach to and meet high standards. These requests, however, proved mostly

fruitless as most jurisdictions have failed to make any attempt to define such OTL or school delivery standards.

Perhaps equally significant, many jurisdictions, including California, are beginning to hold their students and schools accountable for student proficiency on the state standards. For instance, school districts in California, which are mandated to end the practice of social promotion, may choose to tie grade advancement to achievement on the state's standards-based exams. And in the near future, all California children who want to earn a high school diploma will be required to pass a high school exit examination that will be aligned with the state's standards. The stakes are high for California's children. Similarly, the State has begun to hold schools accountable for student performance with a system of rewards for those schools that meet their academic goals and graduated punishments for those that fail. But before the state can hold students, teachers, and administrators accountable, it is fair to ask whether the students and schools enjoy the resources necessary to permit teachers to teach to and children to meet the high standards.

This paper is premised on the intuitively compelling notion that it is not fair to hold students and teachers accountable when they are hamstrung by resource deficiencies. The missing ingredient in California's recipe of high standards and strong accountability is the assurance that all children will receive the opportunities to achieve to the level of the state's standards. What follows in the next section of this paper is a discussion of the State's content and performance standards and their implications for our children. That section describes the state's legislative scheme for standards-based reform and how that scheme has the potential for raising the bar for all students on the one hand, but also carries with it the risk of further exacerbating the existing educational inequalities on the other. Without the provision of sufficient resources, we argue, standards-based reform cannot live up to its potential.

But this begs the question of what, if any, educational resources are necessary for children to meet the state's high standards. Turning from the state's standards-based reform and accountability scheme, the final section of this paper addresses that question by systematically analyzing the text of the state's content standards and identifying those resources that all students *must* receive in order to meet the high standards. We note from the outset that this analysis is based only on the text of the standards and the accompanying, publicly available materials that support standards implementation such as the state's curriculum frameworks. Our analysis is not an attempt to create an "adequacy model" for school resource funding nor a "market basket" of educational goods that are necessary for the operation of a school and delivery of a high-quality educational program. Rather, it is a much more straightforward analysis of the State of California's own texts and what those texts imply in terms of educational conditions and resources.

The most striking finding from this analysis is that the standards do require specific educational resources and conditions in order for children to reach proficiency, including certain instructional materials, technologies, teacher qualities, and facilities.

Put simply, there are specific opportunities to learn that must be provided to all California students. Whether each and every child in the state enjoys those opportunities is a much different matter. What is known, however, is that California's standards-based reform scheme does not ensure that those resources are provided to children.

Standards-Based Reform in California: Raising the Stakes for Schools and Students

California's academic content and performance standards were authorized by the 1995 passage of the Leroy Greene California Assessment of Academic Achievement Act.[1] This act mandates the development and adoption of academically rigorous content and performance standards in the core curriculum areas of English-Language Arts, Mathematics, History-Social Science, and Science, for grades K-12.[2] To better understand the ways in which California policy- and school-reform efforts have been affected by these standards, this section of the paper describes the purpose and development of the standards, the state's accountability system that will be tied to those standards, and the consequences for students who fail to live up to the state's standards.

Purpose of the California Assessment of Academic Achievement Act

The California Legislature's stated intent in enacting the California Assessment of Academic Achievement Act (the "Act") was to:

> [P]rovide a system of individual assessment of pupils that has, as its primary purpose, assisting pupils, their parents and teachers to identify individual academic strengths and weaknesses, in order to improve teaching and learning.… [In addition, the Legislature intends] to determine the effectiveness of school districts and schools, as measured by the extent to which pupils demonstrate knowledge of the fundamental academic skills, as well as the ability to apply those skills.[3]

The Legislature recognized that, in order to provide sound assessments of pupils' and schools' achievement, a set of statewide, academically rigorous content standards and performance standards was required. These standards, as envisioned by the Legislature, would provide all participants in the educational system with a clear set of expectations for student achievement, and would enable schools and administrators to assess the extent to which each expectation was being met.

The Act required that the new standards:

- be measurable and objective;

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1 Cal. Educ. Code §§ 60600-60700 (as originally enacted).

2 Cal. Educ. Code § 60602(a). It is worth noting that, pursuant to Senate Bill 1390, signed by Governor Gray Davis in September 2000, the State Board of Education adopted Visual and Performing Arts Content Standards in January 2001. This paper does not analyze those standards because the state does not assess pupils' performance in relation to those standards.

3 *Id.*

- reflect the knowledge and skills necessary for California's workforce to be competitive in the global, information-based economy of the 21st century;
- be comparable in rigor to the academic content and performance standards used in the school systems of America's global competitors; and
- include input from parents, educators, and the public in all geographic regions of the state, including at least six public hearings.[4]

Development of the Content Standards

The Act established the Commission for the Establishment of Academic Content and Performance Standards ("Standards Commission"). Composed of 21 members appointed by the Legislature, the Governor and the Superintendent of Public Instruction, the Standards Commission included parents, public school trustees, teachers and administrators, representatives of the business community, and individuals with specialized expertise in pupil assessment and/or core curriculum areas.[5] The Committee was broken down into subcommittee groups by core curriculum area, each of which was responsible for spearheading the development of its own standards.[6] By the end of 1998, the State Board of Education had adopted content standards in all four subject areas. Independent experts and agencies that have reviewed the standards give them high marks for their clarity, measurability, and high expectations (American Federation of Teachers 2000; Finn and Petrilli 1999). In addition and as is discussed further below, the state has adopted curriculum frameworks – blue prints and suggested guidelines for teachers to use in developing standards-focused curricula – in the four content areas. An overview of the standards for each content area is provided below.

