PACE/California Diploma Project
Project Goals and Overview

- Provide timely, relevant, and useful information to state policymakers about the relationships between state-level expectations across high school and college in Health and related implications.

- Determine relationships re: English and mathematics knowledge, skills, and cognitive strategies between college entry and CCSS, and between CTE standards in Heath and CCSS.

- Provide support for the CDE’s work to revise CTE standards and align with the CCSS.

- Include exploratory field research to learn about students' experiences in Health in high school and community college.
Structure of Today’s Seminar

- Overview and goals of project
- Findings from ICAS/CCSS crosswalk
- CDE’s CTE standards revision process
- Findings from CTE (Health Science and Medical Technology)/CCSS alignment study
- Initial impressions from student focus groups
- Discussion
Project Components

- Crosswalk between ICAS and CCSS
- Alignment between CTE Standards (Health) and CCSS
- Validity study
- Student focus groups
## Part I: Crosswalk

ICAS Statements of Competencies and Common Core State Standards

<table>
<thead>
<tr>
<th>I. Crosswalk</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Exploratory study comparing ICAS Statements of Competencies and Common Core State Standards</td>
</tr>
<tr>
<td>- December 2011 - March 2012</td>
</tr>
<tr>
<td>- Preliminary report and results drafted</td>
</tr>
</tbody>
</table>
## Part II and III: Alignment and Validity

**Health Sciences and Medical Technology CTE Standards**

### II. Alignment

- Health Sciences and subject area experts analyze the relationship between the new draft Health Sciences Standards and the Common Core State Standards for:
  - Content Alignment: Match, Partial Match (with rationales), and No Match
  - Cognitive Complexity: 4-point scale of Depth of Knowledge
- **March 2012 – May 2012**

### III. Validity

- Faculty and industry experts will rate each of the Health Sciences standards for:
  - Applicability: Prerequisite, Reviewed, Introduced, Subsequent, or Not Applicable
  - Importance: 4-point scale from least to most
- **May 2012 - August 2012**
Crosswalk Results

The following slides outline the methodology and results of the relationship between the ICAS Statements of Competencies and the Common Core State Standards
Methodology

About the Crosswalk

- A crosswalk is a means to examine relationships by arraying two sets of learning expectations orthogonally in a matrix format and then examining the intersection of each element of each statement in a unique cell.

- The relationship represented by that cell is then coded based on a categorization system designed to produce insight into how two sets of statements interact with one another.

Learning Expectations Analyzed

- Intersegmental Committee of the Academic Senates (ICAS) Statements of Competencies for Mathematics and Academic Literacy.

- Common Core State Standards (CCSS) in English Language Arts and Literacy (ELA) and mathematics.
Crosswalk Codes

A five point scale was used to rate each intersection on the crosswalk matrix.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACR</td>
<td>Aligned Content Relationship</td>
</tr>
<tr>
<td>PACR</td>
<td>Partially Aligned Content Relationship</td>
</tr>
<tr>
<td>PCR</td>
<td>Prerequisite Content Relationship</td>
</tr>
<tr>
<td>CTLR</td>
<td>Consistent Teaching/Learning Relationship</td>
</tr>
<tr>
<td>ITLR</td>
<td>Inconsistent Teaching/Learning Relationship</td>
</tr>
</tbody>
</table>
ELA Results

The following slides outline the broad results of the relationship between the ICAS competencies and the Common Core State Standards Anchor Standards.
### Overview of All Intersections

