OFFICE OF CHIEF OPERATIONS OFFICER
Summary of State Board of Education Agenda Items
March 19-20, 2015

OFFICE OF EDUCATOR QUALITY

13.B. Approval to begin the Administrative Procedures Act process: To approve five new supplemental 900 level endorsement codes for secondary education

926 Project Lead the Way (PLTW) – Biomedical Health Science

927 Project Lead the Way (PLTW) – Middle School Science, Technology, Engineering and Mathematics (STEM)

928 Project Lead the Way (PLTW) – High School Science, Technology, Engineering and Mathematics (STEM)

929 Southern Region Education Board (SREB) – Math Ready

930 Southern Region Education Board (SREB) – Literacy Ready

Background Information:

On March 6, 2015, the Commission on Teacher and Administrator Education, Certification and Licensure Development approved five supplemental endorsement codes for secondary education. Each of these endorsements requires specific teacher endorsement training that allows the teacher to teach the identified Project Lead the Way (PLTW) or Southern Region Education Board (SREB) curriculum.

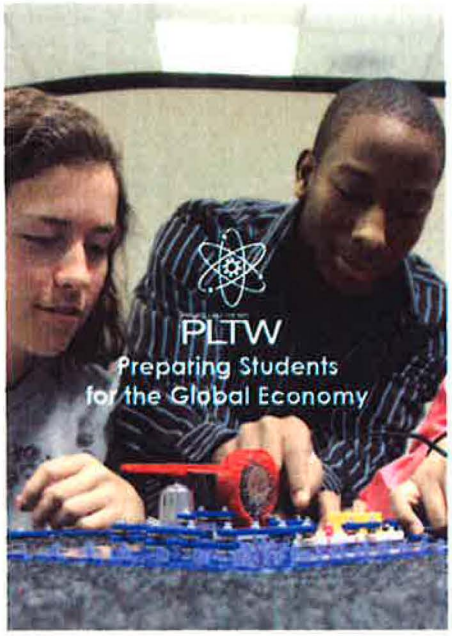
Project Lead The Way (PLTW), a 501(c)(3) nonprofit organization, is the nation's leading K-12 STEM program. Our world-class activity-, project-, and problem-based curriculum and high-quality teacher professional development model, combined with an engaged network of educators and corporate and community partners, help students develop the skills needed to succeed in a global economy.

Recommendation: Approval

Back-up material attached

PREPARING STUDENTS FOR THE GLOBAL ECONOMY

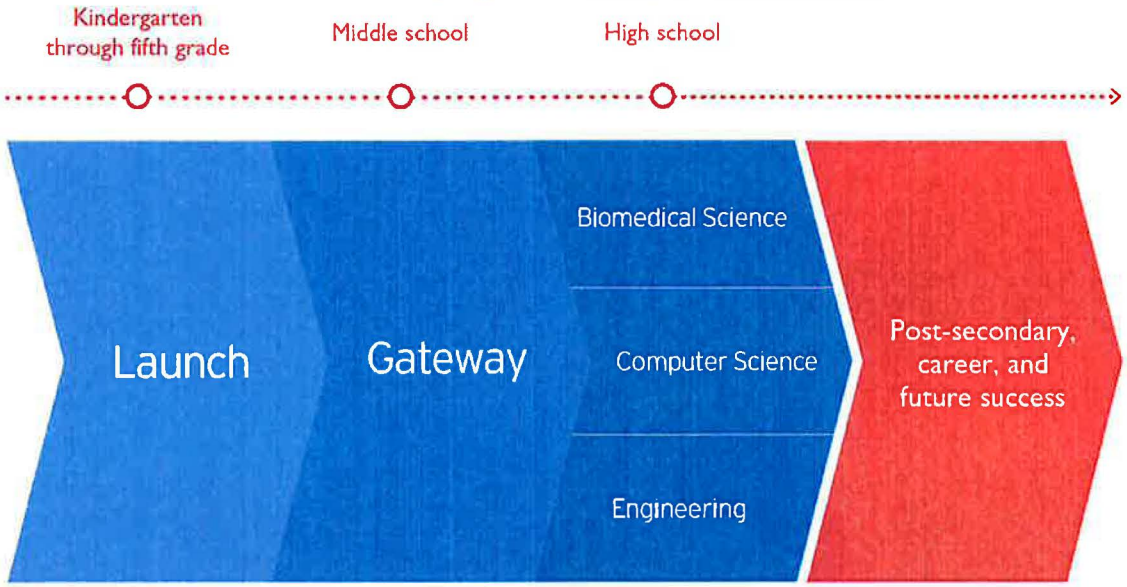
Project Lead The Way (PLTW), a 501(c)(3) nonprofit organization, is **the nation's leading K-12 STEM program.** Our world-class activity-, project-, and problem-based curriculum and high-quality teacher professional development model, combined with an engaged network of educators and corporate and community partners, help students develop the skills they need to succeed in the global economy.



We deliver nearly **6,000 programs** to more than 5,000 elementary, middle, and high schools in all 50 states, across all district and school settings, serving more than **600,000 students annually.** Our sustainable business model allows 100% of all philanthropic contributions to go directly to support schools or donor-approved projects.

Our success and impact has been recognized by universities, Fortune 500 companies, and numerous national organizations. The Social Impact Exchange named PLTW as one of **America's 100 highest performing nonprofits** and Change The Equation, a CEO-led STEM advocacy organization, named PLTW as one of just four organizations **ready for scale nationally.**

PLTW offers five programs of study for K-12 students:



Launch, offered in ten-hour modules, engages students in design problems that encourage analysis, collaboration, and problem solving by exploring topics such as energy, light and sound, and motion and stability.