English-Language Arts

The content standards for English-Language Arts were adopted by the State Board of Education in December 1997. The standards are organized into eight core competencies: (1) word analysis, fluency, and systematic vocabulary development, (2) reading comprehension, (3) literary response and analysis, (4) writing strategies, (5) written and oral English language conventions, (6) listening and speaking strategies, and (7) speaking applications. At the elementary school level, the content standards emphasize development of phonemic awareness, oral and silent reading, and basic writing conventions (such as sentence and paragraph structure). By middle school, students are building on this knowledge, and acquiring sophisticated research techniques, in order to create research reports and oral presentations. At the high school level, students are engaged in interdisciplinary analysis of texts - evaluating the philosophical, political, religious, ethical and social influences on plots and settings – and are using technology and audio-visual materials to develop multimedia presentations. Throughout all grades, reading is a primary focus; by the end of twelfth grade, for example, students are expected to read two million words annually on their own.

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4 Cal. Educ. Code § 60605 (Historical Derivation).
5 *Id.*
6 *Id.*

Mathematics

The Mathematics Content Standards were adopted by the California State Board of Education in December 1997, and are broken down into two sections: K-7 and 8-12. The K-7 standards are not broken down by subject area but into categories called strands, sets of manageable and understandable categories that are used to aid the organization and the thinking about the curriculum. The five strands are Number Sense; Algebra and Functions; Measurement and Geometry; Statistics, Data Analysis, and Probability; and Mathematical Reasoning. As students move to higher grades, problems require increasingly advanced knowledge and understanding of mathematics, are increasingly complex, and require increased use of inductive and deductive reasoning and proof. The grade 8-12 standards are organized by discipline: Algebra I; geometry; Algebra II; trigonometry; the pre-calculus course, mathematical analysis; and probability and statistics.

The standards also focus on developing important skills for the study of advanced mathematics, science and technical careers, and postsecondary study in all content areas. The content of these disciplines must be covered and students are expected to achieve the standards, but not necessarily in a particular sequence. Students are also expected to: develop fluency in basic computational skills; develop an understanding of mathematical concepts; and become mathematical problem solvers who can recognize and solve routine problems readily and can find ways to reach a solution or goal where no routine path is apparent.

History-Social Science

The History-Social Science Content Standards were adopted in October 1998. The standards emphasize three main goals: Knowledge and Cultural Understanding, Democratic Understanding and Civic Values, and Skills Attainment and Social Participation. Within the area of Knowledge and Cultural Understanding, students are expected to develop historical literacy, ethical literacy, cultural literacy, geographic literacy, economic literacy, and sociopolitical literacy. Democratic Understanding and Civic Values enables students to develop an understanding of national identity, our constitutional heritage, and civic values, rights, and responsibilities. Through the Skills Attainment and Social Participation standards, students are expected to develop participation skills, critical thinking skills, and basic study skills. These basic learning skills serve as curriculum strands, unifying the curriculum across all grades. Knowledge and skills increase in complexity in a systematic fashion from kindergarten through grade twelve. The use of primary source documents found in archives, museums, historical sites, and libraries, as well as literature from and about the periods being studied, is also emphasized.

Science

Content standards for Science were adopted by the State Board of Education in October 1998. The science standards include grade-level specific content for kindergarten through grade eight organized around three strands: physical science; earth science; and life science. The standards for grades nine through twelve are divided into four content strands: physics; chemistry; biology/life sciences; and earth sciences. Additionally, the four high school strands are divided into two groups: standards that all students are *expected to achieve* in their science courses, and standards that all students should have *the opportunity to learn*.[7] Significantly, the stated intention of the standards commission is that those opportunities to learn should be offered at every high school.

In addition, the science content standards contain an Investigation and Experimentation (IE) strand which describes a progressive set of expectations for each grade (kindergarten through twelve) across all content areas. The Investigation and Experimentation strand suggests a methodological approach to California's science instruction that incorporates student-initiated inquiry and experimentation. Investigation and Experimentation standards describe learning that "should be integral to, and directly and specifically support, the teaching of the content strands and disciplines." (California Department of Education 2000b, p. 2)

Aligning California Educational Policy with the "World Class" Standards

True to the systemic reform strategy of standards-based reform, California has taken steps toward aligning its educational policies to the state's standards. Although the content and performance standards are only "model" standards, and are technically not binding on individual school districts, it is worth noting that all state-adopted curriculum frameworks, instructional materials, grade promotion policies, high school exit examinations, teacher credentialing standards, and school accountability efforts are intended to be aligned to these standards.[8] This section discusses each of these standards-based policies and their implications for teaching and learning in the state.

Curriculum Frameworks

Curriculum frameworks are the "blueprints" for implementation of the content standards. Rather than explicitly prescribing the particular resources that are required to achieve student mastery of the content standards - such as instructional materials, technology, facilities, and personnel - the curriculum frameworks instead focus upon curricular and instructional content. The Act provides that existing curriculum

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[7] The second group of high school standards includes advanced concepts and extends the content area learning. (*See, e.g.*, California Department of Education 2000c, p.43 ("students know how to predict the probable mode of inheritance from a pedigree diagram showing phenotypes" and "students know how to use data on frequency of recombination at meiosis to estimate genetic distances between loci and to interpret genetic maps of chromosomes").

[8] Cal. Educ. Code §§ 60604(a), 60605, 60618, & 60850.

frameworks in each subject area will be aligned with the new content and performance standards once they were completed.[9]

This alignment of the curriculum frameworks was undertaken by the existing Curriculum Development and Supplemental Materials Commission ("Frameworks and Materials Commission"). The Frameworks and Materials Commission consists of 18 members, 13 of whom are appointed by the State Board of Education upon the recommendation of the Superintendent of Public Instruction or the members of the State Board of Education. At any one time, at least seven of the public members are current classroom teachers, or mentor teachers, for pupils in grades K-12. The remaining appointments include, but are not limited to, administrators, school governing board members, parents and guardians.[10]

Instructional Materials

The Frameworks and Materials Commission was further charged with evaluating new instructional materials submitted for adoption and recommending policies and activities to assist the State Department of Education and school districts in the use of curriculum materials.[11] Criteria for adoption of instructional materials includes a determination of how consistent the submitted materials are with the content and standards of quality prescribed in the adopted curriculum frameworks – which are, in turn, aligned with the state-adopted content standards.[12]