<table>
<thead>
<tr>
<th>ICAS Competencies</th>
<th>ACR</th>
<th>PACR</th>
<th>PCR</th>
<th>CTLR</th>
<th>ITLR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habits of Mind</td>
<td>0.1%</td>
<td>6.0%</td>
<td>7.3%</td>
<td>10.1%</td>
<td>76.5%</td>
</tr>
<tr>
<td>Reading/Writing Connection</td>
<td>0.7%</td>
<td>13.9%</td>
<td>22.6%</td>
<td>4.2%</td>
<td>58.7%</td>
</tr>
<tr>
<td>Reading</td>
<td>1.0%</td>
<td>15.7%</td>
<td>14.0%</td>
<td>2.1%</td>
<td>67.1%</td>
</tr>
<tr>
<td>Writing</td>
<td>0.6%</td>
<td>7.9%</td>
<td>0.1%</td>
<td>11.3%</td>
<td>80.0%</td>
</tr>
<tr>
<td>Listening and Speaking</td>
<td>0.0%</td>
<td>4.1%</td>
<td>0.0%</td>
<td>2.5%</td>
<td>93.4%</td>
</tr>
<tr>
<td>Listening and Speaking for ESL Students</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>3.1%</td>
<td>96.9%</td>
</tr>
<tr>
<td>Technology</td>
<td>0.2%</td>
<td>3.1%</td>
<td>0.0%</td>
<td>6.9%</td>
<td>89.8%</td>
</tr>
</tbody>
</table>
• Of the 131 ICAS competencies, 120 had at least one match to an English Language Arts Anchor Standard in one of the first four categories.
Distribution of Matches (ACR, PACR, PCR, CLTR)

- 4192 total intersections evaluated
- 908 were coded as ACR, PACR, PCR, or CTLR
- The chart to the left illustrates the distribution of the 908 with a relationship to the CCSS
ELA ICAS Competencies (ITLR)

The competencies to the right had no significant relationship to the CCSS

- Habits of Mind: interrogate own beliefs
- Habits of Mind: meet deadlines for assignments
- Habits of Mind: demonstrate initiative and develop ownership of their education
- Habits of Mind: gain attention appropriately
- Habits of Mind: be attentive in class
- Habits of Mind: exercise civility
- Habits of Mind: engage in self-advocacy
- Reading: have patience
- Writing: reasons, and logic
- Listening and Speaking for ESL students: identify nuances of meaning indicated by shifts in vocal inflection and non-verbal cues, such as facial expressions or body language
- Listening and Speaking for ESL students: demonstrate a full range of pronunciation skills including phonemic control mastery of stress and intonation patterns of English.
### Percent by Category with no Relationship to CCSS

<table>
<thead>
<tr>
<th>Academic Literacy Competency Areas</th>
<th>Number of competencies in section</th>
<th>Number of competencies with no significant relationship with CCSS</th>
<th>Percent of ICAS competencies with no significant relationship to the CCSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habits of Mind</td>
<td>27</td>
<td>7</td>
<td>25.9%</td>
</tr>
<tr>
<td>Reading/Writing Connection</td>
<td>9</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Reading</td>
<td>31</td>
<td>1</td>
<td>3.2%</td>
</tr>
<tr>
<td>Writing</td>
<td>26</td>
<td>1</td>
<td>3.8%</td>
</tr>
<tr>
<td>Listening and Speaking</td>
<td>15</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Listening and Speaking for ESL Students</td>
<td>4</td>
<td>2</td>
<td>50.0%</td>
</tr>
<tr>
<td>Technology</td>
<td>19</td>
<td>0</td>
<td>0.0%</td>
</tr>
</tbody>
</table>
Mathematics Results

The following slides outline the broad results of the relationship between the ICAS competencies and the Common Core State Standards High School Clusters and Mathematical Practices
### Math Overview