Gateway, offered in nine-week units, explores energy, aerospace, the environment, modeling, robotics, technology, and other STEM-related topics.

Biomedical Science, offered in full-year courses, explores human medicine, cell biology, genetics, bioinformatics, disease, and other biomedical topics.

Computer Science, offered in full and half-year courses, develops computational thinking skills and explores concepts such as coding, data mining, big data, and cybersecurity.

Engineering, offered in full-year courses, explores the engineering design process, advanced manufacturing, digital electronics, and other topics by linking STEM principles to relevant problem-solving activities.

Learn more about PLTW at our website: pltw.org

See PLTW's work in action on our YouTube page: youtube.com/TeamPLTW

Current Research Findings on PLTW Program Effectiveness

Numerous institutions have released reports highlighting PLTW's success in engaging all types of students in STEM education. Each study is unique in its methodology and focus – some studies cover PLTW programs in certain states, some in specific school districts, while others take a look at how PLTW alumni are performing in college. Every report is different, yet the results say the same thing: PLTW prepares students for the global economy. Below are highlights from the most recent reports.

An Examination of Research Literature on PLTW
Dr. Robert Tai, University of Virginia

Dr. Tai collected and analyzed over thirty research studies and reports on PLTW through November, 2012.

- PLTW contributes to a strong, positive impact on mathematics and science achievement
- PLTW has a positive influence on students' career interest and likelihood to continue their education
- A clear strength of the PLTW program is the intensive teacher professional development program

PLTW Students More Prepared for Higher Education
Dr. James Van Overschelde, Texas State University
Spring 2013 American Journal of Engineering Education

Dr. Van Overschelde collected and analyzed six years of longitudinally-linked student data to compare thousands of PLTW students to their non-PLTW peers.

- Hispanic enrollment in PLTW has increased by over 500%; females nearly 600%; and low-income students by 650%
- PLTW students are more prepared for and attended Texas higher education institutions at a higher rate
  PLTW students scored higher on the state's mathematics assessment
- For those students who did not enroll in college, the median wage for PLTW students was 13.6% higher

Impact on Student Choices
True Outcomes Analysis of End-of-Course Evaluations for PLTW (2009)

- 70% of high school seniors who are taking PLTW courses intend to study engineering, technology, computer science, or another applied science
- Over 93% of PLTW students intend to pursue at least a two-year or four-year degree after high school
- PLTW graduating seniors believe taking PLTW classes has "significantly increased their ability to succeed in college"

Using Propensity Scores to Evaluate Education Programs
Gary Pike and Kristen Robbins, IUPUI

Researchers at Indiana University—Purdue University—Indianapolis analyzed data for more than 56,000 Indiana high school graduates.

- High school graduates who participated in PLTW were nearly three times as likely to major in STEM versus non-PLTW graduates.
- Students who took three or more PLTW courses while in high school were six times more likely to study STEM in college than their peers who had not taken PLTW while in high school.
- PLTW participation was significantly related to persistence into the second year of college, especially for those students who had taken three or more PLTW courses.

Student Success in Postsecondary

60% of the 2013 incoming freshmen class at the University of South Carolina College of Engineering took PLTW in high school

Between 2009-2012, Cal Poly-Pomona reports the number of PLTW students enrolled in the College of Engineering grew from 9% to 20%

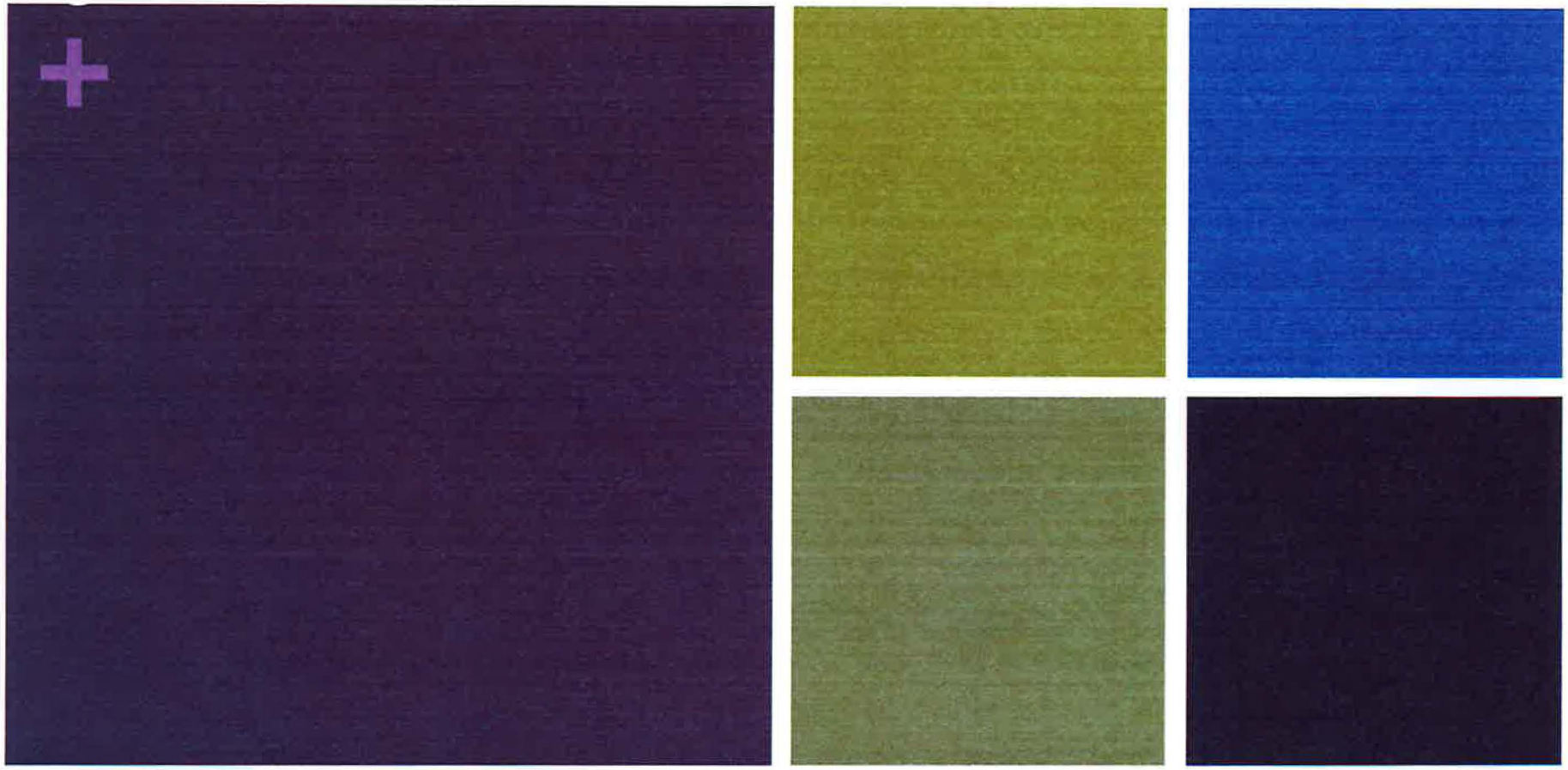
PLTW alumni account for over 45% of the students that were admitted in 2013 to the University of Minnesota's College of Engineering