Assessments & Grade Promotion

In 1997, the California legislature created the Standardized Testing and Reporting (STAR) Program, which called for annual, systematic statewide administration of an achievement test to students in grades 2 through 11.[13] The achievement test was intended to be a nationally normed, off-the-shelf test. Pursuant to the legislature's selection criteria, the state adopted the Stanford Achievement Test Series, Ninth Edition (SAT 9) for the STAR Program. Because this assessment was not aligned with the state's rigorous content standards, the initial intent of the Legislature was to augment this achievement test with items that reflected the content standards developed pursuant to the Leroy Greene California Assessment of Academic Achievement Act; however, in

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[9] Cal. Educ. Code § 60605(e). The Curriculum Frameworks for Reading/Language Arts and Mathematics were adopted by the California State Board of Education on December 10, 1998. The Curriculum Frameworks for History/Social Science were approved by the California State Board of Education on October 11, 2000, but were still in their pre-publication format at the time of this analysis. The Science Framework was approved by the State Board on February 6, 2002, but were also in pre-publication format at the time of this analysis. Since then, modifications have been made to that draft Framework.

[10] Cal. Educ. Code § 33530.

[11] Cal. Educ. Code §§ 33530 & 60204.

[12] Cal. Educ. Code § 60200(c)(1).

[13] The State Board of Education, in its sole discretion, and based on the considerations set forth in § 60644, was charged with designating a single test in grades 2 to 11, inclusive, no later than November 14, 1997. Cal. Educ. Code § 60642(b).

September 2000, the Legislature amended the STAR legislation to include a separate standards-based achievement test, intended to "measure the degree to which pupils are achieving the academically rigorous content standards and performance standards."[14] To this end, the standards-based achievement test is supposed to be aligned with "the academically rigorous content and performance standards adopted by the Board of Education."[15] This assessment, which has been developed for a few grade levels and certain subject areas, is known as the California Standards Test.

The consequences for student performance on the test may be twofold for students. First, the individual student results of both the traditional achievement test and the standards-based achievement test are reported, in writing, to each pupil's school and teachers, as well as the parent or guardian, and are made a part of each student's records.[16] Second, school districts may choose to use these results, together with a student's in-class performance, to determine grade promotion and retention for students in grades two through nine.[17] Because the standards-based achievement test, as well as in-class instruction, is directly aligned with the content standards and curriculum frameworks, promotion and retention can be inextricably bound with student mastery of the content set forth in the standards.

High School Exit Examination

In 1999, as part of Governor Gray Davis's package of education reforms, California's legislature passed a measure that requires the Superintendent of Public Instruction, with the approval of the State Board of Education, to develop a high school exit examination in language arts and mathematics that is aligned with the State's academically rigorous content standards.[18] Though first delivered in the Spring of 2001, the exit exam will first have consequences for California's high school Class of 2004. "Commencing with the 2003-2004 school year and each school year thereafter, each

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[14] 2000 Cal. Adv. Legis. Serv. 576.

[15] Cal. Educ. Code § 60643(a)(2).

[16] District-wide, school-level and grade-level results – though not the score of any individual student – are reported to the governing board; countywide, school-level, and grade-level results for classes and programs under the jurisdiction of the county office of education are similarly reported to the county board of education. In addition, the publishers of the tests must make the individual pupil, grade, school, school district, and state results available to the State Board of Education by August 8 of each year; all results, except those for individual pupils, shall be made available on the Internet by August 15 of each year. Cal. Educ. Code §§ 60641(b)-(c).

[17] Cal. Educ. Code § 48070.5. California Education Code § 48070.5 provides that promotion and retention for students in the second through ninth grades shall be determined on the basis of either of the following: (1) the results of assessments administered pursuant to Article 4 (commencing with Section 60640) of Chapter 5 of Part 33 [STAR program] and the *minimum levels of proficiency* recommended by the State Board of Education pursuant to § 60648 or (2) the pupil's grades and other indicators of academic achievement designated by the district. Cal. Educ. Code § 48070.5(b)(1) & (2) (emphasis added). The "minimum levels of proficiency" refer to State Board of Education's determination of the minimum scores (on the standards-based achievement test) required for satisfactory performance in the next grade. Cal. Educ. Code § 60648.

[18] Cal. Educ. Code § 60850.

pupil completing grade 12 shall successfully pass the exit examination as a condition of receiving a diploma or a condition of graduation from high school."[19]

To assist in the design and composition of the exit examination, the Superintendent of Public Instruction established a High School Exit Examination Standards Panel, consisting of teachers, administrators, school board members, parents, and members of the general public.[20] The examination must have curricular and instructional validity; that is, the examination must test the content found within the State's curriculum framework and be consistent with what teachers actually teach in California classrooms.[21] In addition, the examination must comply with Title VI of the Civil Rights Act[22] and its implementing regulations.[23] Furthermore, the examination must comply with the requirements of the Equal Educational Opportunities Act of 1974,[24] which entitles all public school students to equal educational opportunity without regard to race, sex, color, or national origin.

Beginning with the 2000-2001 school year, and every year thereafter, school districts must notify parents that, commencing in 2003-2004, each student must pass the high school exit examination in order to graduate.[25] The parental notification must provide the date of the examination, the requirements for passing the examination, and "shall inform the parents and guardians regarding the consequences of not passing the examination and shall inform parents and guardians that passing the examination is a condition of graduation."[26]

Students may take the examination beginning in grade nine, but must take it in grade ten, and may take each subsequent administration until successful.[27] Schools must use regularly available resources to prepare students to succeed on the exit examination.[28] Those who do not demonstrate sufficient progress toward passing the exit examination, as measured by authorized tests, grades, and other designated achievement indicators, shall be provided supplemental instruction. Such supplemental instruction, however, may only require the use of regularly available resources, and not reimbursement by the Commission on State Mandates.[29] "It is the intent of the Legislature that a school district consider restructuring its academic offerings reducing the electives available to any pupil who has not demonstrated the skills necessary to succeed on the exit examination, so that the pupil can be provided supplemental instruction during the regularly scheduled academic year."[30] Once a student takes the test, but does not pass it, she must be offered