<table>
<thead>
<tr>
<th>ICAS Competencies by Area</th>
<th>ACR</th>
<th>PACR</th>
<th>PCR</th>
<th>CTLR</th>
<th>ITLR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approaches to Mathematics</td>
<td>1.2%</td>
<td>1.8%</td>
<td>6.2%</td>
<td>2.4%</td>
<td>88.5%</td>
</tr>
<tr>
<td>Aspects of Instruction</td>
<td>0.2%</td>
<td>4.8%</td>
<td>5.4%</td>
<td>1.2%</td>
<td>88.5%</td>
</tr>
<tr>
<td>Subject Matter Essential for All Students</td>
<td>0.0%</td>
<td>7.1%</td>
<td>4.8%</td>
<td>0.0%</td>
<td>88.1%</td>
</tr>
<tr>
<td>Subject Matter Desirable for All Students</td>
<td>0.0%</td>
<td>2.8%</td>
<td>0.8%</td>
<td>0.0%</td>
<td>96.4%</td>
</tr>
<tr>
<td>Subject Matter Essential for Quantitative Majors</td>
<td>0.0%</td>
<td>8.3%</td>
<td>2.0%</td>
<td>0.0%</td>
<td>89.7%</td>
</tr>
<tr>
<td>Subject Matter Desirable for Quantitative Majors</td>
<td>0.0%</td>
<td>1.9%</td>
<td>1.3%</td>
<td>0.0%</td>
<td>96.8%</td>
</tr>
<tr>
<td>Mathematical Skills</td>
<td>0.0%</td>
<td>0.0%</td>
<td>1.7%</td>
<td>1.1%</td>
<td>97.2%</td>
</tr>
</tbody>
</table>
Percent of Math ICAS Competencies with Relationship to CCSS

- Of the 47 ICAS competencies, 46 had at least one match to mathematics cluster or math practice in one of the first four categories.
Distribution of Matches (ACR, PACR, PCR, CLTR)

- 2961 total intersections evaluated
- 227 were coded as ACR, PACR, PCR, or CLTR
- The chart to the left illustrates the distribution of the 227 with a relationship to the CCSS
Math ICAS Competencies (ITLR)

The competency to the right had no significant relationship to the CCSS

- Subject Matter Desirable for all Students - Discrete Mathematics: Topics such as set theory, graph theory, coding theory, voting systems, game theory, and decision theory.
Percent with no Relationship to CCSS

<table>
<thead>
<tr>
<th>Mathematics Competency Areas</th>
<th>Number of competencies in area</th>
<th>Number of competencies with no significant relationship with CCSS</th>
<th>Percent of ICAS competencies with no significant relationship to the CCSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approaches to Mathematics</td>
<td>8</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Aspects of Instruction</td>
<td>8</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Subject Matter Essential for All Students</td>
<td>6</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Subject Matter Desirable for All Students</td>
<td>4</td>
<td>1</td>
<td>25.0%</td>
</tr>
<tr>
<td>Subject Matter Essential for Quantitative Majors</td>
<td>4</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Subject Matter Desirable for Quantitative Majors</td>
<td>5</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Mathematical Skills</td>
<td>12</td>
<td>0</td>
<td>0.0%</td>
</tr>
</tbody>
</table>
Overall Findings

Do all ICAS competencies relate to the CCSS?

ELA
✓ Overall, yes, 92% of the time the ICAS are present in some way when the CCSS are taught or learned
  ✓ CCSS are missing certain “Habits of Mind”
  ✓ CCSS do not address English as a second language sufficiently

Math
✓ Overall, yes, 98% of the time the ICAS are present in some way when the CCSS are taught or learned
  ✓ For areas that are essential for all majors, yes, but completely missing some content that is desirable for all students, such as Discrete Mathematics
Do all CCSS relate to the ICAS competencies?

- The relationship indicates that when the ICAS standards are taught and learned the CCSS will be addressed in some way in ELA and in a majority of instances in some way in mathematics.
- Three CCSS cluster level standards have no matches to an ICAS competency:
  - Functions: Model periodic phenomena with trigonometric functions
  - Geometry: Visualize relationships between two-dimensional and three-dimensional objects
  - Statistics and Probability: Interpret linear models
Considerations and Further Analysis

✓ This scale captures content relationships including alignment, prerequisite, and teaching and learning. It does not, however, unpack those relationships through further specification or rigor.

✓ Examine the ICAS competencies that only have one match with the CCSS and that are rated as partial, prerequisite, or consistent teaching/learning relationship.