38% of the Milwaukee School of Engineering's 2013 freshmen class previously took PLTW courses. Projections for 2014 are over 50%

PLTW can also positively impact **high school graduation rates.** John Cerna, Superintendent of Toppenish Schools (WA), said "We are defying odds. A migrant population, high minority (96%), high poverty (99%). We have all the reasons we shouldn't be successful. Now we have kids who are going on to be engineers and going to universities." Cerna credits this success to Toppenish High School's PLTW program. Participation in PLTW courses has skyrocketed, the dropout rate has decreased, and the state science scores have **increased by 67% over a 3-year period.**

Recent Honors and Recognition

- Change The Equation selected PLTW in October 2013 as one of four STEM programs in the U.S. that are ready for significant scale-up
- The Social Impact Exchange placed PLTW on the S&I 100 Index in 2012 as one of the top 100 high-impact nonprofits in the United States
- PLTW's Gateway program was selected as one of nine Iowa STEM Scale-Up Programs by the Iowa Governor's STEM Advisory Council for 2013-2014
- PLTW was one of seven programs to receive the @Scale endorsement from the Massachusetts Governor's STEM Advisory Council



SREB Readiness Course: Literacy Ready

Cynthia Shanahan, University of Illinois, Chicago
Jodi Holschuh, Texas State University
Leslie Rush, University of Wyoming

Overview

- **Who is this course for?**
  - Non-remedial high school students, who, nevertheless, would be relegated to remedial coursework in college, or if not, would be likely to struggle with the text demands in their beginning college coursework.
  - Non-AP
- **Why do we need a readiness (transitional) course?**
  - The Common Core Standards raise the bar for high school students, who will need to meet higher demands for literacy in English, Science, and History/Social Studies
  - Too many students currently need remedial coursework in College (Some estimates as high as 50%) even before Common Core
  - This readiness course would better prepare students so they would not need a remedial course

Why this course?

- Teaches students to interact with not only literature texts, but also with informational texts in English, history, and science, in line with the Common Core Standards
- This is a literacy course, but the focus in each unit is the interaction of three kinds of learning
  - Learning the literacy
  - Learning the discipline
  - Learning the content
- Each unit teaches students to interact with *challenging texts*, also in line with the Common Core Standards

How was the course developed?

- Three teams: History, Science, English
  - Team Leaders were literacy experts
    - History: Cynthia Shanahan
    - English: Leslie Rush
    - Science: Jodi Holschuh
  - Tim Shanahan provided feedback on text choice, readability
  - Literacy Design Collaborative (LDC) provided guidance on lesson design
- Teams composed of high school and college instructors in the discipline
- State Department participation
- Two face-to-face meetings
- Numerous virtual meetings
- Teams composed first drafts; leaders compiled and composed pilot version
- Teams provided continuous feedback

What features does this course have?

- Overall:
  - Six units, two in each discipline
  - Each unit covers six weeks of instruction (Total: 36 weeks)
  - Each discipline has a less difficult and a more difficult unit
    - 2nd unit has more challenging texts (longer, more difficult)
    - 2nd unit has an increase in sophistication and difficulty of writing tasks
  - All units provide instruction in reading multiple texts and genres
  - All units include vocabulary instruction
  - All units provide numerous opportunities for assessment and evaluation of both literacy skill and content knowledge
  - All units have final projects (presentations, essays, tests)
  - Alignment to Common Core Reading and Writing Standards (ELA, Social Studies/History, Science and Technical Subjects)

Units designed for flexible use

- Some options for delivery:
  - All six units – recommended for students needing the most support in transition
  - Three most difficult units – for students needing less support in transition
  - Units in a selected discipline only – for students who struggle with literacy in one content area but excel in literacy in other content areas (example: good in reading English novels but cannot make sense of science texts)
  - Teachers—ideally content teachers (English, history, science), not just English. (I.e., for full implementation, teachers could each teach content three times and students could rotate)