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19 Cal. Educ. Code §60851(a).
20 Cal. Educ. Code §60850(b).
21 Cal. Educ. Code § 60850(e)(3).
22 42 U.S.C.A. § 2000d.
23 34 C.F.R. § 100.3(b)(2) (as amended by 65 FR 68050-01, November 13, 2000).
24 20 U.S.C.A. §§ 1701-1710, 1712-1718, 1720-1721.
25 Cal. Educ. Code § 48980(e).
26 *Id.*
27 Cal. Educ. Code § 60851(b).
28 Cal. Educ. Code § 60853.
29 Cal. Educ. Code § 60851(e).
30 Cal. Educ. Code § 60853(b).

the opportunity to attend summer school, to receive supplementary instruction designed to assist her on the exit examination, and to re-take any failed sections of the examination until the end of the summer session immediately following their original graduation date.[31] In other words, although the state requires schools to provide assistance to students who are struggling with the high school exit examination, the state does not specify the type or level of assistance nor does it provide any funds to assist schools in supporting their students. Left unclear is how already cash-strapped districts will be able to afford adequate supplemental instruction to ensure that their students can pass the exit examination. Suffice it to say that the stakes for California's high schoolers are high and if they are not provided with the necessary educational resources and conditions for success, many students will not receive a California diploma.

Holding Schools Accountable for Student Performance

Apart from holding students accountable for their own performance on the state standards, California is now holding its schools accountable for that performance. California's Public Schools Accountability Act of 1999 provides for the development of a relatively sophisticated Academic Performance Index ("API") that accounts for various student success indicators including student performance on a standardized achievement test and other assessments tied to the state's content standards.[32] Each year, growth targets on the API are set for all of California's schools and each school's performance in relation to the targets is publicly reported.[33] Beyond being subject to public scrutiny, however, a school failing to meet its expectations is invited to participate in the "Immediate Intervention/Underperforming Schools Program (II/USP)"[34] That program provides for planning and implementation grants to underperforming schools on the condition that the school contracts with an external evaluator whose duties include a review of the school that identifies its weaknesses and provides recommendations for improvement. If, after one year, the school continues to lag behind its growth targets, it is subject to intervention from the local school board that may include the reassignment of personnel and alterations of the teachers' collective bargaining agreement as it applies to the school site.[35] Finally, and most dramatically, should the school fail to meet its targets over two years, the state's superintendent of public instruction and board of education are required to deliver at least one of the following administrative consequences: (1) reassign students to other public schools that have space available; (2) establish a charter school at the existing schoolsite; (3) assign the management of the school to an outside agency such as a college, university, or county office of education; (4) reassign the school's teachers and administration; (5) renegotiate the collective

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[31] Cal. Educ. Code §§ 60851(b), (d), & 37252(b). Moreover, administration of the exit examination must be in compliance with the Individuals with Disabilities Education Act and the Rehabilitation Act of 1973, offering appropriate accommodations. Cal. Educ. Code § 60850(g). Moreover, students who do not speak English may refrain from taking the test for up to two years, but they can only receive their diplomas upon passage of the test. Cal. Educ. Code § 60852.

[32] Cal. Educ. Code §§ 52050-58.

[33] Cal. Educ. Code § 52052.

[34] Cal. Educ. Code §§ 52053, 52053.5, & 52054.

[35] Cal. Educ. Code § 52055.

bargaining agreement; (6) reorganize the school; and/or (7) close the school.[36] Although current interventions are based on student performance on the standardized SAT-9, future interventions will be tied to the state's Standards Test as this test is developed and implemented.

Teacher Credentialing Standards

Beyond its consequences for students and schools, California's standards-based reform scheme has further implications for its future teachers. California issues two types of teaching credentials: single subject and multiple subject. A single subject teaching credential authorizes an individual to teach a specific subject in a departmentalized class, and is primarily used in middle and secondary grades (grades 7-12). A multiple subject teaching credential, on the other hand, enables an instructor to teach all subjects in a self-contained classroom, and is most often used in elementary schools (grades K-6). In order to earn either a single subject or multiple subject teaching credential, candidates are legally required to demonstrate their subject matter competence. This can be accomplished either through completing an approved subject matter preparation program in a California college or university, or by passing one or more subject matter competency tests adopted by the California Commission on Teacher Credentialing.[37]

Authorizing legislation provides that both subject matter competence exams and subject matter preparation programs must be aligned with the state content standards and curriculum frameworks: "The commission [on teacher credentialing] shall ensure that subject matter standards and examinations are aligned with the state content and performance standards adopted for pupils."[38] This mandate is reiterated in the *Single Subject Assessments for Teaching: 2000-2001 Registration Bulletin*, which states, "The content of the SSAT reflects the knowledge required of teachers in California classrooms. The tests are based on California content frameworks and other curriculum and instructional materials" (Educational Testing Service, Single Subject Assessments for Teaching: 2000-2001 Registration Bulletin, 1).

In addition to demonstrating subject matter competence, candidates for either single subject or multiple subject credentials must also complete an accredited program of professional preparation.[39] The California Commission on Teacher Credentialing is charged with ensuring that candidates who are recommended for a credential (pursuant to a program of professional preparation) have demonstrated satisfactory ability to assist

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[36] Cal. Educ. Code § 52055.5. California's school accountability system is also not all sticks; there are some carrots. Those schools that meet or exceed their API performance growth targets may be eligible for both monetary and nonmonetary rewards. Cal. Educ. Code § 52057.

[37] The Legislature has devised alternative credentialing procedures for candidates who have completed their degrees outside of California. *See* Cal. Educ. Code § 44227.

[38] Cal. Educ. Code § 44259(b)(5).

[39] Cal. Educ. Code § 44259(b)(3).

students to meet or exceed state content and performance standards for pupils.[40] It is worth noting, however, that these requirements for ensuring the familiarity with and the skills to teach to the state content standards are aimed only at new teachers. There are no similar requirements that will ensure such familiarity and proficiency among teachers already holding state credentials.

