Six Strategies for Providing High-Quality High School Career/Technical Courses

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Session Objectives

- To review the six strategies for providing quality high school career/technical (CT) courses.
- To examine literacy activities that can be easily incorporated into current CT courses.
- To examine classroom CT activities which would highlight numeracy.
- To examine current standards, classroom activities and assessments.
Changes in Work

- Constant innovations
- The ability to create, analyze and transform and analyze information
- More jobs with higher skill requirements
What is needed in today’s workplace?

- Solve problems and be creative in meeting consumer demands for customization.
- Retrieve, organize and synthesize information into a plan.
- Apply algebra, geometry, and statistics.
- Read, understand and communicate in the language of the field.
- Understand technical concepts and principles.
- Understand, manage and use technology to complete projects.
- Construct written and oral responses.
New Mission for Career/Technical Studies

“To help students complete a program of study that prepares them for both employment and further study”
Purposes of Career/Technical Studies

- Increase academic achievement of all students.
- Ensure that students are technically literate.
- Ensure that students can continue to learn in a career and postsecondary education.
Impact of Career/Technical Courses that Integrate Academics

- Academics were integrated:
  - Reading: 57%
  - Mathematics: 69%
  - Science: 63%

- Less intensive academic integration:
  - Reading: 46%
  - Mathematics: 60%
  - Science: 53%

- Academics were not integrated:
  - Reading: 31%
  - Mathematics: 45%
  - Science: 39%
Six Suggested Strategies

- Establish high expectations.
- Align current standards.
- Focus on literacy in CT courses.
- Focus on numeracy in CT courses.
- Actively engage students.
- Revise current assessments.
Establish High Expectations
Actions That Reflect High Expectations

- Teachers clearly indicate the amount of work necessary to earn an A or B.
- Students are required to do meaningful homework.
- Students are required to revise work until it meets standards.
- Students are required to complete a project and make a presentation on it.

— *HSTW* Benchmarks for New and Maturing Sites
Additional Steps Schools Can Take

- Establish a homework policy.
- Establish an attendance policy.
- Benchmark assignments at the proficient or advanced level.
- Develop course syllabi to communicate expectations.
- Develop common end-of-course exams.
Why Use a Course Syllabus?

- Map for planning
- Opportunity to reflect on a whole course
- Communication of expectations to students, parents, community
- Communication with other teachers or programs in the school
Components of a Course Syllabus

- Course description
- Instructional philosophy
- Major course goals
- Major course projects and instructional activities
- Course assessment plan
Align Current Standards
Aligning Standards

- Align all CT courses with local, state and national industry skill standards.
- Ensure that goals and objectives for all CT courses are clear and student-centered.
Aligning Standards

- Have CT instructors collaborate with external experts to ensure the quality of the program.
  - Local postsecondary representatives
  - Local/state business representatives
  - National industry representatives
Aligning Standards

- CT instructors can also use industry certification exams and postsecondary exams as a tool for measuring student progress.
Focus on Literacy in the CT Classroom
Technical Literacy

- Understand technical concepts and principles.
- Read, understand, and communicate in the language of the field.
- Apply mathematical knowledge, skills and reasoning.
- Use technology to complete projects.
A System of Assignments: Daily

- Directed reading and thinking activity
- GIST
- Two-column notes
Directed Reading and Thinking Activity (DRTA)

- Preview.
- Discuss what you know.
- Write questions.
- Read to find answers.
- Reflect on the reading.
GIST

- Divide the passage.
- Put 20 blanks on the board.
- Read and write a 20-word summary.
- Put 20 more blanks on the board.
- Read and write a 20-word summary of the first two sections.
- Repeat until a summary is written for the entire passage.
Cornell Two-Column Notes
Rationale

- They provide study skills strategy.
- Good notes are a product of good reading.
- They help students organize and prioritize their reading.
- Research indicates that a good set of notes is significant in academic success.
## Cornell Two-Column Notes

| Prepare          | -Determine background knowledge.  
|                  | -Build background knowledge.      |
| Assist           | -Read with purpose.               |
|                  | -Develop comprehension.           |
| Reflect          | -Determine comprehension.         |
|                  | -Develop comprehension.           |
A System of Assignments: Weekly

- Vocabulary blocks
- Lab journals
- Writing assignments
- Mathematics problems
# Vocabulary Blocks

<table>
<thead>
<tr>
<th>Definition:</th>
<th>In Own Words:</th>
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<table>
<thead>
<tr>
<th>Picture or Symbol:</th>
<th>Ways I’ve Used This Word:</th>
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Lab Journals

- What happened?
- What was learned?
- Prompts
- Criteria for entries
Memo Format Criteria

- Heading: To, From, Subject, Date
- Text balanced
- Appropriate fonts, bold, italics
- Text appropriately organized
- Use of bullets, numbering, headings
- Spelling, grammar, punctuation
Bid for Services Format

- Description of services
- Materials list
- Detailed description of process
- Written guarantee
A System of Assignments: Monthly