Example of a Possible Structure for the Literacy Ready Course

	1st Six Weeks	2nd Six Weeks	3rd 6 weeks
T1 (English)	X	Z	Y
T 2 (Science)	Y	X	Z
T3 (History)	Z	Y	X

The units: History Units 1 and 2

	Unit 1	Unit 2
Topic	Civil Rights, with a focus on the Freedom Rides	U.S. foreign relations: • Cuban Missile Crisis • Vietnam • Six-Day War
Theme/Essential Questions	Changes in conceptions of liberty/freedom during the 1960's in relation to Civil Rights	Conceptions of liberty/freedom during the 1960's with U.S. foreign relations.
Final Project	Power-Point presentation of claim and text evidence for Essential Question	Essay addressing essential question Final exam

The units: History Units 1 and 2

	Unit 1	Unit 2
Reading genres	• Textbook chapter • Photographs • Memoir (with photographs) • Political Cartoons • Telegrams • Proclamations • Newspaper reports • Timeline • Anchor text • Lecture • Speeches • Essay • Bios • Lyrics	• Textbook chapters • Photographs • Political Cartoons • Timelines • Lectures • History text • Declarations • Manifestos • Laws • Speeches • Bios

The units: History Units 1 and 2

	Unit 1	Unit 2
Writing genres:	• Free-write • Short answer • Annotation/notetaking • Summarizing • Historical Account • Outline/PowerPoint for research paper • Comparison/contrast essay plan	Free-write Short answer Annotation/notetaking Précis(summarization) Explanatory essays Cause/effect essay

The units: History Units 1 and 2

	Unit 1	Unit 2
Strategies	• Sourcing, Contextualization, Corroboration • G-SPRITE • Nat'l Archives photo analysis technique • Political Cartoon Analysis Guide • Modified Cornell Notetaking • Note organizers • Talk-Through • Reciprocal Questioning • Sentence Analysis	• Sourcing, Contextualization, Corroboration • G-SPRITE • History Pattern Organizer • Nat'l Archives photo analysis technique • Political Cartoon Analysis Guide • Modified Cornell Notetaking • Power-Point Notetaking • Note organizers • Talk-through • Reciprocal Questioning • Socratic Seminar • Paragraph Analysis

The units: Science Units 1 and 2

	Unit 1	Unit 2
Topic	Nutrition	DNA and Biotechnology
Theme/Essential Questions	Making science public and evaluating science claims	Understanding DNA structure and the future of biotechnology
Final Project	Informational pamphlet on a topic related to nutrition and diet	Scientific poster and research symposium presentation Final exam

The units: Science Units 1 and 2

	Unit 1	Unit 2
Reading genres	• Textbook chapter • Science claims in advertisements • Research articles • Science animations • Case studies • Science videos • Labs • Charts • Diagrams • Lecture	• Textbook chapter • Government research reports • Research articles • Science animations • Science models • Science videos • Labs • Codons • Charts • Diagrams • Lectures

The units: Science Units 1 and 2

	Unit 1	Unit 2
Writing genres:	• Free-write • Reflection • Annotation/note taking • Summarizing • Explanatory/informational • Transforming information from text to visual and vice versa • Essay	• Free-write • Reflection • Annotation/note taking • Lab report • Synthesis • Argumentation • Transforming information from text to visual and vice versa • Research poster

The units: Science Units 1 and 2

	Unit 1	Unit 2
Strategies	• Close reading • Checklist for evaluating science in the news • Debate • Text annotation • Concept Charting • Cornell Note taking • Diagramming science processes • Talk-Through • Reciprocal Questioning • Jigsaw • Generative quiz review • Individual and group quiz • Project planning timeline • Peer feedback	• Close reading • Discussion web • Cornell Note taking • Research article note taking template • Modeling • Diagramming science processes • Comparison/contrast charting • Concept maps • Diagramming arguments • Text annotation • Jot lists • Reciprocal Questioning • Generative test review • Project planning timeline • Peer feedback

The units: English Units 1 and 2

	Unit 1	Unit 2
Topic	*The Shallows: What the Internet is Doing to Our Brains*, by Nicholas Carr	*Ubik*, by Philip K. Dick
Theme/Essential Questions	How is the exponential increase of information that we process in all forms of media affecting the way we live?	How is the exponential increase of information that we process in all forms of media affecting the way we live?
Final Project	Synthesis essay	Literary argument essay

The units: English Units 1 and 2

	Unit 1	Unit 2
Reading genres	• Book-length argument • Articles • Interview transcript • Video • Poetry • Cartoon • Blog post	• Novel • Websites • Book covers • Excerpts from novels • Chapter from a textbook • Literary argument, in the form of a chapter from an edited volume • Interview transcript • Biography excerpt

The units: English Units 1 and 2

	Unit 1	Unit 2
Writing genres:	• Reading log • Survey response • Individual and class definitions • Rhetorical précis • Summaries • MLA Citations • Prompt responses • Outline • Reflection • Counter-arguments • Alignment, analysis and evaluation paragraphs • Concept map • Individual and group evaluations • Synthesis presentation and essay	• Reading log • Notes • Predictions and evidence • Summaries • Interpretations and evidence • Level 2 questions • Journal entries • Avatar • Prompt responses • Thesis statements and evidence • Character inference notes • Summary with evidence • Claim chain • Individual and group evaluations • Literary argument essay

The units: English Units 1 and 2

	Unit 1	Unit 2
Strategies	• Annotation • Rhetorical précis • Graphic organizers • Text/text connections • Charting • Note-taking • Vocabulary strategies • Socratic Seminar • Writing process strategies	• Close reading and interpretation • Summarizing • Developing questions • Highlighting • Making predictions • Journaling • Thesis statement development • "Sandwich effect" for embedding quotes in text • Claim Chain • Vocabulary strategies • Socratic Seminar • Writing process strategies

Where are we in the process?

