



## Resource Library

### **Teacher/Leader - Informative Resources** (*For Teacher/Leaders seeking to better understand why integration is important*)

High Quality CTE Tools - CTE Academic Integration (listed by Standard)

<https://www.acteonline.org/professional-development/high-quality-cte-tools/standards-aligned-and-integrated-curriculum/#tab-id-2>

### CTE Academic Integration Webinars

Three recent ACTE webinars are archived. <https://www.acteonline.org/webinars/engaging-high-quality-instruction-series/>

- Part 1: Why is Academic Integration a Necessity in CTE programs: A Discussion with Industry <https://youtu.be/VxSgscV3bm8>
- Part 2: Why is Academic Integration a Necessity in CTE programs: A Discussion with Educators <https://youtu.be/Lyh9QZPOyxY>
- Part 3: Why is Academic Integration a Necessity in CTE programs: A Discussion with Students <https://youtu.be/X4hFR2PFwWY>

#### **Balancing Academic Integration in CTE – ACTE, January 2017**

<https://youtu.be/Zoh lnMw5Mg>

In this webinar, Robert Marraccino draws from his experience building rigorous academic-infused health sciences programs in the state of New York to share tips on deciding the degree of academic content in your CTE curriculum, what criteria to use and where to get started.



## Articles

*Integration of the Common Core State Standards into CTE: Challenges and Strategies of Career and Technical Teachers – Asunda, Finnell & Berry, Career and Technical Education Research, April 2015 (\$)*

<https://www.ingentaconnect.com/contentone/acter/cter/2015/00000040/00000001/art00006>

*This study investigated common barriers, challenges, practical strategies and supporting examples of how teachers are integrating the Common Core State Standards into CTE curricula.*

*Common Ground: Integrating the Common Core and CTE*

Richner, ACTE Techniques Magazine, Nov/Dec 2014

This article explores challenges for CTE and math instructors in integrating the Common Core State Standards for mathematics, and the process of integrating math into CTE courses.

*CTE Academic and Technical Curriculum Integration to Meet the Common Core*

Wright, Thomas and Rogers, ACTE Techniques Magazine, Nov/Dec 2014

York County School of Technology faculty collaborated to develop and implement STEM-related lessons across math, science and engineering technology. <https://www.acteonline.org/wp-content/uploads/2018/05/Techniques-NovDec2014-CTEAcademicTechnicalCurriculumIntegration.pdf>

*Capitalizing on Context: Curriculum Integration in Career and Technical Education*

National Research Center for CTE Curriculum Integration Workgroup, 2010

This publication describes the process, findings and key principles of curriculum integration of two National Research Center for CTE projects: The Math-in-CTE model, in which CTE and math teachers partnered to develop math-enhanced CTE lessons, and the Authentic Literacy in CTE project.

*Oregon Applied Academics Project Final Report*

Pearson, Richardson and Sawyer, National Research Center for CTE, 2013

Teacher teams in Oregon developed a technical math course with nine units that led to math skill gains and satisfaction from teachers and students.

*Integrating Curriculum: Lessons for Adult Education From Career and Technical Education*

Chernus and Fowler, National Institute for Literacy, 2010



This report examines three types of curriculum integration—course integration, cross-curriculum integration and program integration—and lessons from CTE that can be applied to adult education.

*Integration of the Common Core State Standards into CTE: Challenges and Strategies of Career and Technical Teachers* (§)

Asunda, Finnell and Berry, *Career and Technical Education Research*, April 2015

This study explored barriers, challenges, practical strategies and supporting examples of teachers integrating the Common Core State Standards into CTE.

*Developing Authentic, Integrated, Standards-Based Mathematics Curriculum: [More Than Just] An Interdisciplinary Collaborative Approach* (§)

Hernández and Brendefur, *Career and Technical Education Research*, 2003

This research describes the conditions that support the ability of interdisciplinary teams of teachers to create high-quality integrated mathematics curriculum units.