Content and Consequences

Although it got a late start in the development of its academic standards and its standards-based reform policies, California has developed a challenging and meaningful set of content standards for all students to achieve. Coupled with the higher standards, California also intends to make those standards count by holding schools and students accountable for performance on these standards. This is a far cry from the input and process-oriented accountability and monitoring systems that most states, including California, have relied upon for years. Put simply, California has made important initial strides in the development of its standards-based reform scheme. Because student promotion and retention, as well as the state's assessment of a school's performance, hinge upon the extent to which students have mastered the content standards, state policy should also ensure that children are provided with the necessary educational conditions, resources, and support to meet those high standards.

For instance, high stakes tests should only test what teachers actually teach; in other words, the tests must ensure "curricular validity." The consequences for failing to incorporate the content standards into the enacted curriculum may be significant: when a school fails to impart the content set forth in the standards to its students, this reflects poorly on the school's performance, and hinders the ability of its students to advance from one grade to the next, and ultimately to post-secondary education. So significant is the issue of curricular validity that professional organizations and the United States Department of Education, Office for Civil Rights have issued guidelines on the appropriate use of high-stakes tests, including the need for curricular validity (United States Department of Education, Office for Civil Rights 2000).

Beyond ensuring that California's students are exposed to the curriculum necessary to obtain proficiency on the state's performance standards, the state should also ensure that its teachers and students are provided the educational resources necessary to teach to and learn the state's standards. Implicit in the rigorous content standards are resources – facilities, instructional materials, technology, and teachers – that students need in order to attain success on the standards. Without these resources, students are left without a fair opportunity to learn.

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[40] *Id.* Minimum requirements for a preliminary multiple or single subject teaching credential also include: (1) A baccalaureate degree or higher degree from a regionally accredited institution of postsecondary education; (2) Passage of the state basic skills examination (CBEST); (3) Study of alternative methods of developing English language skills (ESL); (4) Demonstration of a knowledge of the principles and provisions of the Constitution of the United States; and (5) Demonstration of a basic competency in the use of computers in the classroom. Cal. Educ. Code § 44259(b).

The Minimum Educational Conditions and Resources Necessary to Provide Students the Opportunity to Obtain Proficiency on the Content and Performance Standards

Before California can develop policies to ensure that all students receive the resources necessary to attain proficiency on the state's rigorous standards, the state must first determine what are those necessary resources. To that end, this study systematically reviews the state's content and curriculum standards as well as other documents promulgated by the state, including the standards for teaching in California. From that review, it became clear that the standards themselves require certain specific educational resources so that teachers can teach to the standards and students can learn what they should know and be able to do. The four appendices included with this report detail our analysis and the resources – technology, facilities, instructional materials and teachers – required for students to have an opportunity to achieve the educational goals set forth in the Content Standards and Curriculum Frameworks. Below our methods and findings are summarized.

Method of Analysis and Organization of Appendices

The study's method of analysis is relatively straightforward, reflecting the clear resource implications from the state's standards. The content standards and curriculum frameworks were initially obtained and read thoroughly to identify the different resource categories implied by the standards. Four such categories were identified: facilities, instructional materials, teacher qualities, and technology. Each resource category was then further divided into specific resources. For instance, in the analysis of the History-Social Science Standards, instructional materials were subdivided into the following resources: textbooks/workbooks; reference books; literature books; maps/globes/other supplies; video/audio tapes/visual media; periodicals.

Next, one researcher analyzed each content standard to determine whether any of the specific identified resources were implied by the standard. This analysis was enhanced by reference to the corresponding curriculum frameworks and, for the teacher quality resources, preparation/certification requirements for California's teachers. If any of the resources was explicitly identified in or implied by the standards, frameworks, or teacher certification requirements, the researcher included that resource as required or implied by the standard. It should be emphasized that the researcher was instructed to make the most conservative judgments possible. Even if a particular standard could "best" be taught with certain resources, the researcher would choose the "minimum" resources necessary to teach the standard. Moreover, the determination of whether a standard required a given resource was based on a textual analysis of the standard and supporting documents alone; the researcher was instructed not to imply resources that were not necessarily implied or identified by the text of the standard.

A second researcher then conducted the same analysis as the first. In addition, however, the second researcher coded the resource as one that is either "required" by the standard or "recommended" by the standard. A third researcher then reviewed the second

researcher's analysis to ensure agreement among the researchers and resolve any remaining discrepancies.

Each of the four appendices is organized into four parts: (1) facilities; (2) instructional materials; (3) technology; and (4) teachers. Within each part, the first column identifies each individual standard. The following columns in each part represent specific identified resources. If a resource is required or recommended by any specific standard or its corresponding framework or teacher preparation/credentialing requirement, the resource column will contain either a "checkmark" (✓) if the resource is required or an "x" or "dot" (□ or ·) if the resource is recommended, along with a brief explanation for why the resource is required or recommended. If the explanation includes a quotation from or reference to a specific standard or substandard, that standard or substandard is identified. All references are to the content standards, unless otherwise indicated. If the explanation relies on the curriculum frameworks, the frameworks are cited ("FW") along with a specific page reference. Finally, if the explanation relies on any teacher preparation or credentialing materials, a specific citation to the document is included.

Findings

The Summary Tables at the end of this paper summarize the findings of the analysis for each content area. Those tables provide the number of standards in each of the content areas in elementary (K-5), middle (6-8), and high (9-12) school that call for specific educational resources. For instance, in grades 6-8, the 3 English/Language Arts standards require computer technology, while 5 recommend or suggest such technology.

From this summary, several findings are noteworthy. First, textbooks that are aligned to the state's content standards are indispensable. In History-Social Science, 90 out of the 104 standards require, at a minimum, a textbook or other written instructional material that provides the content of the standard. Perhaps more surprising is the extensive requirement of technology. Thirteen of the English-Language Arts standards specifically require computers, while four require Internet access. Twenty-two of the Science standards require or recommend computers, while eighteen require or recommend Internet access. Moreover, as demonstrated by the English-Language Arts standards, a well-stocked library or media center is essential, or at least recommended, for elementary, middle, and high schools. Computer technology, Internet access, and well-stocked libraries/media centers are highlighted here because not all children in California enjoy these resources. Below we discuss in greater detail the findings of our analysis.