- Pilot versions of all six units in the course field tested in seven states.
  - Focus for field testing:
    - Timing
    - Clarity
    - Engagement
    - Modifications needed
  - We met virtually with field-test teachers each weekly or monthly to debrief, trouble-shoot, make needed revisions. Pilot teachers kept logs, copies of student work, and responded to questionnaires.
- Formal state and ACHIEVE reviews completed.
- Based on this feedback, we have revised the units for publication in fall 2013.
- Online versions of the courses are planned for target release on a new SREB iTunes U page in spring 2014.

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SREB Readiness Course: Math Ready

From the SREB College and Career Readiness Transitional Course Project

Kenna Barger, SREB
Math Consultant
Atlanta, GA

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Content of Course?

- Resources: Core Standards Memo, MCF Appendix A, MCF Appendix D
- SREB Getting Ready for College and Careers Guide
- Dr. Bill McCallum & Dr. Jason Zimba Consulted
- Partner States' Input - January Mtg.
- Math Transition Team "Clustering" February Mtg. with Lead Writers

High School: A Major Disconnect

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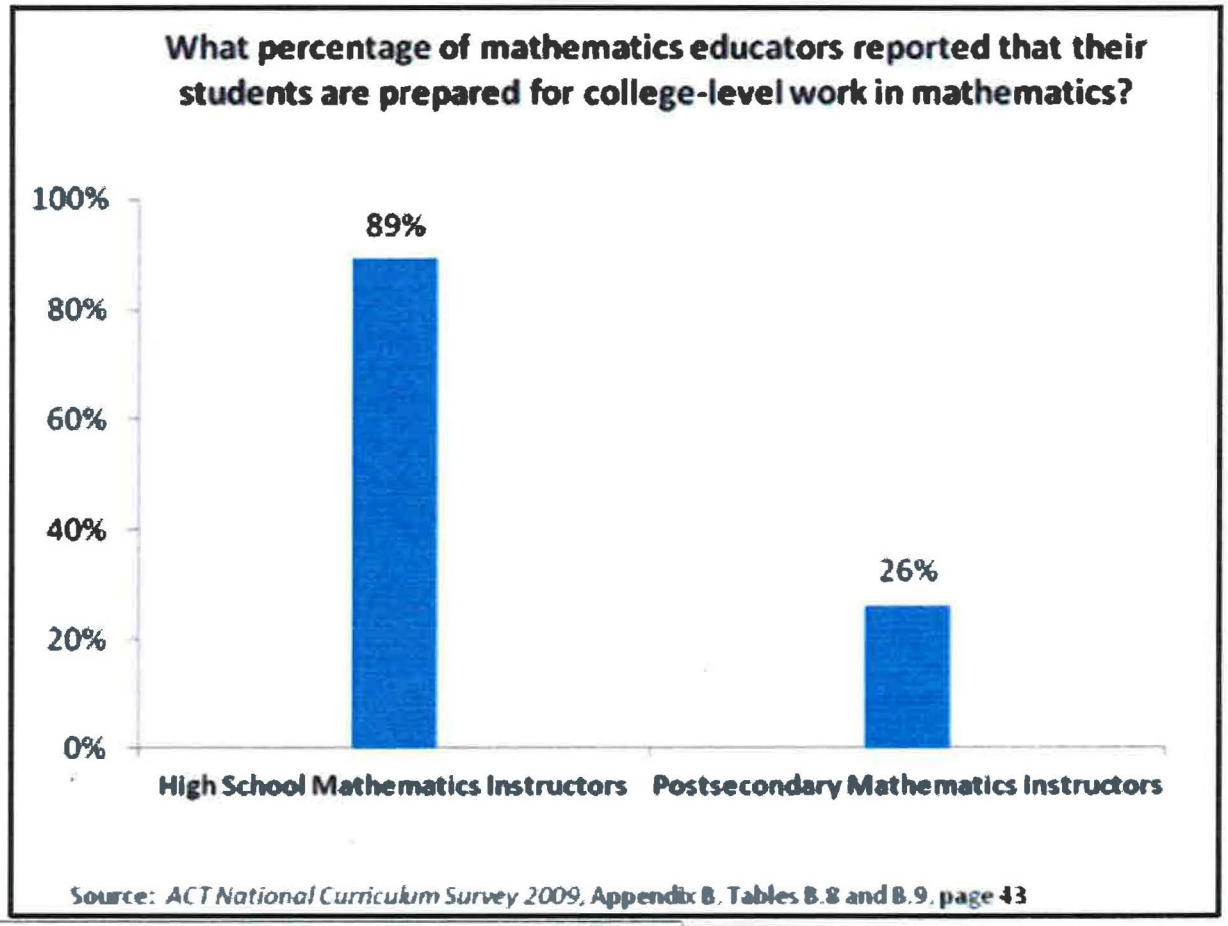

Source: *ACT National Curriculum Survey 2009*, Appendix B, Tables B.8 and B.9, page 43

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Emphases in High School

- Many students in two-year and four-year colleges need remediation in math
- Remedial classes lower the odds of finishing the degree or program
- Need to set the agenda in high school math to prepare more students for postsecondary education and training