- Professional Journal Articles
  - Have students select.
  - Alternate oral and written reports.
  - Use rubrics.
  - Post excellent work.
Focus on Numeracy in the CT Classroom
Numeracy in the CT Classroom

To enhance the mathematical content of CT courses, school leaders can:

- Provide joint planning time for mathematics and CT instructors.
- Provide professional development for CT instructors on mathematics.
- Help CT instructors develop a system of authentic mathematics assignments in their career area.
Authentic Mathematics Assignments

- Providing students with a scenario from their career field and asking them which mathematics skills will help them solve it.
- Demonstrating how mental estimation skills can help to determine reasonableness of a solution.
- Designating days that students can/cannot use calculators.
- Requiring students to explain mathematics skills that they used to solve a problem.
Authentic Mathematics Assignments

- Highlighting a mathematical skill that is used in the classroom and requiring homework to reinforce the skill.
- Requiring students to solve mathematics problems as a team.
- Requiring students to pass a major exam in mathematics for each career course.
Mathematics Problems

- Work with mathematics teachers.
- Develop mathematics problems for units of study.
- Assemble a resource notebook.
Quadratic Functions

Calculating Quadratic Functions
Vertex: \((-b/2a, f(-b/2a))\)
The parabola opens upward if “a” is positive.
The parabola opens downward if “a” is negative.

Problem:
Calculate the vertex and graph the following function:
\(f(x) = -4x^2 + 400x\)
Maximizing revenue occurs when the vertex of the function is calculated:
Vertex: \((-\frac{b}{2a}, f(-\frac{b}{2a}))\)

The parabola opens downward if “a” is negative, which means the function will maximize revenue.

Problem: A manufacturer of clothes dryers has found that when the unit price is \(p\) dollars, the revenue \(R\) (in dollars) is:
\[ R = -4p^2 + 400p \]
Calculate the maximum revenue using the vertex of a parabola method.
Maximizing area occurs when the vertex of the function is calculated:

Vertex: \((-\frac{b}{2a}, f(-\frac{b}{2a}))\)

The parabola opens downward if “a” is negative, which means the function will maximize area.

Problem: A Norman window has the shape of a rectangle surmounted by a semicircle of diameter equal to the width of the rectangle. If the perimeter of the window is 20 feet, what dimensions will admit the most light (maximize the area)?
Agricultural Example

Maximizing area occurs when the vertex of the function is calculated:
Vertex: \((-\frac{b}{2a}, f(-\frac{b}{2a}))\)
The parabola opens downward if “a” is negative, which means the function will maximize area.

Problem: A farmer with 2000 meters of fencing wants to enclose a rectangular plot that borders on a straight highway. If the farmer does not fence the side along the highway, what is the largest area that can be enclosed?
American Diploma Project

For additional ideas, visit the American Diploma Project Web site.

- Core subject area benchmarks
- Sample workplace tasks

http://www.achieve.org/

(Select for full report on ADP.)
Actively Engage Students
Active Engagement

- Use reading and writing strategies.
- Design open-ended questions for which there is no obvious solution.
- Use cooperative learning opportunities to deepen understanding.
- Use project-based learning activities.
- Use computer assisted assignments and research.
- Use class discussions about content covered.
Active Engagement

- Use exploration activities often.
- Use technology weekly to complete an assignment.
  - PowerPoint presentations
  - Word for written assignments
  - Excel spreadsheets
  - Internet search engines for research
- Create integrated and interdisciplinary lessons/projects.
  - Work with other teachers to highlight core standards.
Active Engagement

• Always focus on communication skills:
  • Written
  • Oral
  • Comprehension
Revise Current Assessments
Current Assessments in Career/Technical Classrooms

Used More Frequently:
- Projects
- Observation
- Attendance

Used Less Frequently:
- External employer exams
- Homework
- Portfolios of student work
- Objective tests
STOP

- Limiting to observations and lab projects
- Limiting to “employability”
- No comprehensive exam
- Sloppy work

START

- Expanding tests, portfolios, homework, employer exams
- Adding reports and research
- Comprehensive exam
- Redoing work until it meets standards
End-of-Course Exams

- A written comprehensive exam
  - Includes literacy objectives
  - Includes numeracy objectives
- An oral exam
- An open-ended project
Industry Certification Exams

- Outline expected participation in course syllabi.
- Use as a tool to promote enrollment.
- Celebrate your students’ success.
  - Graduation
  - Newspapers/newsletters
# How to Create a Bank of Exam Items

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<thead>
<tr>
<th>Power Standard</th>
<th>Type of Items</th>
<th>Number of Items and Percentage of Total Exam</th>
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Developing Items

- Begin with standards.
- Decide on type of question.
- Write a model answer.
- Develop guidelines for scoring.
Always Remember…

“Students will need to apply academic skills and theories to the problems they will encounter in the real world. CT education must create opportunities for students to learn in real-world contexts and expose students to the wide range of career paths available to them.”

— Standards Set Benchmarks for Career/Technical Educators, HSTW Update on CT Education by Dr. Gene Bottoms
For Additional Information

Please review our extensive list of publications for *High Schools That Work* at our Web site: [www.sreb.org](http://www.sreb.org)
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