Technology

The content standards and curriculum frameworks encourage the use of technology to supplement reading and classroom activities, and to enrich students' educational experience. From web-driven applications and graphing calculators to word-

processing, technology has become an indispensable learning tool for students in the 21st century.

Computers & Printers

Computers and printers are integral to the standards for all four content areas. In language arts and reading, for example, the standards repeatedly emphasize the importance of developing computer literacy, typing and word-processing skills, and proficiency with online research tools. Similarly, the History-Social Science and Science Content Standards emphasize students' ability to use computers for research, as well as for the purpose of displaying and analyzing data (History-Social Science Standards, pp. 21, 40; Science Standards, p. 21).

The standards further suggest that computers can facilitate development of fundamental analytical skills. According to the Mathematics Content Standards, for example, the use of technology, such as calculators, gives students opportunities to extend their comprehension, reasoning and problem-solving skills beyond what is possible with traditional print resources (Mathematics Standards, Introduction). In addition, the standards recognize that computer-assisted instruction, tutoring systems, and drill-and-practice software may also be used to reinforce basic skills (Mathematics Standards, Introduction).

Consistent with these goals, the California Department of Education, in *Connect Compute, and Compete*, recommends a student-to-computer ratio of four to one in every classroom and library (Reading/Language Arts framework, p. 246).

Software

Of course, in order for students to truly reap the power and versatility of computers, it is imperative that each student has a diverse array of software at his/her disposal. Consistent with this objective, the Language Arts and Reading Content Standards repeatedly call for the availability of software and electronic resources to aid students in developing research techniques and improving word-processing skills, while the Science Content Standards encourage the use of software to analyze data and present results. In furtherance of the latter goal, all adopted science instructional programs include CD-ROMS and videodiscs (Adopted Programs, pp. 14, 16, 19, 22, 24, 26).[41]

Within both mathematics and science, computer software is also required in order to teach statistical analysis techniques. For example, the Mathematics Content Standards

[41] The State formally adopted science instructional materials that support the teaching and learning the skills and knowledge called for in the California Science Content Standards on March 9, 2000. Six programs were adopted: Harcourt Brace, *Harcourt Science* (K-5); Houghton-Mifflin, *Discovery Works* (K-5); McGraw-Hill, *McGraw-Hill Science* (K-6); Glencoe, *Glencoe Science Voyages* (6-8); Holt, Rinehart, Winston, *Holt Science and Technology, Earth, Life and Physical Science* (6-8); and Prentice Hall, *Science Explorer* (6-8).

call for the use of electronic spreadsheet software "to collect, organize and represent data sets and identify relationships between them" (Mathematics Standards, p. 33).

In addition to teaching basic skills, such as data analysis and word-processing, software may also be used to impart content-related information. Hence, the History-Social Science Framework states that computer software can provide "invaluable resources for the teaching of history, geography, economics, and [other] disciplines" (History-Social Science Framework, p. 8).

Internet/WWW/Telecommunications Access

The content standards were initially developed to help students attain the skills and knowledge that are requisite to success in the "information-based, global economy of the 21st century." To that end, the content standards in every subject area both explicitly and implicitly mandate Internet access. For example, the Language Arts and Reading Framework states that "classrooms are enhanced when supplied with adequate hardware, software, and Internet-based resources for students to use in language arts instruction" (Reading/Language Arts Framework, p. 246). More specifically, for instance, Substandard 1.4 in Grade 8 asks students to "[p]lan and conduct multiple-step information searches using computer networks and modems," while students in the sixth grade are asked to "[i]dentify the structural features of popular media (e.g., newspapers, magazines, *online information)* and use the features to obtain information (English-Language Arts Standards, Grade Six, 2.1, p. 36, italics added). Similarly, the History-Social Science Framework emphasizes the importance of using a variety of techniques to "extend the learning process beyond the textbooks," including technology and telecommunications to "bring specific content-related information to the learning environment" (History-Social Science Framework, p. 178).

Within the science curriculum, the standards envision that "students will use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project" (Science Standards, p. 25). In addition, two of the state-adopted science instructional programs include web sites as an integral part of the curriculum (Adopted Programs, pp. 22, 26).

Internet access also enhances students' research capabilities across all content areas, by facilitating access to primary sources, data, periodicals and journals that are not available in school or local libraries. This access is especially critical in the history-social science curriculum, which encourages the use of primary and secondary sources to conduct social science research (History-Social Science Standards, pp. 21, 40).

Audio-Visual Equipment

Although films and television are arguably dated in an era which is dominated by the World Wide Web, traditional audio-visual equipment has not been abandoned as a useful instructional tool by the experts who developed the content standards. Beginning in elementary school, language arts students use films and videos in order to appreciate

and analyze the media as a source of information, entertainment, persuasion, interpretation of events, and transmission of culture (English-Language Arts Standards, p. 33).

Audio-visual equipment is also integral to the standards for both history-social science and science. For instance, each of the adopted science instructional programs includes videos, transparencies, videodiscs, CDs, and/or tapes (Adopted Programs, pp. 14, 16, 19, 22, 24, and 26). The History-Social Science Framework likewise encourages the use of "visual nonprint materials, such as films, videotapes, filmstrips, charts, maps, archival items, or reproductions" (History-Social Science Framework, p. 179).

Instructional Materials

In addition to recommending technology-driven learning resources, the standards for all four core curriculum areas are replete with references to traditional textbooks, periodicals, and audio-visual resources, as well as hands-on learning materials.

Literature Books, Textbooks, Workbooks & Reference Books

As early as kindergarten, students are expected to identify the front cover, back cover and title page of a book (English-Language Arts Standards, p. 1). By second grade, students are navigating their way through tables of contents and chapter headings to locate information in expository text (English-Language Arts Standards, p. 12). And, in third grade, students are using dictionaries and thesauri to facilitate vocabulary development (English-Language Arts Standards, pp. 16, 21).