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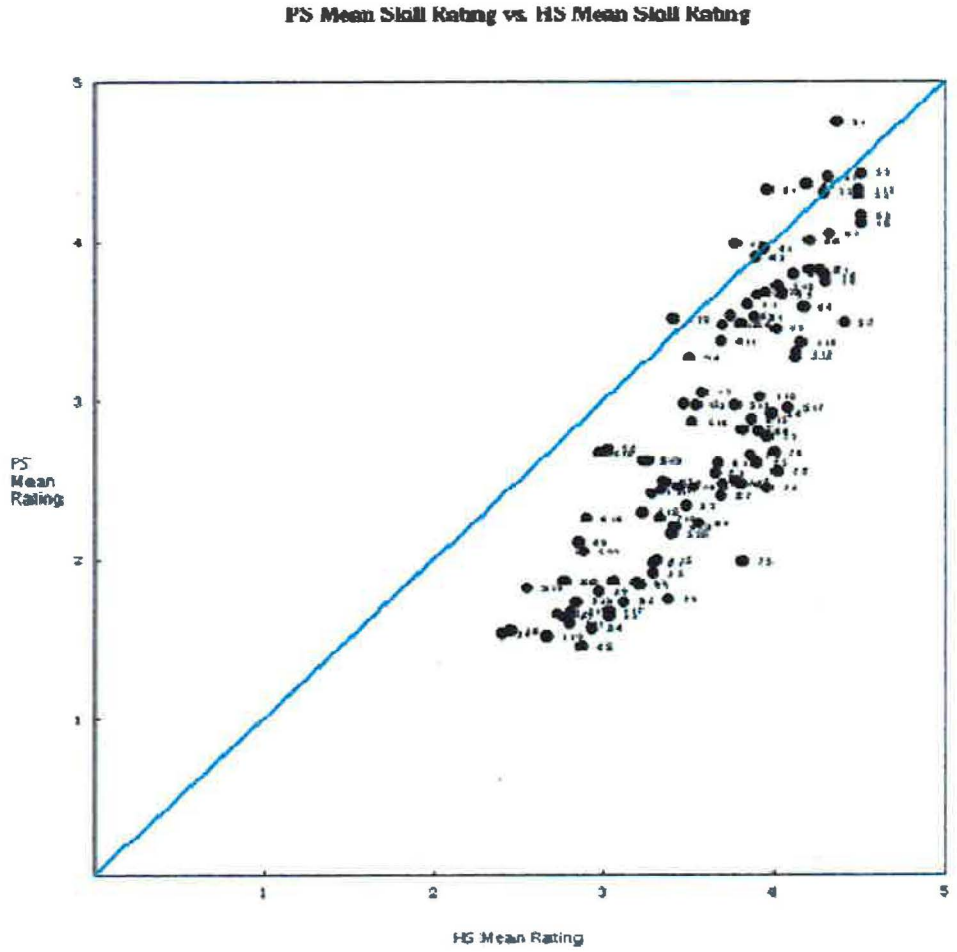
Postsecondary instructors want deeper mastery of fewer things

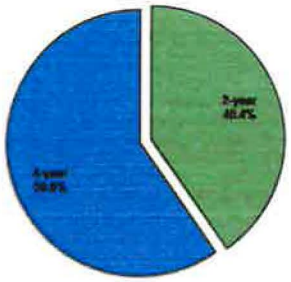
Postsecondary vs. High school skill ratings



Conley et al., validity study of CCSS

- Just-released survey of over 1,800 postsecondary instructors
- Instructors rated each of the CCSSM content standards in high school as to applicability and importance for college-level work
- Range of courses and institutions

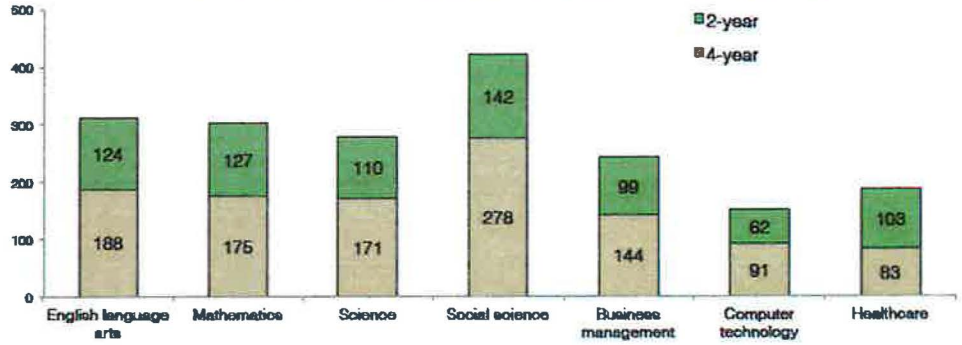
Figure 5. Breakdown of Courses (n = 1897) by Institution Type: 2-year vs. 4-year