*Designing and Implementing an Integrated Mathematics, Science and Technology Curriculum for the Middle School*

Satchwell and Loepp, *Journal of Industrial Teacher Education*, 2002

This article provides an in-depth look at the design, development and implementation of the Integrated Mathematics, Science and Technology curriculum project for middle schoolers.

*Developing and Implementing an Integrated, Problem-Based Engineering Technology Curriculum in an American Technical College System* (§)

Craft and Mack, *Community College Journal of Research and Practice*, 2001

Faculty at the South Carolina Advanced Technological Center of Excellence have developed a postsecondary curriculum integrating math and CTE.

*Embedding the Common Core State Standards or Other Rigorous Standards Into Academic, Career/Technical and Elective Courses* – Southern Regional Education Board, January 2013

[https://www.sreb.org/sites/main/files/file-attachments/13v01w\\_bestpractices\\_embeddingcommon.pdf?1461335407](https://www.sreb.org/sites/main/files/file-attachments/13v01w_bestpractices_embeddingcommon.pdf?1461335407)

This resource describes on-the-ground strategies for integrating academic standards into CTE courses.

*Recognizing Academic Achievement in Career/Technical Education: Conditions for Awarding Academic Credit* – Southern Regional Education Board, January 2012

[https://www.sreb.org/sites/main/files/file-attachments/12v16\\_recognizingacademiccredit.pdf](https://www.sreb.org/sites/main/files/file-attachments/12v16_recognizingacademiccredit.pdf)



This publication describes the conditions that need to be in place — and the obstacles to overcome — before moving forward to award academic credit for CTE course work.

*Capitalizing on Context: Curriculum Integration in Career and Technical Education* – National Research Center for CTE Curriculum Integration Workgroup, March 2010

<https://www.sreb.org/publication/capitalizing-context-curriculum-integration-career-and-technical-education>

This publication describes the process, findings and key principles of curriculum integration of two National Research Center for CTE projects: the Math-in-CTE model, in which CTE and math teachers partnered to develop math-enhanced CTE lessons, and the Authentic Literacy in CTE project. You can also access lesson plans, curriculum maps and other tools for implementing Math-in-CTE.

## Research

*Do Mathematics and Reading Competencies Integrated into Career and Technical Education Courses Improve High School Student State Assessment Scores? (\$)* – Pierce & Hernandez, Career and Technical Education Research, December 2014

<https://www.ingentaconnect.com/contentone/acter/cter/2015/00000039/00000003/art00003>

Quantitative analysis revealed that the integrated CTE courses were statistically significant in improving reading treatment group scores, but not statistically significant in improving mathematics treatment group scores.

*Oregon Applied Academics Project: Final Report* – Pearson, Richardson & Sawyer, National Research Center for CTE, December 2013

<https://www.sreb.org/publication/oregon-applied-academics-project-final-report>

This report describes the development and implementation of a technical math course with nine units that led to math skill gains and satisfaction from teachers and students.

### Academic Teacher Focused Resources

Tamur, M., Jehadus, E., Nendi, F., Mandur, K., Murni, V., 2020. Assessing the effectiveness of the contextual teaching and learning model on students' mathematical understanding ability: a meta-analysis study. *Journal of Physics: Conference Series* 1657, 012067. <https://doi.org/10.1088/1742-6596/1657/1/012067>



## CTE Teacher/Leader - Professional Learning Resources *(For Teacher/Leaders seeking improve knowledge and skills to facilitate integration)*

### CTE Leader Professional Learning

#### CTE Lessons - CTE Administrator

ACTE has developed four lessons for CTE administrators on the topic of Academic Integration organized around the topics of Collaborate, Orient, Relate, and Enhance. This series was created based on the Common Core State Standards but includes suggestions for leading teachers to work together on integration, regardless of specific academic standards.

<https://www.ctelearn.org/cte-lessons/cte-administrator>

CT304	Academic Integration Overview
CT305	Academic Integration: Collaboration
CT306	Academic Integration: Orient
CT307	Academic Integration: Relate
CT308	Academic Integration: Enhance

A companion publication for these administrator lessons on Academic Integration is the **CTE Administrators Handbook** (\$) published in 2019 by ACTE. Module 4, Supporting Academic Integration in CTE includes thought questions, worksheets and activities to support academic integration.