Textbooks are integral to both mathematics and science instruction throughout every grade level, and each adopted science instructional program includes text and workbooks (Science Standards, p. 2; Adopted Programs, pp. 14, 16, 19, 22, 24, 26). In History-Social Science, textbooks help students to learn key events and people of many different historical eras, while access to encyclopedias, atlases, almanacs and other reference books furthers development of important research skills (History-Social Science Standards, pp. 1, 21, 41).

Within both English-Language Arts and History-Social Science, literature books are also an indispensable learning tool. For example, the History-Social Science Framework states that it is important to enrich the study of history with the use of literature, including literature of a historical period and literature about a period, such as poetry, novels, plays, essays, documents, speeches, myths, legends, biographies and religious literature (History-Social Science Framework, p. 4).

Periodicals

Students are also expected to rely on newspapers, journals and magazines in each core curriculum content area. For instance, the Reading and Language Arts Framework states that "children benefit from having age-appropriate and skill-reinforcing magazines,

journals and books in the classroom." (Reading/Language Arts Framework, p. 246). Consistent with this philosophy, the Reading and Language Arts Content Standards include magazines and newspapers as materials that students should read in meeting their annual reading comprehension benchmarks (see, e.g., English-Language Arts Standards, pp. 7, 28, 56, 66). With respect to developing students' understanding of controversial issues, the history-social science framework describes newspapers as "indispensable" (History-Social Science framework, p. 7).

Films, Videos & Audiotapes

Films, videos and audiotapes are also essential in helping to convey the material outlined in the standards and frameworks. In reading and language arts, for example, audio-visual materials inform students' understanding of how various media genres (such as televised news and documentaries) cover the same event, and also help students to identify the aesthetic effects of a media presentation and evaluate the techniques used to create them (History-Social Science Standards, p. 63). Similarly, in science, every state-adopted instructional program includes videos, videodiscs, CDs, and/or tapes (Adopted Programs, pp. 14, 16, 19, 22, 24, and 26).

Chart/Graphing Materials

The math content standards emphasize the use of "grids, tables, graphs, and charts to record and analyze data" (Mathematics Standards, p. 20). Implicit in this directive is the availability of graph paper, chart paper, number squares, compasses, and straight-edges that would be needed to create these charts and graphs. Similarly, the science content standards repeatedly ask students to record and/or display data in tables, graphs, or charts.

Measuring Instruments

Beginning in the elementary grades, mathematics students are expected to use non-standard units to measure and compare the length, weight, and volume of objects (Mathematics Standards, p. 5). In later grades, students need protractors, rulers, stop-watches and thermometers to "compare weights, capacities, geometric measures, times, and temperatures within and between measurement systems" (Mathematics Standards, p. 32). Science students similarly are asked to measure distances and weigh objects as early as elementary school.

Laboratory Equipment & Scientific Calculators; Perishable & Household Materials

The availability of lab equipment, scientific calculators, and perishable materials facilitates student achievement of, and is required by, the Science Content Standards. The standards call for an array of learning materials from kindergarten through grade twelve: from thermometers and wind vanes to geologic and weather maps; from magnifying glasses and microscopes to computer-linked probes; and from batteries,

wires, transistors, and light bulbs to spring scales, balances, and rope (Science Standards, pp. 4, 6, 9, 11, 17, 21, 25, 52).

Maps & Globes

The History-Social Science Standards require students to develop map and globe skills at all grade levels in order to develop knowledge of geography and its effects on societies (History-Social Science Framework, pp. 1, 21, and 40).

Facilities

Schools & Classrooms

Implicit in the content standards and curriculum frameworks is the assumption that students will be taught in facilities that comply with local health and safety regulations, and in settings that are conducive to learning. This suggests that, at a minimum, schools will contain: classrooms with adequate heating and air conditioning, bathrooms that are accessible and hygienic, and schools that are free from vermin and other infestations.

Libraries

In order for students to realize the goals set forth in the content standards for English-Language Arts, History-Social Science and Science, a library is also essential. The Reading and Language Arts Framework, for example, states that "frequent access to extensive school library collections is an effective way to maintain fresh classroom collections [of books], allow students to select books of personal interest, and keep reading motivation high" (Reading/Language Arts Framework, p. 246).

It is worth noting that the pedagogical benefits of school libraries transcend reading and language arts instruction by informing students' overall comprehension of texts and nurturing research strategies that can be used in any discipline. For instance, in order to develop social science research skills, the History-Social Science Standards emphasize access to historical documents, eyewitness accounts, oral histories, letters, diaries, artifacts, photographs, and maps (History-Social Science Standards, p. 1). Similarly, in order to hone scientific research skills, the Science Content Standards require students to investigate a science-based societal issue by researching literature and analyzing data (Science Standards, p. 52).

Media Center

Within the core curriculum area of reading and language arts, the content standards and framework also envision a centralized media center to house the technological resources and texts that are required to enable student mastery of reading

and language arts (see above).[42] According to the Framework, "… the school's library media center is a focal point of reading. The center's collection consists of learning resources and technologies carefully selected to meet the teaching and learning needs of teachers and their students and support curriculum and instruction at the point of need" (Reading/Language Arts Framework, p. 247).

Laboratory/Kitchen

The Science Content Standards state that "students should have the opportunity to learn science by . . . doing laboratory investigations and experiments" (Science Standards, Introduction, p. 2). Execution of these experiments requires close proximity to running water, stoves, gas, sinks, refrigerators, and secure storage facilities. For the lower grades, in which experiments are less complex, a school kitchen may suffice; however, science laboratories are necessary for the middle and upper grades (e.g., to properly use and store microscopes, computer-linked probes, graduated cylinders, mixed solutions, and telescopes) (Science Standards, pp. 4, 6, 9, 11, 17, 21, 25, 52).

Teachers

As noted above, California has adopted teacher credentialing standards that emphasize subject matter competence, as well as mastery of fundamental instructional strategies. This means that, in addition to mastering the content knowledge contained within the standards, teachers must also possess a command of effective teaching techniques.

A teacher of History-Social Science, then, must not only know the details of particular historical events, but also be equipped with the requisite skills to effectively relate these events to his or her students. Likewise, an English-Language Arts teacher must be familiar with historically or culturally significant texts, and be able to convey the themes and meaning of these texts to his or her class.