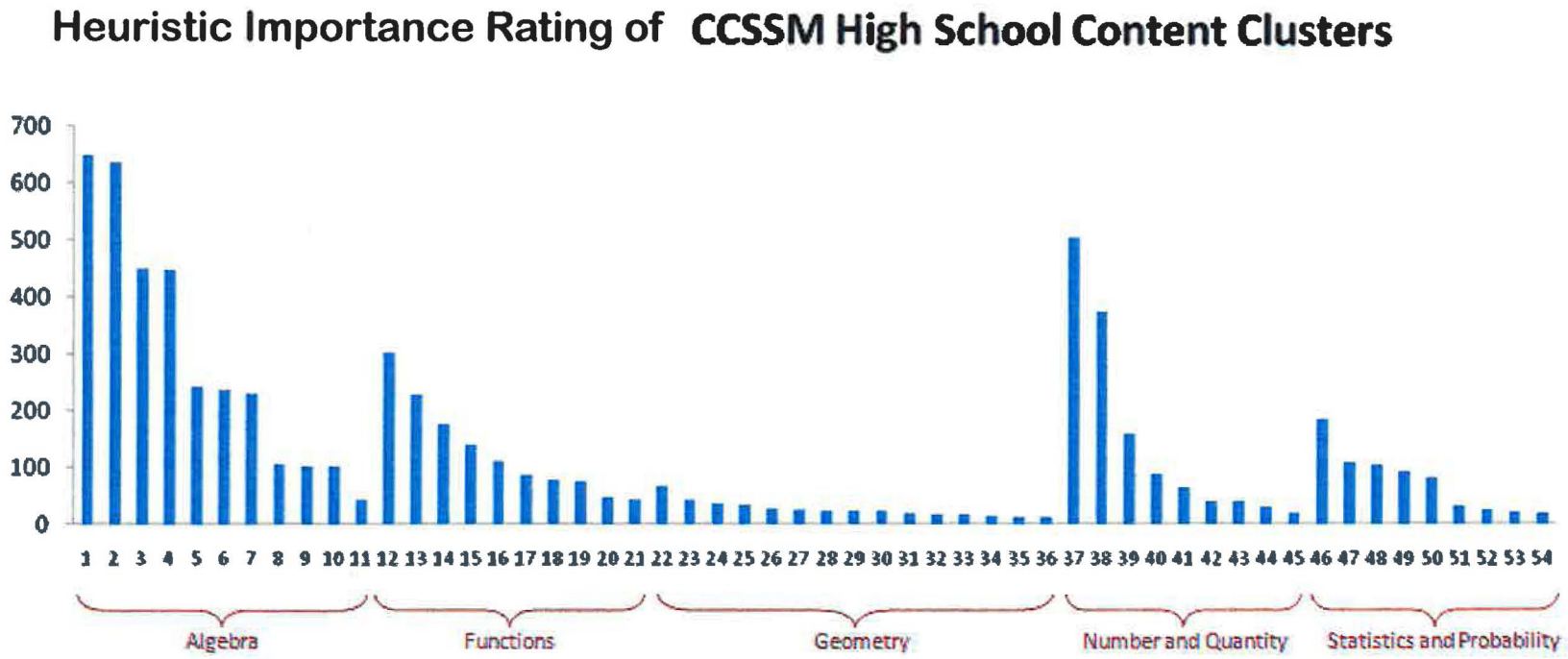
Figures 5 and 6 provide information about the distribution by two- and four-year institutions for the courses as a whole and by content area. Approximately 60% of the courses came from four-year institutions, with the other 40% from two-year institutions. This pattern was fairly consistent for each content area as well, with two exceptions. For the social science courses, the percentage at four-year institutions was slightly higher (66% vs. 34% at two-year institutions). For healthcare courses, the percentage at two-year institutions was higher (55% vs. 45% at four-year institutions).

In order to obtain context for the perceptions of instructors in our sample, we asked several questions about the nature of the courses. Figures 7 through 9 and Table 4 show the demographic information about the courses. Figure 7 shows the level of the course. The survey was intended to capture perceptions of instructors of courses that students encounter at the beginning of their college careers; however, 10% of the respondents considered their

Figure 6. Breakdown of Courses (n = 1897) by Content Area and Type of Institution: 2-year vs. 4-year

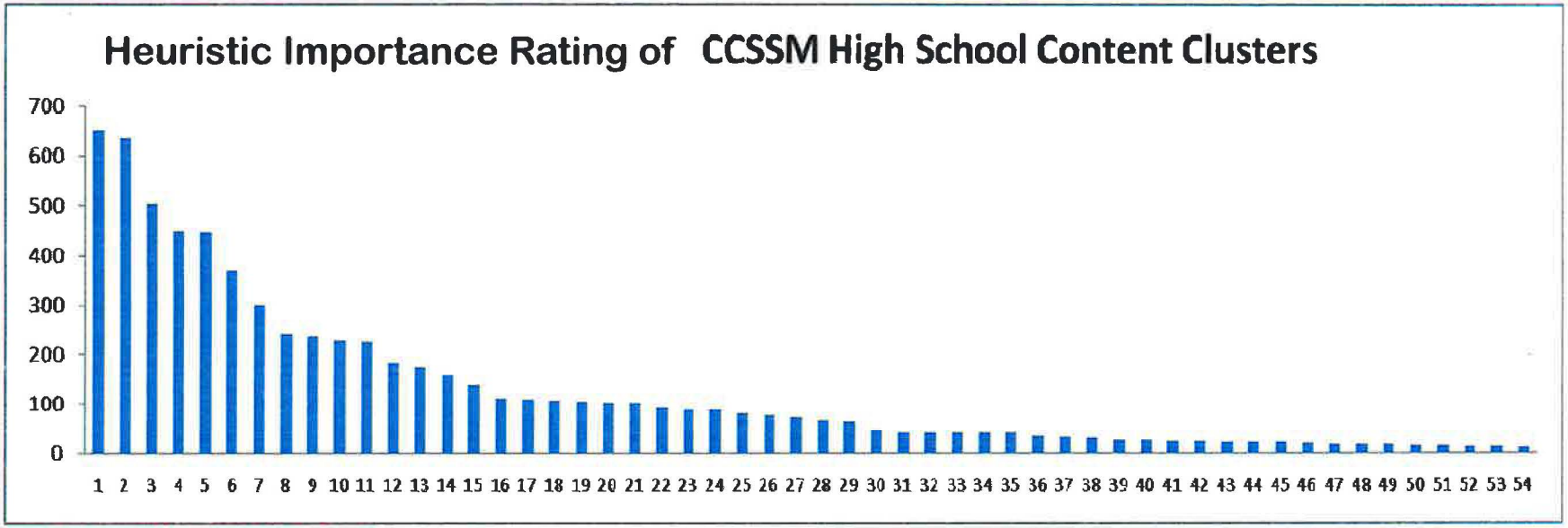


Not all content areas are equally important



Source: Derived from Conley (2011) data

Not many clusters are important



Source: Derived from Conley (2011) data

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Math Ready Unit Order

1. Expressions (AR)
2. Equations (TN)
3. Measurement (KY)
4. Linear Functions (GA)
5. Systems (KY)
6. Quadratics (NC)
7. Exponentials (AR)
8. Optional- Statistics (TN)