### Books

Conrad, M., & Watkins, L. (2022). *Curriculum Development & Design: In Career and Technical Education*. Association for Career and Technical Education. (\$)



<https://web.acteonline.org/itemdetail?ipproductcode=BCDDCTE>

Comprehensive text on curriculum development. It includes chapters on Academic Integration and Approaches for Integrated Learning.

## Leadership Tools

### **Atlas** (\$)

<https://www.onatlas.com>

Atlas is the leading curriculum development and lesson planning platform trusted by educators at over 6,000 schools and districts. Develop, review, refine, analyze and share standards-aligned curriculum and lessons, ensuring equitable learning outcomes for all students. Improve engagement with students, parents, teachers, and the community by sharing your curriculum to provide transparency and accountability.

### **eDoctrina** (\$)

<https://www.edoctrina.org/solutions/educator-suite/curriculum/>

eDoctrina's flipped curriculum mapping approach starts with building units of instruction and builds curriculum mapping reports around those units. Custom reports allow teachers to map out multiple subjects or multiple grade levels in a single report.

### **CTE and Academic Integration Self-assessment Rubric – CTE Technical Assistance Center of New York**

[https://nyctecenter.org/images/files/Academic\\_Integration/Academic\\_Integration\\_Rubric.pdf](https://nyctecenter.org/images/files/Academic_Integration/Academic_Integration_Rubric.pdf)

The CTE Technical Assistance Center of New York undertook a study of academic integration practices in 13 school districts and BOCES that sought to identify the level of integration of academics into CTE programming. The work resulted in a rubric for assessing academic integration in curriculum, instruction and other areas and additional related resources.

## CTE Teacher Professional Learning

CTE Lessons - C.O.R.E. Education ( series of lessons developed several years ago on connecting to Common Core Standards)

<https://www.ctelearn.org/cte-lessons/core-education>



CT501	Introduction to Common Core Standards
CT502	Common Core State Standards for English Language Arts
CT503	Common Core State Standards for Mathematics
CT504	The C.O.R.E. Process
CT505	The C.O.R.E Process: Collaborate
CT506	The C.O.R.E Process: Orient
CT507	The C.O.R.E Process: Relate
CT508	The C.O.R.E Process: Enhance

### Additional Credit courses in CTE Learn

ED134 - Literacy is Not an Option (\$)

## Curriculum and Programs *(For Teacher/Leaders seeking to adopt or replicate existing integration models)*

### Standards

**Integrating Disciplinary Core Ideas, the Agriculture, Food and Natural Resources Career Pathways and Next Generation Science Standards – Barrick, Heinert, Myers, Thoron & Stofer, Career and Technical Education Research, May 2018**

[https://www.researchgate.net/publication/325294110\\_Integrating\\_Disciplinary\\_Core\\_Ideas\\_the\\_Agriculture\\_Food\\_and\\_Natural\\_Resources\\_Career\\_Pathways\\_and\\_Next\\_Generation\\_Science\\_Standards](https://www.researchgate.net/publication/325294110_Integrating_Disciplinary_Core_Ideas_the_Agriculture_Food_and_Natural_Resources_Career_Pathways_and_Next_Generation_Science_Standards)

This study identified disciplinary core ideas for secondary school agriscience programs using a panel of experts in agricultural education, including a matrix of disciplinary core ideas;

\$ indicates cost for resource



Agriculture, Food and Natural Resources career pathways performance indicators; and Next Generation Science Standards performance expectations.

### **The Common Career Technical Core, Programs of Study and Industry-based Standards – Advance CTE, July 2014**

<https://careertech.org/sites/default/files/CCTC-IndustryStandards.pdf>

This report crosswalks the Common Career Technical Core standards developed by Advance CTE against 18 sets of industry-based standards to chart similarities and differences.