• For example, the ICAS competency for Calculus is addressed by only one CCSS cluster as a prerequisite relationship, we would not want to mislead people to think that we are saying that Calculus is completely covered by the CCSS with our preliminary results data.
CTE Model Curriculum Standards Update

Goal: Update the Career Technical Education Model Curriculum Standards to reflect current business and industry practices and align with the recently adopted Common Core State Standards for English language arts and mathematics and the Next Generation Science Practices and Core Ideas
CTE Model Curriculum Standards Update

CTE Standards Design Criteria:

- Fewer, clearer, higher
- Aligned to current business & industry practices
- Aligned with postsecondary entry requirements (within a career focus)
- Lead to a certificate, license or degree
- Meet 21st Century skills & knowledge
- Research-based and measurable
- Enhance, expand or apply CCSS (where practical)
CTE Model Curriculum Standards Update

Process:

- Form review teams for each of the 15 Industry Sectors comprised of business/industry and postsecondary representatives
- Solicit recommendations for CTE Model Curriculum Foundation and Pathways Standards revisions
- Revise MCS Anchor (Foundation) Standards and Performance Indicators
- Identify or revise pathways by title and content
Process (continued)

- Develop standards language for 15 Industry Sector pathways and performance indicators
- Identify Common Core State Standards for English language arts and math, Next Generation Science practices and core ideas, and social studies standards aligned to Industry Sector pathway standards and performance indicators
- Submit draft MCS for review and approval
- Update Framework to reflect MCS revisions
- Build a professional development program
MCS Learning Continuum (new)

CTE Core Practices
(Knowledge and skills for all students)

CTE Anchor Standards
(Common in title, written in context)

Industry Sector Pathway Standards
(Content specific to pathway expectations)

Career Specialty
(Capstone: certification, licensure, degree)
CTE Model Curriculum Standards Update

Anchor Standards:
1. ACADEMICS
2. COMMUNICATIONS
3. CAREER PLANNING & MANAGEMENT
4. TECHNOLOGY
5. PROBLEM SOLVING & CRITICAL THINKING
6. HEALTH & SAFETY
7. RESPONSIBILITY & FLEXIBILITY
8. ETHICS & LEGAL RESPONSIBILITIES
9. LEADERSHIP & TEAMWORK
10. TECHNICAL KNOWLEDGE & SKILLS
11. DEMONSTRATION & APPLICATION
### 2.0 Communications
Students understand the principles of effective oral, written, and multimedia communications.

<table>
<thead>
<tr>
<th>Foundation Standard</th>
<th>ELA Common Core Standard</th>
<th>CTE Anchor Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 Communications</td>
<td>Listening &amp; Speaking</td>
<td>2.0 Communications</td>
</tr>
<tr>
<td></td>
<td>Acquire &amp; use accurately general academic &amp; domain-specific words &amp; phrases, sufficient for reading, writing, speaking, and listening at the career &amp; college readiness level (LS 11-12.6)</td>
<td>Acquire &amp; use accurately industry sector terminology &amp; protocols for communicating effectively in oral, written, and multimedia formats. (deliberate alignment)</td>
</tr>
</tbody>
</table>
CTE Model Curriculum Standards and Framework

Industry Sectors:

1. Agriculture & Natural Resources
2. Arts, Media & Entertainment
3. Building Trades & Construction
4. Business & Finance
5. Education, Child Development & Family Services
6. Engineering
7. Energy & Utilities
8. Fashion & Interior Design
9. Health Science & Medical Technology
10. Hospitality & Tourism
11. Information & Communication Technologies
12. Manufacturing & Product Development
13. Marketing Sales & Service
14. Public Services
15. Transportation
Preliminary Alignment Results

The following slides outline the methodology and some preliminary results of the alignment between the Health Sciences Standards and the CCSS
### Methodology

#### About the Alignment Methodology

- Examines two dimensions of alignment: content alignment and cognitive complexity.
- More rigorous methodology than crosswalk