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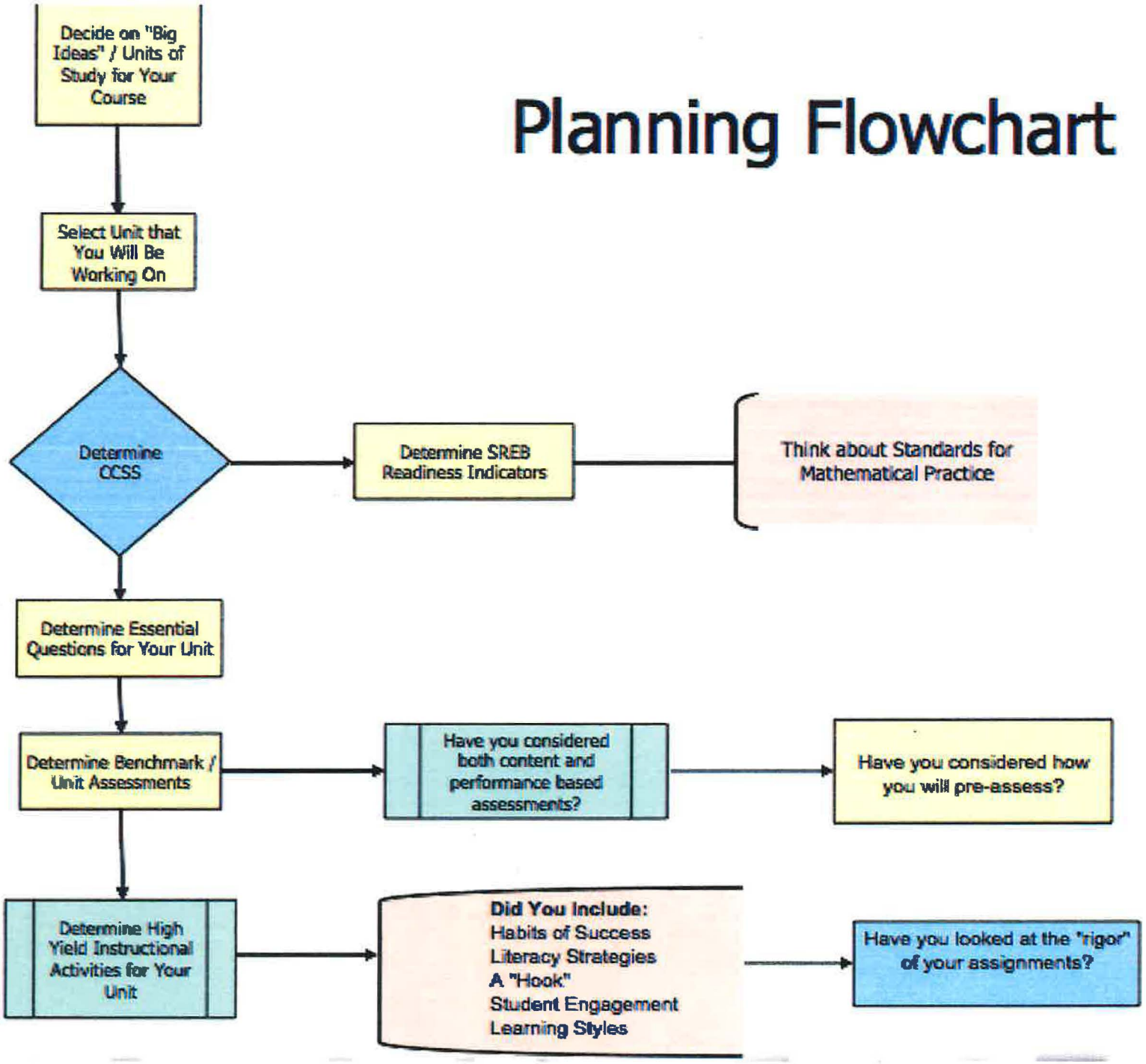
Planning the Units

- Unit Planning Template
- Unit Planning Rubric
- Skeletal Units
- State Review
- Fully Developed Units
- Face to Face Meeting
- State Review
- Unit Assessments
- State Review

Planning Flowchart



The BIG IDEA of Formative Assessment

Students and teachers

Using evidence of learning

To adapt teaching and learning

To meet immediate learning needs

Minute-to-minute and day-by-day

-Marnie Thompson and Dylan Wiliam (2008)

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The 5 Strategies of Assessment for Learning (Formative Assessment)

1. **Clarifying and sharing learning intentions and criteria for success**
2. **Engineering effective discussions, questions and learning tasks that elicit evidence of learning**
3. **Providing feedback that moves learners forward**
4. **Activating students as the owners of their own learning**
5. **Activating students as instructional resources for one another**

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Where are We?

- Field-tested the units and full courses in schools in seven states
- Went through multiple revisions based on monthly feedback from teachers during testing, eight external review states and ACHIEVE
- Final units revised and ready for publication in fall 2013
- Online versions of the courses are planned for target release on a new SREB iTunes U page in spring 2014