## Programs

### **Advanced Career Courses from SREB (\$)**

<https://www.sreb.org/post/advanced-career-curricula>

Co-designed with state leaders, postsecondary educators, employers and master teachers to meet workforce demand in high-tech STEM fields, SREB's Advanced Career curriculum helps students master readiness standards and cultivate the critical thinking, problem-solving, communication and applied academic skills employers value. All courses are taught in the context of a college-ready academic core.

### **CASE (Curriculum for Agricultural Science Education) (\$)**

<https://www.case4learning.org>

CASE is a branded rigorous curriculum for Agriculture and Natural Resources. All courses are cross referenced to related academics in Mathematics, Science and English Language Arts standards. The CASE curriculum now includes 10 year-long courses included in the four CASE Program of Study pathways. The most powerful aspect of CASE is the professional development designed to reinforce and assist the implementation of CASE curriculum. A teacher must successfully complete 50- to 100-hours of intense professional development per course they wish to implement.

### **Contextualized Learning Concepts (\$)**

<https://contextuallc.com>

Developed by teachers in Loveland Colorado offers two successful programs which combine academic knowledge with technical skills. [Geometry in Construction](#) combines home construction with Mathematics Geometry. [AMPED on Algebra](#) combines Manufacturing technology with Algebra. After completing week-long professional development, teachers have access to a kit of lessons and tools to replicate the programs.





## Teacher Lessons and Tools *(For Teachers seeking adopt or adapt instructional units in their own programs)*

### Lessons

#### Math-in-CTE Resources – National Research Center for CTE

<https://www.sreb.org/nrccte-math-cte-resources>

The NRCCTE has transitioned its scientifically based research study of Math-in-CTE into classroom practice with the Math-in-CTE curriculum integration professional development model. Learn more about the process of Math-in-CTE at their [website](#). Online resources published from this process include sample curriculum maps and lesson plans in the following CTE program areas.

- Architecture and Construction - Stair Construction
- Business - Compound Interest
- Finance - Double Declining Depreciation
- Health Science - Back to Basics
- Hospitality and Tourism: Culinary - Safety and Sanitation
- Hospitality and Tourism: Culinary - Costing
- Hospitality and Tourism: Culinary - Salads
- Information Technology - Photoshop Scale
- Manufacturing - Gas Metal Arc Welding (GMAW) Shielding Gas Mix
- Marketing - Break-Even Point
- STEM - Lou-Vee-Air Car
- Transportation, Distribution, and Logistics - Tire and Wheel Assemblies

#### Math T-Charts

<https://www.education.pa.gov/K-12/Career%20and%20Technical%20Education/Resources/Teacher%20Resources/MathTCharts/Pages/default.aspx>

Pennsylvania CTE has developed nearly 200 math lessons for various CTE Trade programs. T-charts “bridge the gap” between CTE and math and can be used by both math and CTE teachers. This resource consists of three components: a T-chart, a script, and practice problems. Each T-chart demonstrates how a CTE teacher teaches the concept covered by the Math Core Standard and how a math teacher teaches the same concept.

### Teacher Tools

\$ indicates cost for resource

Commented [1]: "skills" rather than "trade" ?

Commented [2]: Let's leave it Trade, I capitalized it. I took that right from PA website. The lessons are in several Trade programs and not all of CTE.



ASSOCIATION FOR  
CAREER & TECHNICAL  
EDUCATION®

**New and Related Services Division**  
Integration of Academics and Career and  
Technical Education Section

**The Lexile Career Database® (\$)**

<https://hub.lexile.com/lexile-career-database>

Metametrics Lexile identifies the reading demands of texts of materials needed for entry into the desired career. The database allows the selection of any of the 16 Career Clusters and specific SOC Job codes to reveal entry-level reading Lexile measure ranges, national and regional career information, and additional descriptions of the career. Use this convenient information with students to impress upon them the reading level they need for their chosen career. Lexile measures are the only metric available to compare and describe reading demands of various careers.