#### Research Questions

- To what extent are the knowledge and skills found in the CA CTE Health Science Standards the same or different (aligned) to the Common Core State Standards?
- What is the distribution of the cognitive complexity for both sets of standards across the four levels of a depth of knowledge scale?
### CA Common Core State Standards

**English Language Arts and Literacy**
(grade 11-12)
- Speaking and Listening
- Language
- Reading for Science and Technical Subjects
- Writing for History/Social Studies, Science, and Technical Subjects

**Mathematics** (High School)
- Math Practices
- Number and Quantity
- Algebra
- Functions
- Geometry
- Statistics and Probability
- AP Probability and Statistics
- Calculus

### CA Health Sciences CTE Standards

- Biotechnology
- Patient Care Pathway
- Healthcare Administrative Services
- Healthcare Operational Support Services
- Public and Community Health
- Mental and Behavioral Health
Alignment Process

1. Depth-of-Knowledge
- Content experts with expertise in ELA, mathematics, and health sciences work individually and then as a group to assign Depth of Knowledge levels (cognitive complexity) to each standard

2. Alignment/Match
- Content experts then work individually and then as a group to systematically read each Health standard and evaluate for content matches from the Common Core and make a determination about whether the matched standards represent complete alignment, partial alignment, or no alignment (partial matches are also given a rationale statement)
Step 1: Depth of Knowledge Levels

1. Recall
   - Recall of fact, information, or procedure

2. Skill/Concept
   - Use information or conceptual knowledge, two or more steps, etc.

3. Strategic Thinking
   - Requires reasoning, developing plan or a sequence of steps, some complexity, more than one possible answer.

4. Extended Thinking
   - Requires an investigation, time to think and process multiple conditions of the problem
## Step 2: Alignment Relationship Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete Alignment</td>
<td>All content in the Common Core State Standard(s) fully align with the Health Sciences Standard</td>
</tr>
<tr>
<td>Partial Alignment</td>
<td>Some of the content in a standard from one set of standards relates to some or all of the content in another standard from the comparison set of standards.</td>
</tr>
<tr>
<td>No Alignment</td>
<td>None of the content in the CCSS aligns with any of the content in the Health Sciences Standard</td>
</tr>
</tbody>
</table>

### Rationale Statements for Partial Alignment Matches

<table>
<thead>
<tr>
<th>Rationale Statements for Partial Alignment Matches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Science Standard content is prerequisite to the CCSS</td>
</tr>
<tr>
<td>CCSS content is prerequisite to the Health Science Standard</td>
</tr>
<tr>
<td>Part of the Health Science Standard Matches All of the CCSS</td>
</tr>
<tr>
<td>Part of the CCSS matches all of the Health Science Standard</td>
</tr>
<tr>
<td>Part of the Health Science Standard matches part of the CCSS</td>
</tr>
</tbody>
</table>
Biotechnology Pathway Early Results

The following slides outline the broad results of the relationship between the Biotechnology Pathway and the 1) ELA and Literacy Common Core State Standards, and 2) High School Mathematics Standards and Math Practices
Fig. X. Percent of Common Core English Language Arts, Common Core Mathematics, and California Health Sciences Standards Rated at Each Depth of Knowledge Level
Figures X. Percent of Common Core English Language Arts, Common Core Mathematics, and California Health Sciences Standards Rated at Each Depth of Knowledge Level

- **Recall**
  - ELA and Literacy: 6%
  - Mathematics: 26%
  - Health Sciences: 27%
- **Skill/Concept**
  - ELA and Literacy: 13%
  - Mathematics: 46%
  - Health Sciences: 41%
- **Strategic Thinking**
  - ELA and Literacy: 31%
  - Mathematics: 31%
  - Health Sciences: 18%
- **Extended Thinking**
  - ELA and Literacy: 35%
  - Mathematics: 5%
  - Health Sciences: 9%
No rated Biotechnology statement had a Complete Alignment relationship with a CCSS.