This analysis extends to skills-oriented content standards, as well. Instructors of science must not only be able to conduct experiments, but also must be prepared to empower students to perform the experiments themselves. And, in the area of mathematics, it is not sufficient for a teacher of algebra to know the order of operations; he or she must also be able to teach his or students to apply the order of operations on their own.

Perhaps most apparent from even a cursory reading of the English-Language Arts standards, early grade teachers must be equipped with a deep understanding of reading psychology and development; the structure of the English language; and how to apply best practices of reading instruction. More specifically, teachers must be able to provide instruction and support in phonemic awareness (through grade one), phonics, word

[42] We note that many schools will combine their libraries and media centers, but separated them here for purposes of analysis.

decoding and word-attack skills, spelling, vocabulary, reading comprehension, writing skills and strategies, written and oral English language conventions, and listening and speaking skills.

Conclusion

From the initial passage of the Leroy Greene California Assessment of Academic Achievement Act to the initial administration of the High School Exit Examination in the Spring of 2001, California has made great strides in setting meaningful and clear content standards in the four core subject areas and aligning its assessment and accountability systems to those standards. Yet, to ensure that all children can meet those high standards, much more has to be done. The state should systematically analyze its curriculum frameworks and content standards to create, at each grade level, a basket of educational conditions and resources that all children should receive to have an adequate opportunity to learn the state's standards. This paper provides a beginning for that endeavor, as we have demonstrated that the state content standards require and recommend specific educational resources and conditions. At the very least, all children in California should receive these very resources that the state itself has deemed necessary to succeed in today's California.

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Educational Resources Implied by the California Educational Content Standards
Summary Tables

Mathematics

		Technology				Instructional Materials				Facilities	
		Computers	Software	Internet	Calculator	Texts	Manipulatives	Charting & Graphing Materials	Measuring Instruments	Classroom	Media Center
K-5	Required	-	-	-	-	51	18	12	8	67	-
(n=67)	Suggested	1	1	-	-	-	1	-	-	-	-
6-8	Required	1	1	-	-	51	2	9	1	51	-
(n=51)	Suggested	-	-	-	1	-	-	-	-	-	1
9-12	Required	-	-	-	-	94	-	15	-	94	-
(n=94)	Suggested	8	8	-	6	-	-	-	-	-	10
TOTALS	Required/Suggested	1/9	1/9	-	0/7	196/0	20/1	36/0	9/0	212/0	0/11
	TOTAL:	**10**	**10**	**-**	**7**	**196**	**21**	**36**	**9**	**212**	**11**

English/Language Arts

		Technology				Instructional Materials				Facilities		
		Computers	Software	Internet	Audio-Video Equipment	Literature Texts	Reference Books	Films/Audio Video Tapes	Periodicals	Classroom	Library	Media Center
K-5	Required	2	2	-	3	19	8	3	6	47	-	-
(n=47)	Suggested	2	1	2	-	4	2	-	13	-	4	4
6-8	Required	3	2	2	3	7	-	2	6	24	8	8
(n=24)	Suggested	5	2	2	-	3	3	1	5	-	-	-
9-12	Required	8	4	2	6	4	1	4	2	16	7	7
(n=16)	Suggested	1	2	4	-	1	2	-	7	-	-	-
TOTALS	Required/Suggested	13/8	8/5	4/8	12/0	30/8	9/7	9/1	14/25	87/0	15/4	15/4
	TOTAL:	**21**	**13**	**12**	**12**	**38**	**16**	**10**	**39**	**87**	**19**	**19**

History/Social Science

		Technology				Instructional Materials						Facilities		
		Computers	Software	Internet	Audio-Video Equipment	Texts	Primary Materials	Literature Books	Maps/Globes	Visual Media	Periodicals	Classroom	Library	Media Center
K-5	Required	-	-	-	-	23	-	3	8	2	-	36	-	-
(n=36)	Suggested	-	-	-	1	-	3	14	1	4	-	-	6	2
6-8	Required	-	-	-	-	30	-	2	5	-	-	30	-	-
(n=30)	Suggested	-	-	-	-	-	4	10	2	1	-	-	3	-
9-12	Required	-	-	-	-	37	1	3	1	-	-	38	-	-
(n=38)	Suggested	1	1	1	7	-	6	10	2	8	5	-	10	7
TOTALS	Required/Suggested	0/1	0/1	0/1	0/8	90/0	1/13	8/34	14/5	2/13	0/5	104/0	0/19	0/9
	TOTAL:	**1**	**1**	**1**	**8**	**90**	**14**	**42**	**19**	**15**	**5**	**104**	**19**	**9**

Science

		Technology				Instructional Materials									Facilities		
		Computers	Software	Internet	Audio-Visual Equipment	Texts	Supp./ Reference Materials	Films, Videos, Audiotapes	Graphing/ Charting Materials	Measuring Instruments	Periodicals	Household/ Perishable Items	Laboratory Supplies	Laboratory Equipment	Classroom	Library	Water, Gas, & Electricity Supply
K-5	Required	-	-	-	-	12	2	-	5	4	-	8	-	2	29	-	2
(n=29)	Suggested	4	1	4	3	-	12	3	2	6	2	12	10	9	-	6	8
6-8	Required	2	-	1	-	23	5	-	3	3	-	2	1	3	23	1	1
(n=23)	Suggested	8	2	8	2	-	6	2	1	4	2	14	6	8	-	4	7
9-12	Required	2	2	-	-	36	5	-	2	-	-	2	2	2	36	-	1
(n=36)	Suggested	6	3	5	6	-	11	5	2	2	1	7	8	7	-	5	6
TOTALS	Required/Suggested	4/18	2/6	1/17	0/11	71/0	12/29	0/10	10/5	7/12	0/5	12/33	3/24	7/24	88/0	1/15	4/21
	TOTAL:	**22**	**8**	**18**	**11**	**71**	**41**	**10**	**15**	**19**	**5**	**45**	**27**	**31**	**88**	**16**	**25**