Of the 44 Biotechnology rated statements, 34 or 77% were rated as having a partial match relationship with the matched CCSS for ELA and Literacy.

23% or 10 statements were had no matched ELA standards.
CCSS content is prerequisite to the Biotechnology content

Part of the CCSS matches all of the Biotechnology content

Part of the Biotechnology content matches part of the CCSS content
<table>
<thead>
<tr>
<th>Biotechnology Standard</th>
<th>DOK Level</th>
<th>English Language Arts and Literacy Common Core Standard</th>
<th>Alignment Relationship</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>A8.0. Understand that manufacturing represents inter-connectedness between science and production. A8.6 Use the Internet to find information about, traditional pharmaceuticals, herbal remedies and recombinant pharmaceuticals.</td>
<td>2</td>
<td>WHST6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. (DOK Level 4) WHST7. Conduct short as well as more sustained research projects to answer a question (including a self generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (DOK Level 4)</td>
<td>Partial Match</td>
<td>Part of the Health CTE matches part of the CCSS</td>
</tr>
</tbody>
</table>
No rated Biotechnology statements had a Complete Alignment relationship.

Of the 44 Biotechnology rated statements, 18 or 41% were rated as having a partial match relationship with the matched CCSS mathematics standards.

59% or 26 statements were had no matched mathematics standards.
Biotechnology Rationale

Statements for Partial Alignment - Math

- CCSS content is prerequisite to the Health CTE
- Part of the CCSS matches all of the Health CTE
- Part of the Health CTE matches all of the CCSS
- Part of the Health CTE matches part of the CCSS
### Example of Matched Math Standard

<table>
<thead>
<tr>
<th>Biotechnology Standard</th>
<th>DOK Level</th>
<th>Mathematics Common Core State Standard or Math Practice</th>
<th>Alignment Relationship</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>A7.0 Follow sustainable and safe practices with high regard for quality control. A7.6 Determine which equipment is appropriate to use for a given task and what units of measurement are used.</td>
<td>1</td>
<td>MP.5 Use appropriate tools strategically. (DOK Level 3)</td>
<td>Partial Match</td>
<td>Part of the Health CTE matches part of the CCSS</td>
</tr>
</tbody>
</table>
Student Focus Groups

- Exploratory

- Conducted on March 30, 2012 at the California Health Occupations Students of America (Cal-HOSA) conference

- Four high school focus groups (N = 40; juniors and seniors) and two community college focus groups (N = 17).

- Initial impressions
General Impressions: Overall

- There was variation across h.s. pathways/academies in terms of level of math, amount of specific health info, depth of advising, opportunities to connect with colleges, work-based learning opportunities, etc.

- Focus in h.s. is on getting into college, not on college success.

- Need stronger advising in h.s. and college about specific health opportunities and college in general.

- More optimism expressed in h.s. groups.

- Sense of fending for oneself once in college.
General Impressions: H.S.

- Health pathways in h.s. provides students with fall-back career and way to earn money in college.
- Work-based learning is positive, and a big time commitment.
- Optimistic about college preparation.
- Many had connected in some way with a college (such as concurrent enrollment).
- Strong interest in matriculating directly into college.
- Clear sense of which college they wish to attend.
- Felt supported in pathway/academy.
- Value of rotating/experimenting within Health.
- Few had a clear sense of math knowledge/skills needed to prepare for college.
General Impressions: College

- General feeling of lack of preparation for college (8 out of 9 in one group, 4 out of 8 in other).

- Surprises in college: less writing (shorter papers), harder to earn good grades, very self-directed, not enough advising, noticeable impact of budget cuts, wanted more prep in nonacademic areas.

- Wanted more specific information about health options and careers while in h.s.
Student Quotes
Next Steps
Timeline

1. Complete Remaining Pathways for Alignment April 2012
2. Analyze Alignment Results May 2012
3. Recruit Validity Participants May – July 2012
4. Conduct Validity Survey July – August 2012
5. Analyze Validity Results September 2012
6. Final product(s) October 2012
Discussion